

Index to Telegraph and Telephone Age

JANUARY 1 TO DECEMBER 16, 1910

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Directory of Annual Meetings.

Association of Railway Telegraph Superintendents meets at Boston, Mass., June 19-23, 1911.

Commercial Cable Company meets the first Monday in March, at New York.

Great North Western Telegraph Company meets the last Wednesday in September, at Toronto, Ont.

International Association of Municipal Electricians meets at St. Paul, Minn., 1911. Date to be named later.

Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, will meet at Atlantic City, N. J., 1911. Date to be selected later.

Postal Telegraph-Cable Company meets the fourth Tuesday in February, at New York.

Telegraphers' Mutual Benefit Association meets the third Wednesday in November, at New York.

Train Despatchers Association meets in Baltimore, Md. June 20, 1911.

The stockholders of the Western Union Telegraph Company meet the second Wednesday in October, at New York; election of officers occurs on the third Wednesday in October.

Telegraph and Telephone Age

No. 1.

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Twenty-seventh Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Questions and Answers.

Question: What do the figures 4, 8, 16, 32, and 40, respectively, on the brass bar of condensers signify? I notice that the same combination or groups appear on all multiplex condensers, regardless of size.

Answer: The figure or figures immediately over each hole in the brass bar indicates the percentage of the condenser's full capacity that may be placed in commission by inserting a metal plug therein. It will be seen that the sum of the respective groups of figures is 100, which represents 100 per cent of the condenser's capacity regardless of its size. When all holes are utilized the full capacity is in commission.

Question: Why is it necessary to use four ohm sounders on multiplex apparatus in an office where fifty ohm sounders are used with the relays on all the single line circuits? Why not install one uniform winding for all?

Answer: It is necessary to use low wound sounders on duplex and quadruplex apparatus in order that when a loop is cut in its resistance will not be great enough to decrease the strength of the local current sufficiently to interfere with the operation of the loop. The sounders in branch offices on duplex loops are also four ohm instruments placed in series with others in the conductor of what is called a "built-up" loop. If the sounder on a multiplex set was wound to fifty ohms, its connection in series with the four ohm sounders on the loop would add so much resistance to such loop that the local current would be too feeble to operate the branch office sounders properly. On the other hand, if fifty ohm sounders were made the standard type for both multiplexes and branch office loops it would require a much greater expenditure of electrical energy than the present method to maintain the local battery as well as require many alterations in the system.

The most important reason, however, for preferring four ohm sounders in built-up loops is that the lower the resistance of the sounders the less will be the alteration in the volume of current flowing in the loop when a branch office cuts out his instrument temporarily. The removal of a 50 ohm sounder would obviously make a great difference.

Question: Which type of quadruplex apparatus and battery equipment do you consider the most efficient in extremely wet weather, the old gravity battery arrangement, or the dynamo and proportion box outfit?

Answer: For a given conductor with other conditions equal, the gravity battery equipment, if in good condition, should certainly give the best service. Not that the chemical battery current itself is necessarily more steady or effective than that mechanically generated, but principally because of the mechanical construction of the pole-changer employed which minimizes the period of "no magnetism." Where the walking-beam pattern of pole-changer is used, as is required in the dynamo arrangement, the duration of the period of break is actually increased during wet weather

owing to the then greater volume of current prohibiting a close adjustment of contact points of that apparatus.

It must not be understood, however, that for year in and year out service the gravity equipment is preferable. For reliability and constant service the dynamo is undoubtedly the superior method of the two. Gravity batteries require a great deal of attention and offer innumerable opportunities for openings at the binding posts of one or more of the many jars, not to mention high resistance due to evaporation of the liquid, imperfect contact and other ills such batteries are subject to.

Question: What is an enclosed arc light, and what advantage, if any, has it over the open arc method?

Answer: A closed arc light is one in which the carbons are enclosed within an air-tight globe, which latter is itself enclosed in a larger globe open at the top and bottom. In the open arc ordinary arc light carbons are burned in the open air, being merely enclosed within a large open globe for protection.

The advantages derived by the enclosed over the open arc lamp are that they not only usually give out a somewhat steadier light but the life of the carbons themselves is greatly prolonged by being thus shut off from the oxygen of the air.

It is also claimed that enclosed arc lamps give out a greater candle power in a useful direction, that is to say, downward, than the open arc method with the same watt expenditure.

Each type of lamp requires practically the same number of watts, yet the enclosed arc light burns with but half the volume of current required by the open arc type, but requires an electromotive force twice as great.

watt and a watt-hour? Also between an ampere watt and a watt hour? Also between an ampere and an ampere-hour?

Answer: A watt, or an ampere merely represents the expenditure of one unit of electrical power, or current volume, respectively, without any reference to the length of time such energy is maintained. In order to calculate the maintenance of expenditures of electrical energy, charges for the same are usually based on a certain rate per hour. Hence we get the terms watt-hour and ampere-hour.

A watt-hour represents the continued exertion of one watt of electrical energy for a period of one hour. In like manner one ampere-hour means the maintenance of one ampere of electric current for one hour.

Question: What advantage is derived by running two dynamos in parallel, and how are they connected together?

Answer: The benefit derived by coupling two generators possessing identical voltages together in this manner lies in being thereby able to deliver a greater volume of current during certain active periods of the day or night, as the demand may require, than either machine singly could

supply. Each machine connected in parallel adds its own current capacity to that of its companion or companions, and thus increases the possible output in the same manner as when two or more storage battery cells are coupled for a greater quantity.

Two or more generators in parallel are preferred to one large machine possessing a capacity equal to the combined capacities of those in parallel, for the reason that while the load is light the machines not required may be disconnected and the demand still supplied by a comparatively small generator.

Recent Telegraph and Telephone Patents.

A patent, No. 941,839, for a telephone exchange system has been secured by Charles L. Zahm, of Los Angeles, Cal.

A patent, No. 942,208, for duplex cable telegraphy has been secured by Isidor Kitsee, of Philadelphia, Pa. A duplex telegraph in which the receiver includes a transformer with the primary in the line, a receiving instrument controlled by the transformer secondary and a third winding on the transformer for neutralizing the effect of the impulses in the transformer secondary.

A patent, No. 942,332, for an electrical conductor has been awarded to I. Kitsee, of Philadelphia, Pa. For telephone currents and the like, comprising conductively independent conductors arranged together, the resistance of the conductors being half of that between the conductors, and the mutual capacity twice that of the absolute capacity of the conductors.

A patent, No. 942,620, for electric telegraphy has been taken out by J. A. L. Dearlove, of London, Eng. For duplexing cables in which the artificial cable is made independent of variations in temperature. The cable is in strip form, having a negligible temperature coefficient, a series of inducing sheets attached thereto, earth plates and dielectric arranged between the conducting and inducing sheets.

A patent, No. 942,807, for telegraphic repeating apparatus has been issued to W. F. Athearn, of New York. A telegraph repeater with two sections, each comprising a pole changer, a polar relay operable by the pole changer with one section, a neutral relay controlled by the pole relay, extra contacts upon the pole changer and a repeating sounder controlled by the contact and controlling the neutral relay.

A patent, No. 942,814, for a multiple-telegraph has been granted to S. D. Field, of Stockbridge, Mass. Main and artificial lines, a differentially wound relay with one winding in the main line and the other in the artificial line and the other relay with the coils in the main and artificial lines in bridge relation with the first relay and with an inductive capacity greater than the main line and artificial line coils of the first relay.

A patent, No. 942,815, for a relay has been awarded to S. D. Field, of Stockbridge, Mass. For multiplex telegraphs. Has a movable arma-

ture, a main electromagnet and a holding electromagnet therefor and an auxiliary electromagnet acting in the same direction as the holding magnet.

A patent, No. 942,844, for an automatic telegraph has been secured by L. M. Potts, of Baltimore, Md. Page printing telegraph, in which the sending form consists of a sheet of paper carrying perforations and the transmitter is a polarized relay and segmental ring forming a sending commutator, the brushes being driven by a motor. The receiving circuit includes a main relay and receiving commutator, and controls printing magnets.

A patent, No. 943,115, for a selective signaling apparatus, has been secured by O. M. Leich, of Rochester, N. Y. Supplies currents of different frequency, each to a substation and uses a selective signaling apparatus responsive to alternating-current of a given frequency, and also a second signaling apparatus with a non-resonant path and a serial impedance to cause a selective operation between the frequencies.

The following patents have expired:—

A patent, No. 486,051, for a telegraph sounder held by James Maret, of Mount Vernon, Ky., and William L. De Graff, of Homer, Mich.

A patent, No. 487,154, for telegraphic apparatus held by Josiah A. Parker, of St. Louis, Mo.

Patents, Nos. 487,981, 487,982, 487,983, 487,984 and 487,986, for a printing telegraph, held by the estate of Chas. L. Buckingham, New York.

Patent, No. 487,984, for a synchronous multiple-telegraph, held by the estate of Chas. L. Buckingham, New York.

Investigation of Telephone and Telegraph Companies in New York.

The special committee appointed by the New York State Legislature to investigate the telegraph and telephone companies in the State to determine whether they should be placed under the supervision of the Public Service Commission, which began looking into conditions in Greater New York and vicinity December 1, has held several sessions during the past two weeks. Since taking the testimony of Theodore N. Vail, president of the American Telephone and Telegraph Company, which appeared in part in our issue of December 16, a large part of the time has been spent in examining the officials of the Postal Telegraph-Cable Company. Mr. Theodore L. Cuyler, assistant treasurer of the company, was a witness before the committee on several occasions, answering questions in regard to the various companies comprising the Postal system.

Mr. Edward J. Nally, vice-president and general manager was also examined in regard to rates charged by his company and other matters pertaining to operating conditions. In regard to the

organization of the Postal system Mr. Nally said that the Postal Company of Connecticut acts as a holding company of practically all of the forty-one Postal subsidiaries. It, in turn, is owned by the Commercial Cable Company, a majority of the stock of which is held by the Mackay Companies, a Massachusetts business corporation.

Being asked what he knew about a suggested community of interests existing between the Western Union and the Postal, Mr. Nally said:

"I do not know exactly what you mean by community of interest. But I do know that there is the hottest sort of competition between the Western Union and the Postal. This hair of mine is gray—what there is of it. What of it is gone, is gone because of the strife and effort of that competition. Never, I believe, was there a hotter fight in the way of business competition than has existed between the Western Union and the Postal.

"To me the whole thing has resolved itself into a point of service. There is little sentiment among the people. They will not take the Postal service simply because that company is fighting another. They go, and go only, where they can get the best and quickest service. They want good service, and if our company can give better service than another, we get the business."

"You make quicker deliveries than other companies?"

"Yes."

"To what extent have you succeeded?"

"I feel secure in saying that no such excellent service was ever given before in the world as is put up by the Postal today," said Mr. Nally, proceeding to relate how the Postal, at a large expense, during the past summer has instituted a special rush service for the large cities. He read several letters from users of the wires, voluntary contributions, he said, testifying to the good work done. No extra charge is made for this service, although it costs the company much money. Mr. Nally said that, as a whole, the Postal companies were prosperous ventures, but some of the constituent corporations individually had lost money, particularly in the West.

"What do you think of public or governmental control of public service corporations?"

"Proper control is not bad."

"Well, good or bad control is a matter of adjustment. What do you think of control?"

"We are not opposed to it."

"There has been talk of a merger between the Western Union and the Postal. If your company were to absorb the Western Union, could you use their equipment?"

"All of it that is fit. I think the Western Union is a pretty good company."

"Could the Western Union use the Postal equipment?"

"Yes; I can testify to that."

Mr. Nally said that about 80 per cent. of the telegraph business of the country was competitive business, and that his company and the West-

ern Union split the competitive business practically in half.

"You say your company operates along the right of way of the Pennsylvania Railroad in the East. Do you plan extensions along other railroad lines?"

"We do not want the railroad business. Railroad service is too exacting. The railroad companies want both ends and the middle. I think the present condition of the Western Union is due to the unprofitable railroad business they carry."

"Do you not consider your Pennsylvania Railroad contract a profitable one?"

"I do not. It is impossible to divide the income so that one can tell that with any degree of accuracy. Our feeling, however, is that it is not a profitable business."

Upon being asked the reason for the raising of telegraph rates two years ago Mr. Nally said:

"Everything went up in price and we had to raise our prices, too. We even had to pay the messenger boys more. Usually they make from \$25 to \$35 a month. Years ago, when I worked as a messenger, we made only \$13 a month. The boys are paid by piece, a cent and a half or two cents for each message delivered. We offer them two cents each for 'pick-up' messages—that is, those they get in answer to messages delivered."

Mr. Nally could give no idea of the improvement of gross income from the increase in rates, nor could he tell from a percentage basis exactly what it aggregated. In New York State, out of 7,138 Postal rates in effect among various offices, 3,957 were raised from twenty-five cents to thirty-five cents, and 3,141 were left unchanged. Rates to offices within 150 miles of one another were left at the twenty-five cent figure, generally speaking.

In answer to the question as to whether there was not an understanding between the companies in regard to rates Mr. Nally said:

"It is true that there is an understanding as to rates, but this does not in any sense mean that the companies are working together. If there were no standard of rates one company would get all the business and the other would die. It is exactly the same as the New York Central Railroad and the Pennsylvania Railroad charging the same fare from New York to Chicago.

"I can cite you an instance showing the practical application of this matter of rates. One of the Southern States passed a law compelling the Western Union to give a rate of fifteen cents for messages everywhere in the State. They thought the Postal, being a new company, should have some encouragement. The State authorities consented to the Postal charging twenty cents. We figured it out and decided we would not take advantage of the opportunity. We said we would rather charge fifteen cents, the same as the Western Union, than have the Western Union take all of the business. The Western Union would

probably have been willing to adopt the fifteen-cent rate, so as to monopolize the business, although my experience has shown that a fifteen-cent rate is profitless."

Mr. E. J. Page, counsel for the committee, asked how much it was necessary to charge for the telegraph companies to make a profit, and Mr. Nally replied, that at a twenty-five-cent rate the profit, generally, would not be over one cent on a message of ten words. He declared that in Brooklyn, with a twenty-five-cent rate, the Postal lost \$4,518 in 1907 and \$849 in 1908, and this did not take into account depreciation of wires and plant. He thought the company lost money on messages sent and delivered to Manhattan, but that on messages originating in Manhattan and going outside the State there was a substantial profit.

Mr. Nally informed the committee that in messages sent from Postal stations to towns where the Postal has no stations the Western Union, which delivers the messages from the nearest Postal office, charges such high rates that the Postal frequently loses on the transaction. Sometimes the loss is two cents and sometimes more. The Western Union, he said, always charges the full local rate, and this, with additional words placed in the messages in transfers, for which the Postal has to pay, often raises the total above the amount the Postal charges its customer. He considered this an unfair advantage on the part of the Western Union.

Personal.

James L. Rand has been appointed correspondent of the Associated Press in Boston, succeeding S. M. Barber, resigned. He will have charge of the assembling and distribution of news for that association in all the New England states, except Connecticut, in the Maritime Provinces of Canada and Newfoundland.

Mr. Stephen C. Mason, who entered the telegraph service in 1850, and who held many official positions in the service of the Western Union Company at Chicago and elsewhere, but who retired from active service about three years ago and is now living in Lockport, Ill., celebrated the golden anniversary of his wedding December 7. Among the presents received were fifty "American Beauty" roses from telegraph friends in Chicago.

Mr. Percy W. Miller, of the Kerite Insulated Wire and Cable Company, New York, and Mr. Frank R. Whall, of C. F. Whall and Company, of Boston, were passengers on the Southern Railway train which was wrecked near Greensboro, N. C., on December 15. Both gentlemen were considerably bruised and had a miraculous escape from death. The car in which they were sleeping plunged off a high trestle into a creek and the passengers who escaped had to climb through a broken window.

Mr. Francis W. Jones, formerly electrical engineer of the Postal Telegraph-Cable Company, who retired two years ago is, with his wife, spending the winter at West Palm Beach, Florida.

Major Walter A. J. O'Meara, chief engineer of the British Post Office Telegraphs, sailed for England December 22 on the Mauretania, after a stay of three months in this country. Part of Major O'Meara's time while here has been spent in investigating the telegraph and telephone systems and the remainder in traveling in the West for the benefit of his health.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Colonel Robert C. Clowry, president and general manager, spent the Christmas holidays with friends in Trenton, N. J.

Mr. George J. Gould and son Jay were passengers upon the train upon the Southern Railway which was wrecked December 15. Although several persons were killed and many injured, both Mr. Gould and his son escaped without injury.

Mr. C. R. Tilghman, of the electrical engineer's office, who installs the ticker service for the company in the different cities, was a recent New York visitor.

The annual meeting of the Eastern Telegraph Company was held at Portland, Me., on December 15. The following directors were chosen: R. C. Clowry, B. Brooks, J. B. Van Every, G. W. E. Atkins, of New York; C. F. Ames, of Boston; Hon. Frederick Robie, of Gorham, Mass.; H. H. White, of Portland. The directors elected Hon. Frederick Robie president and H. H. White clerk.

RESIGNATIONS AND APPOINTMENTS.

Mr. S. P. Jones, district inspector, has been appointed manager at Houston, Texas, vice Mr. C. W. Gribble. Mr. W. Y. Nolley has been appointed to succeed Mr. Jones.

Mr. J. W. Sharman has been appointed manager at Alexandria, La., vice Mr. J. G. Hamilton, resigned on account of ill health.

Mr. Kenneth Stiles, formerly of Chicago, has been appointed manager at Monroe, La., vice Mr. Eugene Stamard, resigned.

Mr. Thomas Atkinson has been appointed manager of the office at Springfield, Mass., vice B. A. Cratsly.

Postal Telegraph Cable Company.

EXECUTIVE OFFICES.

Mr. W. D. Francis, superintendent of supplies, has returned from an extended business trip to California and Oregon.

Among recent executive office visitors were Mr. T. W. Carroll, general superintendent, and Mr. C. M. Baker, superintendent of construction, Chicago.

Handsome new branch offices have been opened in San Francisco in the Palace Hotel and in the Mining Exchange.

A new and enlarged office at Tacoma, Wash., is now being arranged for.

A special blank for greeting purposes was distributed by the company during the holidays. The blanks have an attractive heading with a wreath of holly and the words "Merry Christmas and Happy New Year."

On the afternoon of the day before Christmas, the officers and employes of the company, to the number of over one hundred, enjoyed a Christmas entertainment in the reception room, on the tenth floor of the building. The room was suitably decorated for the occasion, with Christmas bells and festoons of red and green.

The effect of the table decoration was a field of snow, on which were arranged tiny Christmas trees and toys of various kinds, and at one end a huge snowball, in the hollow of which were favors for every one present, each one accompanied by a line or two of a humorous nature touching on the characteristics of the person for whom they were intended.

Mr. G. W. Fleming, of the office of the superintendent of traffic, impersonated Santa Claus, and in a happy manner, reading aloud the inscriptions on the tags, presented the favors.

Refreshments were served by Mr. Howlett, the restaurateur.

The affair was in the nature of a surprise to those assembled, being arranged and carried out by Miss T. N. Brown, of the office of the vice-president and general manager, who was ably assisted by Miss Benz, Miss Vivian, Mr. T. E. Fleming, Mr. F. E. d'Humy, Mr. J. H. Flood, Mr. G. W. Fleming and Mr. F. H. Hollenbeck.

Invitations of a mysterious nature, which had been furnished with the compliments of Superintendent Smith, of the Tariff Bureau, had been issued some days before, and all were on the quiver to know what was really going to happen.

The entire force was represented, from the president to the Messenger Department. Greetings were exchanged, toasts were given to Mr. Mackay, Mr. Nally and others present, and a rousing vote of thanks was tendered to the ladies who so admirably carried out the splendid affair. It was altogether a happy and enjoyable occasion, and a general good time was participated in by all.

RESIGNATIONS AND APPOINTMENTS.

Mr. L. L. Apperson has been appointed chief operator at New Orleans, vice E. E. Cord, deceased. Mr. S. W. Harvey has been appointed chief operator at Mobile, vice Mr. Apperson.

District Foreman J. F. Heard has been transferred to the office of J. P. Edwards, division electrical engineer, Atlanta, Ga.

The Cable.

The twenty-fifth anniversary of the establishment of the Commercial Cable Company was appropriately celebrated on December 23 by Mr. Clarence H. Mackay, president of the company, inviting all of the officials and heads of departments and employees and their families to a theatre party at the New Theatre, of which Mr. Mackay is one of the founders and vice-president. Among those present besides Mr. Mackay were Mr. George Gray Ward, vice-president and general manager, Mr. George Clapperton, traffic manager, Mr. S. S. Dickinson, general superintendent, Mr. Albert Beck, secretary, Mr. E. C. Platt, treasurer, all of the Commercial Cable Company, and Mr. Edward J. Nally, vice-president and general manager, Mr. Charles C. Adams, second vice-president, Mr. Charles P. Bruch, third vice-president, and Colonel A. B. Chandler, chairman of the Board of Directors of the Postal Telegraph-Cable Company. The performance of "The Nigger" was thoroughly enjoyed by the four hundred cable and telegraph people present.

President Mackay, on December 27, was to give a banquet in the spacious dining hall of the Hardware Club, which occupies the top floors at 253 Broadway. This, however, was postponed on account of the death of Dumont Clarke, a director of the Commercial Cable Company.

Dumont Clarke died December 26 at his home in Dumont, N. J., aged sixty-nine years. Mr. Clarke was president of the American Exchange National Bank of New York, and one of the foremost financiers in the metropolis. He was a director of the Commercial Cable Company and a trustee of the Mackay companies.

Dominion Government Telegraphs.

The report of the Public Works Department of the Dominion of Canada for the year ended March 31, 1909, shows that the amount expended on Government telegraph lines was \$434,845.18, and the receipts \$113,175.34. The system now embraces 6,973.75 miles of land lines and 259 knots of cables. There are 401 offices, at which were received and despatched 149,649 messages. The fact that signal service messages, meteorological service messages and reports and fisheries bulletins are handled free of charge accounts in a measure for the large deficit. There was constructed during the year an extension of the Eskasoni branch line on Cape Breton Island, N. S., to the Grand Narrows, sixteen miles. The Grand River branch to Enon, also on Cape Breton Island, was extended twelve miles towards Victoria Bridge, and it is proposed to extend this line to Gaberous. In Quebec, the Chicoutini-St. Charles line was extended to Peribonka, a distance of thirty-eight miles. In Alberta, a line is under construction, from Athabasca Landing, for 70 miles toward Peace River. Contracts for the supply of poles and material for the extension of this line for 100 miles have been awarded.

Municipal Electricians

Mr. Frank P. Foster, of Corning, N. Y., secretary of the International Association of Municipal Electricians, has been suffering from an attack of erysipelas for the past month, but is now convalescent.

Considerable dissatisfaction is being expressed in Los Angeles over the award of a contract for fire alarm and police telegraph apparatus in that city for about \$30,000 to the Cregier Signal Company of Chicago. Politics alone determined the award of the contract to this company which has never installed a similar system, and the head of which is usually occupied as the leader of an orchestra. Several reliable concerns submitted bids for the apparatus, and the opinion of a board of experts which condemned the Cregier system absolutely was entirely disregarded. The Insurance Press in commenting upon the award says:

"To say the least it is amusing that a violin player, the manager of a humble orchestra, should work part of the time as the promotor of a system for transmitting fire alarms. Possibly, the Cregier orchestra could be hired for grand opera with as much propriety and regard for the fitness of things as the Cregier system of fire telegraph could be installed in any self-respecting city, desiring the best apparatus."

Counting Code Words in Canada.

After the telegraph companies in Canada gave notice to the public that an amendment to the rule concerning the counting of code words would be put into effect on December 1, an appeal was made by the Canadian Manufacturers Association of Toronto to the Board of Railway Commissioners, for Canada, to disallow the amendment. An order was therefore immediately issued by the Board to the telegraph companies restraining them from putting the amendment into effect until judgment had been rendered by the Board after hearing evidence, December 21 being selected as the date on which the case would be tried. Owing to a number of other cases taking precedence, the matter did not come up until December 22, when the Board thoroughly went into the subject, occupying over three hours with the case. After hearing evidence from both sides, judgment was finally rendered authorizing the amendment to the rule, but stipulating that between offices in Canada it should not go into effect until July, 1910. This delay was made to give those having cipher codes a chance to make alterations if they so desired, the complainants having objected that many of their codes would be seriously affected.

The amendment was the same as that put into operation in the United States by both the Postal and Western Union Telegraph Companies on December 1, by which arbitrary combinations of letters will be charged for at the rate of five letters per word instead of ten as heretofore.

At the hearing of the case there were present on behalf of the Canadian Pacific Railroad E. W. Beatty, solicitor of the company, James Kent, manager of the telegraph department, and W. J. Camp, electrical engineer. Representing the Great North Western Telegraph Company was G. D. Perry, secretary-treasurer, and representing the Western Union Telegraph Company was D. C. Dawson, superintendent at St. John, N. B.

H. P. Dwight Eighty-One Years Old.

On December 23 Mr. H. P. Dwight, of Toronto, president of the Great North Western Telegraph Company, celebrated his eighty-first birthday. Mr. Dwight has been a resident of Toronto for nearly sixty years and is one of the most popular and best-known men in that city, as well as in the Dominion. He is especially active, alert and clear-headed for a man of his age and is just as much interested as ever in the affairs of every-day life, and always has a cordial greeting for his friends. He was the recipient upon his birthday of many congratulatory messages from leading and distinguished men throughout the country who united in wishing him many more birthdays.

Purchase of Independent Telephone Lines by J. P. Morgan and Company.

One of the most important developments in the independent telephone situation in the middle west occurred December 15 when it was announced that J. Pierpont Morgan and Company, New York, had secured a controlling interest in the United States Telephone Company and the Cuyahoga Telephone Company. The former company covers Ohio and a part of Michigan and has long distance connections in Buffalo, Pittsburg, Indianapolis and Detroit. The Cuyahoga company operates in Cleveland. On December 17 further announcement was made that the same interests had secured a majority of the stocks of the Toledo Home Telephone Company, the Citizens' Telephone Company of Columbus, the Indianapolis Telephone Company, the New Long Distance Telephone Company, of Indiana, and the New Telephone Company of Indianapolis.

The system thus acquired embraces 101,500 telephones and 40,000 miles of long-distance lines, covering Ohio, Indiana, and Michigan.

The companies have an aggregate capitalization of \$12,500,000 bonds, \$4,500,000 preferred stock, and \$11,000,000 common. The actual value of the physical property is estimated at \$23,000,000. Morgan and Company are said to have paid approximately \$10,000,000 for their holdings.

Because of the relations existing between the American Telephone and Telegraph Company and Morgan and Company, it was at once rumored that the purchase had been made with the idea of turning the properties over to the Bell interests. A letter, however, addressed by Mr. Clarence Brown, general counsel for the independents to the presidents of the various companies, does not

confirm this view of the situation. The letter reads in part:

"I am authorized by J. P. Morgan and Company to advise that while they do not wish to dictate to the officers and directors of the company, they would like you and them to be advised as to their views concerning the proper policy to be pursued in the interest of all stockholders and of the public.

"In their opinion, the business should be conducted precisely as it has been in the past, in reference to the construction, maintenance and operation of the property, with a view to securing the best possible results for the stockholders consistent with the duty which the company owes to its patrons and the public.

"The properties should be not only fully maintained, but improved and developed as business warrants. Nothing should be done to impair their earnings or securities."

A representative of J. P. Morgan and Company has also confirmed Mr. Brown's statement, saying: "The stock has been purchased by the firm for its own account, and the lines are to be operated as heretofore, as far as I know. They have always been in competition with the Bell system, and the information I have does not lead me to believe they will be operated otherwise in the future. We have been in communication with Mr. Clarence Brown, and the statement given out by him is authorized."

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, when questioned in regard to the matter said: "The Morgan firm was not acting for our company. It saw a good chance to get the stock cheap and took advantage of it. Indeed, we had been offered a chance to acquire the companies, but were prevented under the law from doing so. The companies have been competitors of the Bell, and doubtless will continue to be. I hardly think they will constitute the basis of a rival combination. Even Mr. Morgan, I think, would hesitate to attempt the founding of a telephone system, calculated to rival the Bell in extent."

It is likely that an investigation of the sale will be made by the State authorities of Ohio.

A resolution has been introduced in Congress by Representative Hitchcock of Nebraska, directing the Secretary of Commerce and Labor to have the Bureau of Corporations prepare for Congress a statement of the physical valuation of the telegraph, telephone and cable lines and other tangible property belonging to the Western Union Telegraph Company, the Postal Telegraph-Cable Company, and the American Telephone and Telegraph Company.

The resolution calls for the data to be complete to December 1, and is to embrace the subsidiary concerns, include the capital stock and the bonded debt of each of the three corporations and approximately the market value of the stock and bonds. It also authorizes the bureau to employ surveyors and appraisers for this work.

Automobile Line Repair Wagon.

The Postal Telegraph-Cable Company's new motor wagon for line repair work, mention of which was made in our previous issue, and which is being tried out in the mountains of Pennsylvania between Baltimore and Pittsburg is giving very satisfactory service. This is probably the first motor truck ever used for this purpose by a telegraph company, and the result of the experiment is being watched with interest by many. The Postal wagon was furnished by the Chase Motor Truck Company, of New York, and weighs 1,650 pounds. Its body is ten feet long and forty-two inches wide, and it is designed to carry a load of 1,000 pounds. The wagon has, however, carried from 1,700 to 1,800 pounds over sandy and



POSTAL TELEGRAPH LINE REPAIR WAGON.

hilly roads without any difficulty. The New England Telephone and Telegraph Company has used a similar equipment for some time with very satisfactory results, and it is said that they are now contemplating the purchase of several more.

It is estimated that such a vehicle will give five years service without any excessive cost for repairs, and it is believed that it will show enough saving over a horse drawn wagon to pay for itself in two years. The engine used is a fifteen horsepower, two cycle, three cylinder, air cooled engine of very simple construction. In fact, the construction and operation of the motor are so simple that a lineman of the company came to New York and after receiving a few hours instruction in handling the wagon drove it to the territory where it is being used without any difficulty. The machine has solid rubber tires and to prevent racking the driving mechanism is so geared that it cannot run at a rate exceeding fifteen miles per hour. It will go from ten to fourteen miles upon one gallon of gasoline, thus making the cost of its operation much less than that of a horse-drawn vehicle. If after a thorough test the new equipment fulfills all present expectations the use of these wagons by the Postal as well as other telegraph and telephone companies will no doubt become very general.

Radio-Telegraphy.

At the regular monthly meeting of the Wireless Institute of New York, to be held in the Engineering Societies Building, January 5, Mr. L. R. Gleason will read a paper upon the subject of "Measuring Instruments and Measurements in Wireless Telegraphy."

The Telefunken Wireless Telegraph Company has been recently awarded a contract by the Argentine Government for the construction of 105 ship and shore wireless stations. The contract calls for the completion of all of these stations by July, 1910.

At a meeting of the Armour Institute of Technology branch of the American Institute of Electrical Engineers, held in Chicago December 16, Professor G. E. Marsh presented an interesting paper upon "Wireless Telegraphy," in which he explained in considerable detail the fundamental principles involved in the generation and receiving of electric waves.

At the regular monthly meeting of the Society of Wireless Telegraph Engineers, held at Boston December 6, Mr. Sewall Cabot gave a working demonstration of wireless transmitting apparatus employing a spark gap which consisted of synchronously rotating aerial subdivisions. Electrical measurements were made indicating in a general manner the amount of electrical energy in the antenna circuit and the amount of damping in the radiated wave.

The use of wireless for advertising purposes was instituted by a New York department store during the Christmas holidays. The vessels of the Atlantic fleet of the United States Navy were at sea on their way to New York, where the sailors were to be given shore leave for Christmas. Knowing this and also that the sailors would have a good supply of money to spend in buying Christmas presents for their friends, the advertising manager of this store caused a wireless message to be sent to all of the vessels of the fleet to be displayed upon their bulletin boards, calling the attention of the sailors to their Christmas announcement in the Army and Navy Journal.

The scout cruisers, Salem and Birmingham of the United States Navy have been cruising in the North Atlantic during the past month in connection with the wireless experiments being conducted by the Navy Department at Brant Rock, Mass. The first experiments have been made for the purpose of testing a method for determining the location of vessels at sea. The two cruisers will soon start for West Indian waters and will there engage in tests of long distance communication with the Brant Rock station. This station is one of the most powerful in existence, and has a range of 3,000 miles across the sea. The tower has a height of 490 feet and a message sent from this place was recently intercepted by a station at Omaha.



THEODORE NEWTON VAIL.

Theodore Newton Vail.

Theodore Newton Vail, president of the American Telephone and Telegraph Company, is a man most prominently before the public eye at the present time. He is the head of a great system of telephone and telegraph organizations whose combined capital nears the billion dollar mark. Mr. Vail has the distinction of being the first man to head a system of that magnitude, every dollar of whose capitalization represents actual value, the physical valuation of the property of his organization at the present time being conservatively estimated at \$85,000,000 in excess of all capital obligation. The remarkable part of it all is that this great telephone industry has sprung up from nothing in a period equal to just about half the span of Mr. Vail's life and Mr. Vail himself laid the foundations upon which it has been built. The story of the telephone is a story of a large part of his life. In all of his business career the word failure has not been found in his vocabulary, in fact, it has been said that the only failure he has ever made was his failure to stay retired from active life when he bought a large farm in Vermont and settled down several years ago to enjoy the remainder of his years in rest from the cares of the business world.

Mr. Vail was born in Ohio July 16, 1845, the son of Daniel R. and Phoebe Vail, his paternal ancestors being English Quakers, some of whom were among the pilgrims who came early to this country and settled in Massachusetts.

Branches of the family later drifted to Westchester County, New York, and then to Morris County, New Jersey, where the ninth generation is now living.

Mr. Vail's mother's people were Dutch and French, and were among the early settlers in New York and New Jersey. His uncle, Alfred Vail, was a partner of Professor Samuel F. B. Morse, the inventor of the telegraph and it was in his workshop at Morristown that the first telegraph instruments were built.

As a boy Mr. Vail attended the Morristown common school and then the Morristown Academy. He then studied medicine for a while, but gave that up to learn telegraphy. He had a position as an operator in New York for a while and was then sent west of the Missouri River to work for the Union Pacific Railroad in the same capacity. Just after the Civil War he was appointed to the Railway Mail Service and had a run from Omaha to Ogden for six years, making his home in Omaha. In 1873 he was appointed to a position in the office of the General Superintendent of Railway Mails at Washington, and one year later became assistant superintendent of that department. He was made assistant general superintendent in 1875, and general superintendent in 1876. In this office he re-organized the railway mail system and brought it to a higher level of efficiency than it had ever before attained. His work in this line brought him to the attention of the public and it was but natural in 1878, when the promoters of the original telephone

company wanted a man to place the telephone upon a business-like basis and push its development, that they should choose Mr. Vail as their organizer.

In 1877 an association had been formed to take over the telephone patents of Professor Alexander Graham Bell and develop them. Of the three other men besides the inventor who formed the company, Gardiner G. Hubbard, Professor Bell's father-in-law was somewhat of a promoter, but his capital limited. Thomas Sanders was a man of some means and Thomas A. Watson was a mechanical genius. The next year it was decided to form two companies, one in New England which was known as the New England Telephone Company, and another to cover the territory outside of New England to be known as the Bell Telephone Company. All of the partners in the enterprise felt the need of an organizer and they accordingly called in Mr. Vail to become general manager of the Bell Telephone Company.

In 1879 the two original companies were consolidated under the name of the National Bell Telephone Company. By this time public attention had been attracted to the telephone and its possibilities were beginning to be realized. Mr. Vail, recognizing the fact that the patents held by his company would become more and more valuable, followed the policy of giving only short licenses for the use of the patents reserving the right in most cases at the end of five years to go into the field and take over the business itself. He believed that the Bell interests were so important that there was a partnership right in them which had value independently of the patent rights and that a permanent business could be established which would outlast all patents. For this reason instead of selling the right to use their system he followed the policy of taking a partnership in the business as extended represented by a certain stock interest. In pursuance of this policy The American Telephone and Telegraph Company was formed in 1885 to take control of the long-distance business and eventually to absorb all of the constituent operating companies by taking over their franchises. Before this was accomplished, however, Mr. Vail withdrew from participation in the management of the telephone business and embarked in enterprises of his own in South America and elsewhere. Success followed his efforts and having acquired a handsome fortune he retired to his farm in Vermont, cutting loose from all business cares.

In the spring of 1907, however, Mr. Frederick I. Fish, who had been president of the American Telephone and Telegraph Company, retired. The directors were in a quandry to find a successor. The business had grown by leaps and bounds in the last decade and the trouble was to find a man broad enough to fully grasp the magnitude of the position and solve the vastly important problems connected with its direction. The only man who measured up to the standard which they set was Theodore N. Vail, and he was accordingly asked to accept the trust. At first he refused, saying

that he was too old, being sixty-two years of age. The directors were insistent, however, and as he was one of their number, having always retained his position on the board, he finally yielded and went back into the harness.

The original idea of the American Telephone and Telegraph Company to absorb the various operating companies had not been carried out, and as a result the service in the territory of some of the companies was in a flourishing condition, while other companies lacking funds for development were not so prosperous. Mr. Vail at once took steps to remedy this condition. Soon after he assumed control the panic of 1907 came and upset business generally. The year of depression which followed was signalized by Mr. Vail, by establishing a record for his company as the only industrial organization which at the end of that year showed an increase in net earnings.

When he took up the direction of the telephone affairs Mr. Vail recognized at once the advantages which might accrue to both companies by a union of the telegraph and telephone facilities and interests. Because of the litigation between the American Telephone and Telegraph Company and the Western Union Telegraph Company, which had been drawn out for over twenty years, no advantage had been taken of the splendid opportunities for exchange of facilities between the two organizations. The only feasible way in which this could be brought about was for the telephone company to secure a controlling interest in the telegraph company. This Mr. Vail set out to do, and his efforts, as usual, met with success.

Mr. Vail has said that half a billion dollars would be spent in the next ten years by the telephone companies, and if he remains at the helm there is no doubt but that this prediction will come true. Though sixty-four years of age, Mr. Vail is remarkably well preserved, and from present appearance will be able to conduct for years to come the great organization which he is building up. Unlike many of the heads of large interests, he is a firm believer in publicity, and all of the various transactions involved in the formation of the parent and subsidiary companies are public property. Instead of shunning investigation he rather courts it and with good reason, for the system of which he is the head has not been built merely for the present but for the future, and thanks to his great foresight in rearing the structure, will endure long after he has finally laid aside the reins for other hands to hold. Mr. Vail is to-day, without doubt, the foremost telephone and telegraph man in the world.

Theodore N. Vail Upon Business Training.

The following contribution in "System" of Theodore N. Vail, president of the American

Telephone and Telegraph Company is well worth reading by all young men, containing as it does some most valuable hints as to necessary qualifications for success.

All business as now conducted—particularly those lines of business which embrace the so called industries—requires specialized training and technical education, in fact so much scientific knowledge that the distinctive line between "business" and "profession" is fast disappearing.

Anyone who hopes to achieve success, even the average, must know more, or at least as much about some one thing as any other one and not only know, but know how to do—and how to utilize his experience and knowledge for the benefit of others. Broad success depends on singleness of purpose, clear perception of what is to be desired and to be accomplished, and capacity to recognize true values of men and things and properly place them.

Thorough preparation in elementary knowledge wherever and however acquired, development and training of the powers of concentration and application, is the best, in fact the only, foundation upon which to build this special or technical training. After this the willingness to persevere in the effort to accomplish something for the purpose of accomplishment, the ambition to do whatever is to be done and whatever is undertaken and do it right—making personal ambition secondary to everything else—will bring about great success, providing the God-given, or inherent, capacity to do great things exists; but in any case success up to the full measure of capacity.

Without this preparation and training failure is absolutely certain.

The crying evil of the young man who enters the business world today is the lack of application, preparation, thoroughness, with ambition but without the willingness to struggle to gain his desired end.

Mental and physical strength comes only through the exercise and working of mind and body.

There is too little idea of personal responsibility; too much of "the world owes me a living," forgetting that if the world does owe you a living you yourself must be your own collector.

The cause of all this is the lack of and continual letting down of both domestic and social discipline. Convention and morals are purely a matter of discipline; discipline need not necessarily be brutal or even severe, but better brutal than none at all.

It is for the parents to see that the youth has the foundation training and discipline. If the youth is given that, he will get for himself every bit of the rest to the limit of his capacity.

Opportunities never were more plenty than now, but one must have the training and development not only to recognize opportunity but take advantage of it when recognized.

Which?

Shall I work for a corporation, or shall I go into business for myself? That is the question. Very often the benefit of the doubt is accorded to the latter alternative, but the flesh is weak. The individual lacks the decisive courage of conviction or the necessary capital to experiment and remains with the corporation ever after. Providence usually works in a way that is strange and misunderstood, and, like babies who cry for things injurious, the grownups are denied many doubtful blessings.

The popular opinion that energy is best rewarded when applied to a business in which the individual is the sole profit sharer does not always give due consideration to the opposite desideratum; the sole profit sharer is also the sole loss sharer. If we inherit an established business or if we inherit enough capital to buy a "sure thing" (if there is such a thing) why then there is no doubt but that we should apply our energy to a self-owned business. Even if our early experience has fitted us for the opportunity to go into the trade of our calling doubtless we should take advantage of the opportunity. But when we have none of these things to depend upon the surest and the safest market for our inexperienced ability and untrained energy will be found among the well established corporations. Especially when we have spent the younger years of experience in the service of a corporation, great must be the inducement to warrant us in cancelling its value and taking up a new business without knowledge of its detail or surety of our aptitude. The percentage figures of men who fail in business is appalling. When we consider that most of even these failures are men who have been brought up, trained and experienced in the very enterprises they fail to make a success of for themselves, then the chances of a man leaving a corporation to take up an untried venture in which he has had no practical experience must be extremely precarious. The man who leaves the corporation to buy out a business or run a hotel is taking the wrong end of a big bet.

The opinion that corporation service is ungrateful is not always well founded, and its grounds for justification are getting less every year. The day of corporate abuse is fast passing, the "big stick" cowed the tyrant, in spite of demagogues and jaundiced journalism the corporations are adjusting themselves to the tenets of the Golden Rule. They began to because they had to, then they kept on because they found it paid. Honesty has always been the best policy, but until lately no one ever dreamed that it is as true of corporations as it is of men. Reasonable profits honestly earned are paying dividends today where unreasonable profits dishonestly mismanaged paid them yesterday. That is why it takes brainy men instead of blood-relations to run a corporation today.

Under these conditions energy and ability are paid commensurately with their producing power. If you can really do the job better than the next man and the boss finds it out—and it won't take him long—you are going to get the next man's job sooner than later, for the boss has got to have that job done the best to pay six per cent on the investment. At public, legislative and competitive censured rates it takes the very best kind of men to pay six per cent. There is your chance—if you are of the very best—for a salary that will make the net profits of many a self owned business look like a boy's pocket money after the circus. Mediocrity will never reach the executive chair—at least not to stay. But mediocrity would starve to death in business now-a-days—if the sheriff didn't close up the business first. Even something much better than mediocrity or mediocrity in the best of luck is taking long chances in self-owned business. There are so many unforeseen contingences like fire, storm, bad years and financial depressions which beset the pathway to old age security. After twenty years of affluence one fell swoop might land you high and dry on the mercy of your relatives or, what is better, on the desolate shoals of penury. The lap of luxury isn't as willing as your mother's used to be. In a corporation many twenty dollar a week mediocrity has paid for a little house and lot on the installment plan and reared up a family of children to bless old age and shoo the wolf from the door. When the final summons came there was a couple of thousand dollars benefit insurance to settle for the obsequies and reward the children for their trouble.

If it lays a flattering unction to your soul to imagine what you would be if you were in a business for yourself, then dwell in the air castle and spin in the fairy red automobile, but don't forget to lay aside four or five week's salary every year for the proverbial and probable rainy day and spend much of what's left on a little house and lot. By so doing the chances are that you will be mighty sure of a comfortable if not stylish overcoat when the winter time of dotage comes. That's more than many a man, as good, or even better, than you or I can bank on in business for himself!—Michigan State Gazette.

For the convenience of our readers we have prepared and published in our catalogue, together with prices, a carefully selected list of standard books treating on wireless telegraphy. These volumes which include the most up-to-date works upon the subject, furnish the best information obtainable, the kind giving the most efficient aid and direction to the student. Orders for the books enumerated, or indeed for any others that may be required, which must be accompanied by the cash, will be filled on the day of their receipt, and sent with all the carrying charges prepaid. Address J. B. Tallavall, Telegraph and Telephone Age, 253 Broadway, New York.

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JANUARY 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

New Year's Greetings.

In coming to our readers, beginning with this first issue of the New Year, under a changed heading, we trust that they will recognize an old friend, even under a new name. In the twenty-seven years which have elapsed since the founding of this publication great changes have come about in the telegraph and allied industries. At that time the telegraph, having been in operation for over thirty-five years, had already covered the country with a network of wires, while the telephone, which had been invented but a few years previous, was regarded as little more than a plaything. The telegraph had been tried and its value proven, and any one who expressed the opinion that the new invention would some day become a serious competitor of the telegraph and possibly in time supersede it would have been regarded by most people as a fit subject for the insane asylum. Yet since that time the telephone has been gradually improved, some of the brightest minds of the past quarter century having spent all of their energies in investigating and

solving the many questions which had to be answered before the telephone could become a commercial success. The results of their efforts are apparent in the remarkable growth of the telephone industry in the past few years. It has long since surpassed the telegraph in the number of miles of wire operated, gross income, etc., and, as is admitted by the telegraph officials themselves, has cut into the business of the telegraph to a considerable extent. While it does not at this time seem probable that the telephone will ever entirely supersede the telegraph, still this is an age of wonders, and no clear thinking person will deny that this very thing is one of the possibilities of the future. The president of the American Telephone and Telegraph Company, who has probably done more than any other man living to develop the telephone, believes that in a short time a person in New York or Boston will be able to exchange conversation satisfactorily with a person in San Francisco. If this can be accomplished it will be a great advantage for the telephone in enabling it to handle the long-distance rapid communication which has heretofore been monopolized by the telegraph.

Whatever may be the developments in the years to come there is no doubt but that the bond between the two systems which has lately been strengthened by the combination of interests of the Western Union Telegraph Company and the American Telephone and Telegraph Company, will continue to grow in strength, and out of this union it is hoped may be evolved an ideal system of transmitting communication, if an ideal can ever be attained in any line of endeavor.

In coming to our readers under the heading Telegraph and Telephone Age we make recognition of this bond of common interest, believing that the same is appreciated by the majority of those to whom we appeal. To those who have supported our efforts during the past years, we would say that our concern in the telegraph and all connected with it is as great as it ever was and that we will strive as heretofore to serve their interests as efficiently as possible. We believe we can do this best by including in our reading columns matter pertaining to telephone equipment, operation, maintenance, etc. We accordingly extend hearty New Year's greetings to our readers and trust that the year now beginning may be a prosperous one to all. A year ago the country had not yet recovered from the financial panic of 1907, and conditions of uncertainty prevailed in business circles. Now, however, our former prosperity seems to have returned and unless the industries of our country receive further setbacks by reason of adverse legislation, which does not now seem probable, there is no reason why we should not enjoy a long period of commercial and individual prosperity, for the well-being of the individual depends directly upon progress in the industrial world.

In looking over the events of the past year, by far the most important happening in telegraphic

circles was the buying of a minority interest, amounting to practical control, in the Western Union Telegraph Company, by the American Telephone and Telegraph Company. The economic advantages of this union have been thoroughly discussed. The year now beginning will undoubtedly see many important changes made in the telegraph service in order to secure those possible benefits and adjust the operation of the two systems to each other. While it probably cannot be said that any marked advance in telegraph methods and practices has been made in the past year, still the executive officers and engineers of the companies have shown themselves to be ever alert to take advantage of any opportunity for improvement in the conditions of telegraphic operation.

The use of the Barclay printing telegraph system has been widely extended and many other steps have been taken to render the service more rapid and reliable. The Commercial Cable Company has spent a large amount in diverting to Newfoundland one of their cables which formerly landed at Nova Scotia, in order that they can render more efficient service to their customers. The assertions of those critics who claim that telegraphic methods are growing less progressive each year can easily be refuted by anyone at all conversant with actual conditions.

The development of wireless telegraphy has been most rapid since January, 1909. The utility of this wonderful art being shown so conclusively at the time the steamer Republic was run into and sunk by the Florida last January gave a great impetus to its extension, so that now there is hardly a passenger-carrying vessel in which any great number of people will entrust their lives, that is not equipped for communication with other ships and the shore from mid-ocean. Over-enthusiastic supporters of this new art believe that in a few years we will do away with the use of wires altogether for the distribution of electric current in any form. This seems to be a most visionary view to take, but who can tell? As with the Atlantic Cable, the jest of one day became the fact of the next, and this has been repeated so often that conservative men have ceased to declare anything impossible.

As in the past, we will endeavor to keep abreast of the times and give our readers an accurate and straightforward resumé of happenings of interest to them. In recognition of this aim our paper is constantly gaining a wider reading both at home and abroad. Its news columns and the educative influences it exerts, beginning with the student and the operator at the key, are becoming more generally recognized, understood and appreciated. All this makes for stability and power. The paper has readers in every part of the world. Its foreign subscriptions are growing in number; included among these are the telegraph departments of every government abroad maintaining such administrative offices, without a single ex-

ception. This is a record of which we are pardonably proud.

In extending congratulations and well wishes to our readers at this time we feel a personal interest in everyone who has favored us with a subscription. We are not speaking to strangers, but to friends, many of whom we know personally and whose friendship we cherish as one of our most valued possessions. Not a few of these have been subscribers to *Telegraph Age* since its inception, and have learned to look for its coming twice every month as for the coming of a dear member of the family. Of all these we bespeak the same hearty support for *Telegraph and Telephone Age* which they have accorded us in the past and trust we may enjoy many more years of the same cordial relationship which has existed heretofore.

Proposed National Wireless Telegraph Board.

To meet the need for regulation of the hundreds of wireless stations which are being established both by commercial companies and by amateurs, Representative Roberts, of Massachusetts, has introduced a resolution in Congress providing for the creation of a wireless telegraph board. The demand for some kind of regulation is apparent to all who are conversant with the situation in the wireless field and unless something in this line is not done soon the extension of the industry will be seriously hampered.

Mr. Roberts's resolution authorizes the appointment of a board of seven members, one expert each from the War, Navy and Treasury departments, three experts representing the commercial wireless-telegraph and wireless-telephone interests and one scientist well versed in the art of electric wave telegraphy and telephony.

The duties of the board, according to the resolution, shall be to prepare a comprehensive system of regulations to govern the operation of all wireless plants afloat and ashore which come under the cognizance of the United States, with due regard alike for Government and commercial interests.

It is provided that within 30 days of the organization of the board it shall submit its report and recommendations to Congress. To defray the expenses of the board \$2,000 is appropriated.

Disastrous Sleet Storm in Kansas.

A severe sleet and wind storm swept over a part of the State of Kansas on December 4, breaking down the telegraph and telephone poles by the thousand. As is usually the case in such storms the wires were broken in hundreds of places, so as to be rendered valueless for reconstruction purposes. Iron wire and copper wire suffered alike in the storm, No. 6 iron wire being literally torn into shreds. The telegraph and telephone companies all suffered alike, one of the telegraph companies alone losing over five hundred poles in a distance of one hundred miles.

DIRECTORY OF THE TELEGRAPH

THE FOLLOWING PAGES EMBODY A DIRECTORY OF THE LAND LINE TELEGRAPHS, THE SUBMARINE CABLES, WIRELESS TELEGRAPH COMPANIES, THE SIGNAL SERVICE OF THE UNITED STATES ARMY, AND OTHER INFORMATION OF COMPANY AND ASSOCIATION INTERESTS ALLIED TO THE TELEGRAPH. THE DETAIL OF THIS WORK, WHICH HAS BEEN CAREFULLY COMPILED UNDER OFFICIAL AUTHORITY, AND WHICH IS FURNISHED IN RESPONSE TO A GENERAL DEMAND, IS THE ONLY GROUPING OF TELEGRAPH INTERESTS OF NORTH AMERICA EVER ATTEMPTED. THESE PAGES POSSESS A REFERENCE VALUE OF DISTINCT WORTH, USEFUL ALIKE TO THE INTERESTS CONCERNED AND TO THE BUSINESS WORLD.

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NEW ORLEANS, LA., WESTERN UNION, T. P. Cummings, mgr., T. H. Kelly, c. o.; POSTAL, William C. Lloyd, mgr., L. L. Apperson, c. o.

NEWPORT, KY., WESTERN UNION, Miss Mary McCabe, mgr.; POSTAL, Edward Kauffman, mgr.

NEWPORT, R. I., WESTERN UNION, H. L. Lockrow, mgr., P. J. Walsh, c. o.; POSTAL, L. N. Boone, mgr.

NEWPORT NEWS, VA., WESTERN UNION, T. A. Worthington, mgr.

NEWTON, MASS., WESTERN UNION, E. L. Murphy, mgr.

NEWTON, MASS., POSTAL, W. N. Gilmore, mgr.

NEW YORK, WESTERN UNION, T. A. McCarnmon, c. o.; POSTAL, F. F. Norton, c. o.

NIAGARA FALLS, N. Y., WESTERN UNION, Charles H. Simpson, mgr.

NORFOLK, VA., WESTERN UNION, L. C. Hall, mgr., W. A. Clarke, c. o.; POSTAL, Charles H. Ashburn, mgr., H. A. Lanier, c. o.

NORRISTOWN, PA., POSTAL, H. M. Bolton, mgr.

NORTH ADAMS, MASS., WESTERN UNION, H. G. Nichols, mgr.; POSTAL, W. F. Orr, mgr.

OAKLAND, CALIF., WESTERN UNION, E. G. Folger, mgr., W. H. Pearson, c. o.; POSTAL, John R. Clark, mgr.

OGDEN, UTAH, WESTERN UNION, T. McGuinness, mgr.; POSTAL, W. S. O'Brien, mgr.

OMAHA, NEBR., WESTERN UNION, W. W. Umsted, mgr.; POSTAL, J. G. Wolf, mgr., D. Butler, c. o.

ORANGE, N. J., WESTERN UNION, C. R. Crowell, mgr., R. I. Osgood, c. o.; POSTAL, L. C. Delahanty, mgr.

OSHKOSH, WIS., WESTERN UNION, Arthur H. Allen, mgr., Earl H. Pynch, c. o.; POSTAL, J. N. Chase, mgr.

OSWEGO, N. Y., WESTERN UNION, James P. Doyle, mgr., J. E. Grill, c. o.; POSTAL, L. A. Metzger.

PADUCAH, KY., WESTERN UNION, C. G. Quisenberry, mgr., H. Summerville, c. o.; POSTAL, W. B. Harris, mgr.

PASSAIC, N. J., WESTERN UNION, C. F. H. Johnson, mgr.; POSTAL, G. S. Richtmyer, mgr., N. Aronovitz, c. o.

PATERSON, N. J., WESTERN UNION, D. L. Doran, mgr., V. C. Brown, c. o.; POSTAL, E. J. McCabe, mgr.

PAWTUCKET, R. I., WESTERN UNION, K. G. Leary, mgr.; POSTAL, H. C. Knowles, mgr.

PENSACOLA, FLA., WESTERN UNION, L. R. Daniel, mgr., R. J. Gonzales, Jr., c. o.; POSTAL, H. H. McLellan, mgr., H. B. Pinney, c. o.

PEORIA, ILLS., WESTERN UNION, William Howard, mgr., Thomas H. Anderson, c. o.; POSTAL, S. S. Lacey, mgr., F. H. Jacobs, c. o.

PETERSBURG, VA., WESTERN UNION, George A. Lanier, mgr., R. R. Rayburn, c. o.; POSTAL, V. H. Borst, mgr.

PHILADELPHIA, PA., WESTERN UNION, J. W. Reed, mgr., J. P. McLoraine, c. o.; POSTAL, J. A. McNichol, mgr., E. W. Miller, c. o.

PITTSBURG, PA., WESTERN UNION, E. Ross Collins, mgr., W. J. Dodge, c. o.; POSTAL, A. W. Rinehart, mgr., A. M. Smith, c. o.

PITTSFIELD, MASS., WESTERN UNION, J. M. Hamilton, mgr.; POSTAL, P. J. Macken, mgr., W. B. O'Connell, c. o.

PORTLAND, ME., WESTERN UNION, H. H. White, mgr.; POSTAL, C. C. Ramsay, mgr.

PORTLAND, ORE., WESTERN UNION, W. A. Robb, mgr., W. E. Brooks, c. o.; POSTAL, J. Anand, mgr., B. S. Durkee, c. o.

POUGHKEEPSIE, N. Y., WESTERN UNION, Samuel K. Rupley, mgr., Thomas R. Fox, c. o.; POSTAL, Cuyler E. Williams, mgr.

PROVIDENCE, R. I., WESTERN UNION, Phillip S. Carey, mgr., Joseph A. Moran, c. o.; POSTAL, George H. Mills, mgr., H. A. Pratt, c. o.

PUEBLO, COLO., WESTERN UNION, W. F. Drake, mgr.; POSTAL, G. N. Probert, mgr., E. H. Robertson, c. o.

QUINCY, ILLS., WESTERN UNION, J. H. Gates, mgr., Daniel O'Neal, c. o.; POSTAL, E. W. King, mgr., F. L. Martin, c. o.

QUINCY, MASS., WESTERN UNION, A. W. Mitchell, mgr.

RACINE, WIS., J. C. Dorchester, mgr.; POSTAL,

Herbert F. Wheeler, mgr., Gustav Achanofsky, c. o.

READING, PA., POSTAL, W. T. Phillips, mgr.

RICHMOND, IND., WESTERN UNION, A. A. Burr, mgr., B. B. Burr, c. o.

RICHMOND, VA., WESTERN UNION, A. C. Stevenson, mgr., F. R. Veale, c. o.; POSTAL, C. T. Sydnor, mgr., W. B. Jenkins, c. o.

ROANOKE, VA., WESTERN UNION, J. F. Terrell, mgr., V. C. Brown, c. o.

ROCHESTER, N. Y., WESTERN UNION, G. D. Butler, mgr.; POSTAL, R. J. Little, mgr.

ROCKFORD, ILLS., WESTERN UNION, F. E. Buchanan, mgr., A. E. Schaller, c. o.; POSTAL, J. H. O'Donnell, mgr., Harry R. Fitch, c. o.

ROME, N. Y., WESTERN UNION, George A. Barker, mgr., Edward Bauer, c. o.

SACRAMENTO, CAL., WESTERN UNION, William Dumas, mgr., A. Culton, c. o.; POSTAL, J. K. Beede, mgr., J. H. Fitz Gerald, c. o.

SAGINAW, MICH., WESTERN UNION, E. A. Patterson, mgr., M. Walldauer, c. o.; POSTAL, J. W. Robinson, mgr.

SANDUSKY, O., WESTERN UNION, E. W. Grope, mgr., H. C. Hickman, c. o.

ST. JOSEPH, MO., WESTERN UNION, J. A. Crawford, mgr., L. G. Rosebery, c. o.; POSTAL, W. G. Brimson, mgr.

ST. LOUIS, MO., WESTERN UNION, R. H. Bohle, mgr., W. E. Bellman, c. o.; POSTAL, William S. Daniel, mgr., C. F. Bartlett, c. o.

ST. PAUL, MINN., WESTERN UNION, W. R. Chapman, mgr., Nicolas Lee, c. o.

SALEM, MASS., WESTERN UNION, J. R. Story, mgr.; POSTAL, C. F. Skelley, mgr.

SALT LAKE CITY, UTAH, WESTERN UNION, A. W. Long, mgr.; POSTAL, W. W. Morrison, mgr., R. D. Riley, c. o.

SAN ANTONIO, TEX., WESTERN UNION, J. L. Newton, mgr., J. F. Marshall, c. o.

SAN FRANCISCO, CAL., WESTERN UNION, J. V. O'Brien, mgr., H. S. Converse, c. o.; POSTAL, G. W. Holt, mgr., F. Arnberger, c. o.

SAN JOSE, CAL., WESTERN UNION, J. R. Bailey, mgr.; POSTAL, W. C. Harris, mgr.

SAVANNAH, GA., WESTERN UNION, W. B. Stuart, mgr., J. Marshall, c. o.; POSTAL, W. T. Austin, mgr.

SCHENECTADY, N. Y., WESTERN UNION, A. E. Reynolds, mgr., W. L. Burger, c. o.; POSTAL, F. W. Baumgras, mgr.

SCRANTON, PA., WESTERN UNION, Richard O'Brien, mgr., W. H. Collins, c. o.; POSTAL, J. O. Baskerville, mgr.

SEATTLE, WASH., WESTERN UNION, J. F. Rawie, mgr., J. L. McDonnell, c. o.; POSTAL, J. J. Dunne, mgr.

SHEBOYGAN, WIS., WESTERN UNION, G. P. Stark, mgr.; POSTAL, F. W. Scherman, mgr.

SHREVEPORT, LA., WESTERN UNION, J. P. Rohling, mgr., D. W. Hausam, c. o.

SIOUX CITY, IA., WESTERN UNION, J. P. O'Donnell, mgr., R. W. Kean, c. o.; POSTAL, F. E. Parham, mgr., C. O. Fretheim, c. o.

SOMERVILLE, MASS., WESTERN UNION, F. J. Nicoll, mgr.

SOUTH BEND, IND., WESTERN UNION, B. J. Graybill, mgr., M. G. Haney, c. o.; POSTAL, L. McNeff, mgr.

SOUTH OMAHA, NEB., WESTERN UNION, N. B. Mead, mgr.

SPOKANE, WASH., WESTERN UNION, B. S. Jones, mgr., Thomas P. McKinney, c. o.; POSTAL, D. Fletcher, mgr.

SPRINGFIELD, ILLS., WESTERN UNION, J. B. Inman, mgr.; POSTAL, Charles Stewart, mgr.

SPRINGFIELD, MASS., WESTERN UNION, B. A. Cratsley, mgr.; POSTAL, C. H. Goddu, mgr.

SPRINGFIELD, MO., WESTERN UNION, E. H. Rippey, mgr.

SPRINGFIELD, O., WESTERN UNION, George R. Carter, mgr.; POSTAL, C. A. Winston, mgr.

STOCKTON, CALIF., WESTERN UNION, J. H. Sharon, mgr., J. P. Sharon, c. o.

SUPERIOR, WIS., WESTERN UNION, William R. Hollis, mgr., Arthur H. Stucke, c. o.

SYRACUSE, N. Y., WESTERN UNION, J. E. Bierhardt, mgr., D. V. Ferris, c. o.; POSTAL, J. W. Weed, mgr., T. E. Weed, c. o.

TACOMA, WASH., WESTERN UNION, R. R. Sprinkle, mgr.; POSTAL, J. M. Bell, mgr.

TAUNTON, MASS., WESTERN UNION, F. D. Shaw, mgr.; POSTAL, W. C. Cassidy, mgr., J. W. Cassidy, c. o.

TERRE HAUTE, IND., WESTERN UNION, W. W. Wagoner, mgr., H. Hassinger, c. o.; POSTAL, Frank N. Broad, mgr., Charles D. Macer, c. o.

TOLEDO, O., WESTERN UNION, F. J. Krumling, mgr., J. S. Reichert, c. o.; POSTAL, A. L. Lafferty, mgr.

TOPEKA, KAN., WESTERN UNION, W. C. Carswell, mgr.; POSTAL, A. D. Matthews, mgr.

TRENTON, N. J., WESTERN UNION, C. J. Swartz, mgr.; POSTAL, E. P. Cooper, mgr.

TROY, N. Y., WESTERN UNION, I. W. Copeland, mgr., George Buchanan, c. o.; POSTAL, Marshall L. Barnes, mgr., R. S. Klien, c. o.

UNION STOCK YARDS, ILLS., WESTERN UNION, J. E. Applegate, mgr.

UTICA, N. Y., WESTERN UNION, F. E. Howell, mgr., F. J. Dean, c. o.; POSTAL, C. F. Lawlor, mgr.

VICKSBURG, MISS., WESTERN UNION, Ozro Stanley, mgr., H. O. Albaugh, c. o.

WACO, TEX., WESTERN UNION, H. L. Burross, mgr., S. M. Renick, c. o.

WALTHAM, MASS., WESTERN UNION, L. B. White, mgr.

WASHINGTON, D. C., WESTERN UNION, H. F. Taff, mgr., J. W. Collins, c. o.; POSTAL, F. B. Travis, mgr., C. F. Thompson, c. o.

WATERBURY, CONN., WESTERN UNION, G. H. Baudini, mgr., William Doolin, c. o.; POSTAL, M. M. Hunter, mgr.

WATERTOWN, N. Y., WESTERN UNION, C. E. Comstock, mgr., Edgar J. Comstock, c. o.; POSTAL, F. D. Haynes, mgr.

WHEELING, WEST VA., WESTERN UNION, H. Young, mgr.; POSTAL, F. H. Warden, mgr.

WICHITA, KANS., WESTERN UNION, E. J. Sullivan, mgr.; POSTAL, C. Funk, mgr.

WILKES-BARRE, PA., WESTERN UNION, Eugene F. Cowell, mgr., Robert T. Harris, c. o.; POSTAL, B. F. Ziegler, mgr., D. A. Kane, c. o.

WILLIAMSPORT, PA., WESTERN UNION, S. G. Smith, mgr.; POSTAL, G. E. Sornberger, mgr.

WILMINGTON, DEL., WESTERN UNION, A. W. Springer, mgr.; POSTAL, W. W. Anderson, mgr., W. R. Jackson, c. o.

WILMINGTON, N. C., WESTERN UNION, W. G. Sale, mgr., E. L. Spooner, c. o.; POSTAL, E. H. Bass, mgr.

WINONA, MINN., WESTERN UNION, H. B. Thornton, mgr., Louis Fischer, c. o.

WOONSOCKET, R. I., WESTERN UNION, R. M. Barry, mgr.; POSTAL, I. E. Bolton, mgr.

WORCESTER, MASS., WESTERN UNION, Peter Cunningham, mgr.; POSTAL, F. N. Cooke, mgr.

YONKERS, N. Y., WESTERN UNION, Miss B. M. Melot, mgr., Miss Kathryn E. Wade, c. o.; POSTAL, A. J. Collier, mgr.

YORK, PA., WESTERN UNION, R. A. Black, mgr.; POSTAL, R. W. Buckingham, mgr.

YOUNGSTOWN, O., WESTERN UNION, F. W. Taylor, mgr.; POSTAL, C. A. Mathany, mgr., J. E. Connelly, c. o.

ZANESVILLE, O., WESTERN UNION, C. E. Jones, mgr., B. F. Renter, c. o.; POSTAL, O. T. Leasure, mgr.

POSTAL TELEGRAPH-CABLE COMPANY OF TEXAS.

Executive offices, Dallas, Tex.; incorporated 1896; capital \$120,000.

The system of this company embraces 12,624 miles of wire; 3,738 miles of poles.

S. M. English, president and general manager.

MANAGERS AT PRINCIPAL PLACES.

Abilene, Tex.	P. Chamberlain
Ardmore, Okla.	W. T. Salisbury
Arkansas City, Kan.	H. E. Leasure
Austin, Tex.	L. A. Ott
Bartlett, Tex.	M. C. Allen
Bartlettville, Okla.	Mrs. Pauline Long
Bauxite, Ark.	V. McLaughlin
Beaumont, Tex.	T. A. Darling
Belton, Tex.	Claude Cox
Bonham, Tex.	Z. H. Hartman
Bowie, Tex.	Hugh Cathey
Corsicana, Tex.	R. L. Garrison
Chickasha, Okla.	E. Curtis
Crowley, La.	Miss E. V. Tillery
Dallas, Tex.	W. L. Jones
Denison, Tex.	H. E. Gordon
El Reno, Okla.	Mrs. C. Sellers
Enid, Okla.	P. E. Drawer
Fort Smith, Ark.	J. W. Gilliam
Ft. Worth, Tex.	A. C. Farmer
Gainesville, Tex.	H. H. Henderson
Galveston, Tex.	F. C. Cole
Greenville, Tex.	Mrs. L. H. Bowlby
Guthrie, Okla.	C. N. Jones
Helena, Ark.	J. G. Faulkner

Hillsboro, Tex.	W. H. Hord
Hope, Ark.	A. P. Andrews
Hot Springs, Ark.	D. L. Edwards
Houston, Tex.	J. D. McLelland
Jennings, La.	Miss L. A. Dobrowolski
Joplin, Mo.	J. F. O'Donnell
Laredo, Tex.	T. J. Bolleter
Lake Charles, La.	R. O. Kirby
Little Rock, Ark.	O. M. Lowe
McAlester, Okla.	G. O. Pittman
McKinney, Tex.	G. D'Armand
Marshall, Tex.	L. E. Keasler
Malvern, Ark.	L. E. Cobbs
Minden, La.	J. A. Taylor
Monroe, La.	J. L. Ketchum
Morgan City, La.	J. L. Fisher
Mulvane, Kans.	R. P. Seyfer
Muskogee, Okla.	J. Coffey
New Iberia, La.	Miss Roberta Carter
Oklahoma City, Okla.	W. A. Logan
Orange, Tex.	M. A. Bravo
Paris, Tex.	H. E. Simms
Pine Bluff, Ark.	V. V. Vandeventer
Plano, Tex.	L. T. Pellerin
Port Arthur, Tex.	Miss K. L. Polansky
San Antonio, Tex.	W. E. Herring
Shawnee, Okla.	J. P. Moore
Sherman, Tex.	P. R. Napier
Shreveport, La.	P. H. Fennell
Sapulpa, Okla.	Mrs. Fae Hardwick
Tallulah, La.	N. D. Johnson
Taylor, Tex.	E. C. Matthews
Temple, Tex.	Jeff Light
Texarkana, Tex.	J. B. Prudhomme
Tyler, Tex.	Miss Kate Frasier
Tioga, La.	J. A. Vandervoort
Tulsa, Okla.	E. E. Louderback
Waco, Tex.	A. G. Steele
Wichita Falls, Tex.	J. L. Stearns
Welsh, La.	W. M. Loving
West, Tex.	J. H. Chambliss
Yukon, Okla.	R. A. French

THE NORTH AMERICAN TELEGRAPH COMPANY.

Executive offices, 511 Phoenix Building, Minneapolis, Minn.; incorporated 1885; capital \$1,000,000.

OFFICERS.

Clinton Morrison, president; H. A. Tuttle, vice-president and general manager; E. C. Cooke, treasurer; A. S. Harris, secretary.

The property of this company consists of telegraph lines and offices in States of Illinois, Iowa, Wisconsin and Minnesota.

MANAGERS OF PRINCIPAL OFFICES.

Aurora, Ill.—D. C. Brant.
 Dubuque, Iowa.—W. G. Norman.
 Duluth, Minn.—J. L. Fuller.
 La Crosse, Wis.—R. A. Swenson.
 Mankato, Minn.—J. S. Davies.
 Minneapolis, Minn.—D. G. McIntosh.
 St. Paul, Minn.—T. Doherty.
 Superior, Wis.—A. T. Ritzman.
 Winona, Minn.—H. E. Averill.

THE CANADIAN PACIFIC RAILWAY COMPANY'S TELEGRAPH.

Executive offices, Hospital and St. Francois Xavier streets, Montreal, Que.; incorporated in 1881.

The property of this department consists in 11,500 miles of poles and cables, and 65,000 miles of wire.

OFFICERS.

James Kent, Montreal, manager of telegraphs; W. J. Camp, Montreal, electrical engineer; F. J. Mahon, St. John, N. B., superintendent; J. F. Richardson, Montreal, Que., superintendent; W. Marshall, Toronto, Ont., superintendent; F. T. Jennings, North Bay, Ont., superintendent; B. S. Jenkins, Winnipeg, Man., general superintendent, western lines; John Tait, Winnipeg, Man., superintendent; J. McMillan, Calgary, Alta., superintendent; James Wilson, Vancouver, B. C., superintendent.

CONSTRUCTION AND INSPECTION STAFF.

D. Merscrean, St. John, N. B., general foreman; Joseph Townsley, superintendent of construction, and J. A. Grant, assistant superintendent of construction, Montreal; J. Mitchell, Montreal, inspector; S. Elliott, Montreal, inspector of telephones; E. A. Spear, assistant superintendent of construction, Toronto; A. Allen, Sudbury, Ont., superintendent of construction; R. N. Young, Winnipeg, Man., assistant superintendent; D. C. Coons, Winnipeg, inspector; E. M. Payne, Regina, inspector; C. H. Powell, Calgary, inspector; H. McIntyre, Vancouver, B. C., inspector; A. C. Fraser, Moosejaw, Sask., inspector; F. E. J. Camp, telephone inspector, Revelstoke, B. C.

MANAGERS OF PRINCIPAL OFFICES.

Sydney, N. S.—A. P. Anderson.
 Halifax, N. S.—W. M. Godsoe.
 St. John, N. B.—J. M. Barnes.
 Quebec, Que.—J. F. N. Caisse.
 Montreal, Que.—A. Walsh.
 H. Bott, chief operator.
 Ottawa, Ont.—W. T. Robinson.
 J. C. Cooney, chief operator.
 Toronto, Ont.—D. G. Sturrock.
 F. C. Robertson, chief operator.
 Hamilton, Ont.—C. J. Jones.
 London, Ont.—D. H. Bowen.
 North Bay, Ont.—W. S. Metzler.
 Sudbury, Ont.—C. W. McMillan, circuit manager.
 Sault Ste. Marie, Ont.—M. A. Sheridan.
 Sault Ste. Marie, Mich.—W. J. Atchison.
 Fort William, Ont.—W. Graham, circuit manager.
 Port Arthur, Ont.—E. E. Jessop.
 Winnipeg, Man.—W. Rutherford.
 W. J. Kane, chief operator.
 Brandon, Man.—W. M. Thompson.
 Regina, Sask.—W. M. Kennedy.
 Moosejaw, Sask.—D. W. Gibson.
 Saskatoon, Sask.—S. Skattebol.

Swift Current, Sask.—S. M. Thurston, circuit manager.

Calgary, Alta.—J. T. Fitzgerald.

J. J. Schetgen, chief operator.

Edmonton, Alta.—D. H. Barclay.

Revelstoke, B. C.—J. L. Smith, circuit manager.

Nelson, B. C.—W. B. Shaw.

New Westminster, B. C.—H. A. Wilson.

Vancouver, B. C.—E. Paterson, act'g mgr.

J. Fletcher, chief operator.

Victoria, B. C.—W. Christie.

Nanaimo, B. C.—W. F. Archibald.

GOVERNMENT TELEGRAPH SERVICE.

DOMINION OF CANADA.

Executive office, Department of Public Works, Ottawa, Ont.

This system embraces 973.75 miles of land lines, 259 miles of cable, and 401 offices.

EXECUTIVE.

Hon. William Pugsley, Minister of Public Works.

J. B. Hunter, Deputy Minister of Public Works.

STAFF AT HEADQUARTERS.

D. H. Keeley, general superintendent.

M. W. Crean, technical assistant.

J. E. Gobel, technical assistant.

J. P. Demartigny, accountant, telegraph branch.

GENERAL INSPECTORS.

A. B. McDonald, North Sydney, Cape Breton, lines in Nova Scotia and New Brunswick.

J. S. Macdonald, Edmonton, Alberta, lines in Northwest and South British Columbia.

SUPERINTENDENTS.

Edwin Pope, Quebec, dist. supt., North Shore and G. N. W. traffic.

J. C. Taché, dist. supt., Chicoutimi district and North Shore to Bersimis.

E. H. Tetu, Long Point of Mingan, dist. supt., North Shore, East Bersimis.

P. Pouliot, dist. supt., Quarantaine line, etc., to Grosse Isle.

A. Malouin, dist. supt., West Point, Anticosti Island.

A. Le Bourdais, Grindstone, dist. supt., Magdalen Islands.

D. C. Dawson, St. John, N. B., dist. supt., Cape Breton system.

Mrs. C. C. Seely, Grand Manan, N. B., dist. supt., Bay of Fundy system.

J. McR. Selkirk, Leamington, Ont., dist. supt., Pelee Island system.

Robert C. Macdonald, Edmonton, Alta., dist. supt., Northwest Territories.

Wm. Henderson, Victoria, dist. supt., British Columbia, south.

C. S. Stevens, Summerland, B. C., supt., Penticton line.

J. T. Phelan, Vancouver, B. C., supt., Yukon system.

H. Gilchen, Whitehorse, Y. T., dist. supt., Atlin-Boundary.

THE GREAT NORTH WESTERN TELEGRAPH COMPANY.

Executive offices, Toronto, Ont.; organized in 1881; capital \$500,000.

The property of this company consists of 13,410 miles of poles—406 miles of wire in cables, 49,686 miles of wire. The company maintains a total of 1,360 offices of which 1,183 are located in Canada and 177 in the United States. Of the 1,360 offices 894 are reached exclusively by the lines of this company. The following is a list of a portion of the more important circuits operated between large cities:

Montreal to Quebec, Que.; St. John, N. B.; Halifax, N. S.; North Sydney, N. S.; New York, N. Y.; Albany, N. Y.; Ottawa, Ont.; Toronto, Ont.; Chicago, Ill.; Boston, Mass.; Ogdensburg, N. Y.

Toronto to New York, N. Y.; Buffalo, N. Y.; Montreal, Que.; Ottawa, Ont.; North Bay, Ont.; Hamilton, Ont.; London, Ont.; Detroit, Mich.; Chicago, Ill.; Winnipeg, Man.

OFFICERS.

H. P. Dwight, president; I. McMichael, vice-president and general manager; George D. Perry, secretary-treasurer and superintendent of supplies; A. C. McConnell, auditor; S. B. McMichael, general assistant; W. J. Duckworth, superintendent of construction; D. E. Henry, chief clerk, general manager's office; Edwin Pope, superintendent, Que.; A. R. Porte, superintendent, Ogdensburg, N. Y.; inspectors—C. W. Dawzy and C. E. Lillic, Toronto, Ont.; J. Beauchamp, Quebec.

MANAGERS OF PRINCIPAL OFFICES.

Belleville, Ont.—P. F. Canniff.

Brandon, Man.—Miss E. Quigg.

Brantford, Ont.—E. Cameron.

Hamilton, Ont.—J. Jamieson.

Kingston, Ont.—T. A. Hanley.

London, Ont.—W. C. Furness.

Montreal, Que.—L. S. Humes.

Niagara Falls, Ont.—George Phemister.

North Bay, Ont.—M. B. Douglas.

Ogdensburg, N. Y.—A. R. Porte.

Ottawa, Ont.—C. E. Davies.

Plattsburg, N. Y.—W. C. Crooks.

Quebec, Que.—Edwin Pope.

St. Catharines, Ont.—T. E. Dudley.

St. Thomas, Ont.—George Rowley.

Sault Ste. Marie, Ont.—Thomas Taylor.

Toronto, Ont.—G. Hogarth.

Watertown, N. Y.—C. E. Comstock.

Windsor, Ont.—H. H. Hodgkinson.

Winnipeg, Man.—J. Padington.

THE GRAND TRUNK PACIFIC TELEGRAPH COMPANY.

Executive offices, Montreal, Que.; incorporated July, 1906; capital \$5,000,000.

OFFICERS.

Charles M. Hays, president; C. J. Chamberlin, vice-president; A. Bruce Smith, general manager. The property of this company consists of lines

now in operation in the Provinces of Ontario, Manitoba, Saskatchewan and Alberta, and lines under construction in the Provinces of New Brunswick, Quebec, Ontario and British Columbia.

PRINCIPAL OFFICES.

Allan, Sask.,	Ardrossan, Alta.,
Asquith, Sask.,	Atwater, Sask.,
Biggan, Sask.,	Bradwell, Sask.,
Cabot, Man.,	Caye, Man.,
Chauvin, Alta.,	Coblentz, Sask.,
Edgerton, Alta.,	Edmonton, Alta.,
Fenwood, Sask.,	Firdale, Man.,
Goodeve, Sask.,	Grandora, Sask.,
Gregg, Man.,	Harte, Man.,
Holden, Alta.,	Ingelow, Man.,
Ima, Alta.,	Ituna, Sask.,
Juniata, Sask.,	Justice, Man.,
Kelliber, Sask.,	Kinley, Sask.,
Landis, Sask.,	Lazare, Man.,
Lency, Sask.,	Meighen, Alta.,
Melville, Sask.,	Nokomis, Sask.,
Oakner, Man.,	Pope, Man.,
Portage la Prairie, Man.,	Punnichy, Sask.,
Raymore, Sask.,	Rivers, Man.,
Riley, Alta.,	Scott, Sask.,
Semans, Sask.,	South Saskatoon, Sask.,
Spy Hill, Sask.,	Tofield, Alta.,
Tate, Sask.,	Unity, Sask.,
Uno, Man.,	Venn, Sask.,
Wainwright, Alta.,	Watrous, Sask.,
Winnipeg, Man.,	Yonker, Sask.,
Dexter, Ont.,	Dona, Ont.,
Lake Superior Jct., Ont.,	Oscar, Ont.,
West'n Ontario J't., Ont.,	Westford, Ont.,

TELEGRAPH AND CABLE LINES, SIGNAL CORPS, UNITED STATES ARMY.

PRINCIPAL OFFICER: BRIGADIER GENERAL JAMES ALLEN, CHIEF SIGNAL OFFICER OF THE ARMY.

Miles of aerial lines:

United States	145
Alaska	1,363
Philippine Islands	34

Total 1,542

Miles of Cables:

Washington-Alaska system	2,592.0
Philippine Islands	24.0

Total 2,616.0

Cableships:

- "Burnside," Seattle, Wash.
- "Cyrus W. Field," New York.
- "Liscum," Philippine Islands.
- "Joseph Henry," New York.

The mileage of aerial lines and cables given herewith does not include the lines in the Philippine Islands transferred to the Insular Government by the Signal Corps in 1907. These comprised 3,982 miles of land lines and 1,296 miles of cable.

LAND LINES IN THE UNITED STATES.

From—	To—	Miles.
Huachuca, Ariz.	Lewis Springs . .	19.0
Ft. Bayard, N. Mex.	Bayard	3.0
Holbrook, Ariz.	Fort Apache . . .	92.0
Fort Myer, Va.	Ft. Washington, Md.	21.5
Fort Clark, Tex.	Spofford Junction .	9.5

Total 145.0

OFFICES WASHINGTON-ALASKA MILITARY CABLE AND TELEGRAPH SYSTEM.

Land Lines.	Interme- diate. Miles.	Total Miles.
St. Michael-Valdez.		
St. Michael	0	0
Golsova	35	35
Unalakleet	30	65
Old Woman	50	115
Kaltag	45	160
Nulato	40	200
Koyukuk	30	230
Louden	50	280
Melosi	35	315
Kokrines	38	353
Birches	40	393
Fort Gibbon	55	448
Rapids	24	472
Rampart	23	495
Glen	35	530
Hot Springs	21	551
Tolovana	37	588
Minto	39	627
Nenana	35	662
Chena	29	691
Fairbanks	10	701
Salcha	37	738
Delta	29	767
Richardson	2	769
McCarty	20	789
Donnelly	36	825
McCallum	37	862
Paxson	18	880
Hogan	30	910
Gulkana	30	940
Copper Center	25	965
Tonsina	25	990
Teikhell	24	1,014
Saina	24	1,038
Wortmans	12	1,050
Valdez	18	1,068
Nome-Fort Davis.		
Nome	0	1,068
Fort Davis	4	1,072
Gulkana-Fort Egbert.		
Gulkana	0	1,072
Chistochina	40	1,112
Mentasta	46	1,148
Tanana Crossing	51	1,209
Ketchumstock	55	1,264
Fort Egbert	87	1,351
Boundary (no station)	12	1,363

		Interme- diate.	Total	Station	ALASKA.	Call	Power
Cables.		Miles.	Miles.				k.w.
Seattle-Seward.							
Seattle	0	0	0	Circle City	FK	3	
Sitka	1,085	1,085	1,085	Fort Egbert	FQ	3	
Valdez	599	1,684	1,684	Fairbanks	FB	3	
Fort Liscum	4	1,688	1,688	Fort Gibbon	FG	10	
Seward	189	1,877	1,877	Mouth of Yukon	FE	1	
Montague Island-Cordova-Cape				Nome	FD	10	
Whitshed	68	1,945	1,945	Petersburg	EP	1	
Sitka-Skagway.				Fort St. Michael	FM	3	
Sitka	0	1,945	1,945	Wrangell	FW	1	
Cape Fanshaw (no station)	211	2,156	2,156	PHILIPPINE ISLANDS.			
Juneau	98	2,254	2,254	Manila	PN	1	
Haines Mission	106	2,360	2,360	Corregidor Island	FH	10	
Skagway	18	2,378	2,378	Jolo	FS	3	
Cape Fanshaw-Ketchikan.				Malabang	FA	3	
Cape Fanshaw (no station)	0	2,378	2,378	Zamboanga	FM	3	
Wrangell	63	2,441	2,441	U. S. ARMY TRANSPORT SERVICE.			
Hadley	69	2,510	2,510	Kilpatrick	ATK	3	
Ketchikan	28	2,538	2,538	Logan	ATL	3	
Lawton-Worden.				Sherman	ATR	3	
Fort Lawton	0	2,538	2,538	Sheridan	ATS	3	
Fort Worden	42	2,580	2,580	Thomas	ATU	3	
Ward-Lawton.				Cableship Burnside	BS	3	
Fort Ward	0	2,580	2,580	Cableship Joseph Henry	FR	2	
Fort Lawton	12	2,592	2,592	ARTILLERY HARBOR TUGS.			
Sitka-Japonski Island.				Reno	X	$\frac{1}{2}$	
Sitka	0	2,592	2,592	Captain Rowell	RW	$\frac{1}{2}$	
Japonski Island	35	2,592.35	2,592.35	General Randall	OR	$\frac{1}{2}$	
Wireless.		Miles.		General R. B. Ayres	FY	$\frac{1}{2}$	
Egbert-Circle	107	107		Harvey Brown	HIB	$\frac{1}{2}$	
Circle-Fairbanks	130	130		TELEGRAPH OFFICES OF SIGNAL CORPS			
Fairbanks-Gibbon	130	130		IN THE PHILIPPINE ISLANDS.			
Gibbon-Nome	330	330		Camp Bumpus, Leyte.			
Nome-St. Michael	127	127		Camp Daraga, Luzon.			
Petersburg-Wrangell	30	30		Camp Downes, Luzon.			
Total	854	854		Camp Gregg, Luzon.			
Recapitulation.				Camp John Hay, Luzon.			
Land lines (double wire)	204	204		Camp Jossman, Guimaras.			
Land lines (single wire)	1,159	1,159		Camp McGrath, Luzon.			
Wireless	854	854		Camp Stotsenberg, Luzon.			
Cables	2,592.35	2,592.35		Fort William McKinley, Luzon.			
Total	4,809.35	4,809.35		Fort Wint, Grande Island.			

WIRELESS STATIONS, UNITED STATES

Station	ARMY.	Call	Power
			k.w.
Fort Andrews, Mass.	FC	1	
Fort H. G. Wright, N. Y.	FW	1	
Fort Hancock, N. J.	FN	1	
Fort Leavenworth, Kan.	FL	3	
Fort Levett, Maine	FV	1	
Fort Monroe, Va.	FO	1	
Fort Omaha, Nebr.	FS	3	
Presidio, San Francisco	PS	1	
Fort Riley, Kan.	FZ	3	
Fort Totten, N. Y.	FT	$\frac{1}{2}$	
Fort Wood, N. Y.	FD	3	
Fort Worden, Wash.	FX	1	
S. C. Laboratory, Wash, D. C.	SC	3	

TELEPOST COMPANY.

Executive offices, 225 Fifth Avenue, New York; incorporated under the laws of Maine in 1907; capital \$18,000,000. The company owns the De-lany system of automatic rapid telegraphy, and operates lines between Boston and Portland, Me., and also lines radiating from St. Louis.

OFFICERS.

H. Lee Sellers, president; C. H. Silliman, first vice-president; Jules Guthridge, second vice-president; R. H. Sellers, secretary and treasurer; Thomas Conyngton, general counsel; Jacques Krebs, assistant treasurer; Patrick B. Delany, E.E., consulting engineer; J. W. Larish, E.E., electrical engineer; L. W. Shumaker, superintendent of traffic; Wm. H. McCollum, superintendent of construction.

VOTING TRUSTEES.

Hon. Henry W. Blair, Manchester, N. H.; Gen. A. R. Buffington, U. S. A., Madison, N. J.; Hon. Charles J. Faulkner, Martinsburg, W. Va.; Rear Admiral Charles A. Sigsbee, U. S. N., Washington, D. C.; Rev. Charles H. Parkhurst, D. D., H. Lee Sellers, F. W. Shumaker, New York City.

DIRECTORS.

Thomas Conyngton, New York City; James S. Gailey, Waterbury, Conn.; Jules Guthridge, Washington, D. C.; H. Lee Sellers, R. H. Sellers, C. H. Silliman, F. H. Stillman, New York City.

OFFICES AND MANAGERS.

Boston, Mass., Louis Solomon.
Lowell, Mass., Miss B. M. Sutcliff.
Lawrence, Mass., G. H. Patterson.
Haverhill, Mass., Geo. A. Smith.
Exeter, N. H., Geo. W. Yeaton.
Biddeford, Maine, F. L. Malone.
Portland, Maine, B. H. Taylor.
Portsmouth, N. H., T. C. Leckey.
Dover, N. H., F. C. Stewart.
St. Louis, Mo., W. W. Beattie.
Springfield, Ill., J. B. Ellinger.
Sedalia, Mo., S. H. Chaney.
Terre Haute, Ind., C. V. Bertsch.
Aurora, Ill., B. H. Artes.
Indianapolis, Ind., Thos. E. Newsom.
Chicago, Ill., J. A. Breen.

MEXICO.

Camillo A. Gonzales is director-general of telegraphs of Mexico, with offices in the City of Mexico.

The telegraph system of Mexico embraces 36,104 kilometers of aerial lines, and 68,771 kilometers of wire, and about 7 kilometers of underground cable. It also comprises 745.5 kilometers of submarine cable and 17.5 kilometers of subfluvial cable.

THE ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.

The object of this association is the improvement of the telegraph service, and the promotion and advancement in general of the interests of the telegraph department of railroads.

Place of next meeting, Los Angeles, Cal., May 16, 17, 18, 19, 20, 1910.

OFFICERS FOR 1909-1910.

John L. Davis, president, Chicago, Ill.; I. T. Dyer, first vice-president, Los Angeles, Cal.; G. A. Cellar, second vice-president, Pittsburg, Pa.; P. W. Drew, secretary and treasurer, Chicago, Ill.; C. Selden, chairman, Eastern Division, Baltimore, Md.; E. A. Chenery, chairman, Western Division, St. Louis, Mo.

COMMITTEES.

EXECUTIVE—John L. Davis, chairman; I. T. Dyer, G. A. Cellar, P. W. Drew, C. Selden, E. A. Chenery.

ENTERTAINMENT—I. T. Dyer, F. S. Rawlins, E. A. Klippel, B. F. Frobes, B. A. Kaiser, P. W. Miller, A. P. Eckert.

LADIES' RECEPTION—Mrs. B. F. Frobes, Mrs. I. T. Dyer, Mrs. F. S. Rawlins, Mrs. E. F. Raymond, Mrs. H. C. Chace, Mrs. J. B. Sheldon.

TOPICS—J. B. Sheldon, F. E. Bentley, J. G. Jennings.

HIGH TENSION WIRE CROSSINGS—G. A. Cellar, H. Groce, W. W. Ashald, W. P. Cline, C. Selden.

LIST OF ACTIVE MEMBERS.

Name.	Railroad.	Address.
W. W. Ashald, supt. tel.,	G. T.,	Montreal, Que.
B. B. Baughman, supt. tel.,	W. & L. E.,	Canton, O.
Wm. Bennett, supt. tel.,	C. & N. W.,	Chicago, Ill.
F. E. Bentley, supt. tel.,	T. R. R. Assn.,	St. Louis, Mo.
J. H. Brennan, asst. supt. tel.,	St. L. & S. F.,	St. Louis, Mo.
H. L. Bennett, supt. tel.,	H. & T. C.,	Houston, Tex.
George Boyce, supt. tel.,	C.,	St. P., M. & O., St. Paul, Minn.
F. G. Boyer, supt. tel.,	N. T. Co.,	Oil City, Pa.
S. K. Bullard, supt. tel.,	M., K. & T.,	Dennison, Tex.
W. J. Camp, elec. engr.,	Can. Pac.,	Montreal, Que.
G. A. Cellar, supt. tel.,	Pa. Lines W. of P.,	Pittsburg, Pa.
H. C. Chace, asst. supt. tel.,	A., T. & S. F.,	Los Angeles, Cal.
E. A. Chenery, supt. tel.,	Mo. Pac.,	St. Louis, Mo.
J. P. Church, chief clerk,	Wabash,	Decatur, Ill.
W. P. Cline, supt. tel.,	A. C. Line,	Wilmington, N. C.
W. L. Connelly, trainmaster,	C., I. & S.,	Danville, Ill.
J. L. Davis, supt. tel.,	C. & E. I.,	Chicago, Ill.
E. W. Day, asst. supt. tel.,	B. & O.,	Baltimore, Md.
E. E. Dildine, asst. supt. tel.,	Nor. Pac.,	St. Paul, Minn.
G. A. Dornberg, gen'l foreman,	Pa. Lines W. of P.,	Pittsburg, Pa.
P. W. Drew, supt. tel.,	M., St. P. & S. S. M.,	Chicago, Ill.
I. T. Dyer, supt. tel.,	S. P. L. A. & S. L.,	Los Angeles, Cal.
J. B. Fisher, supt. tel.,	Penn. R. R.,	Philadelphia, Pa.
L. B. Foley, supt. tel.,	D., L. & W.,	New York, N. Y.
A. S. Foote, gen'l foreman,	Sunset Lines,	Houston, Tex.
S. A. D. Forristall, supt. tel.,	B. & M.,	Boston, Mass.
B. F. Frobes, supt. tel.,	O. S. L.,	Salt Lake City, Utah.
U. J. Fry, supt. tel.,	C., M. & St. P.,	Milwaukee, Wis.
J. W. Fry, asst. supt. tel.,	C., M. & St. P.,	Seattle, Wash.
C. H. Gaunt, supt. tel.,	A., T. & S. F.,	Topeka, Kas.
O. C. Greene, supt. tel.,	Nor. Pac.,	St. Paul, Minn.
E. P. Griffith, supt. tel.,	Erie,	Jersey City, N. J.

- T. R. Gooch, c. t. despr., R. F. & P., Richmond, Va.
 G. H. Groce, asst. to gen'l mgr., Ill. Central, Chicago, Ill.
 W. H. Hall, asst. supt. tel., M., K. & T., Dennison, Tex.
 J. G. Hampton, supt. tel., No. Amn. T. Co., Desc-ronto, Ont.
 A. Hatton, inspr. of trans., C. P., Winnipeg, Man.
 J. L. Henritz, supt. tel., C. & S., Denver, Col.
 Percy Hewett, supt. tel., Sunset Lines, Houston, Tex.
 Otto Holstein, c. t. despr., Central Ry. of Peru, Lima, Peru.
 J. G. Jennings, supt. tel., C., R. I. & P., Chicago, Ill.
 F. T. Jennings, supt. tel., C. P., North Bay, Ont.
 W. M. Johnson, Jr., train despr., B. & L. E., Greenville, Pa.
 W. B. Jones, supt. trans., C., I. & L., La Fayette, Ind.
 L. M. Jones, asst. supt. tel., A., T. & S. F., Topeka, Kas.
 G. C. Kinsman, supt. tel., Wabash, Decatur, Ill.
 V. T. Kissinger, asst. supt. tel., C., B. & Q., Lincoln, Neb.
 Wm. Kline, supt. tel., L. S. & M. S., Toledo, O.
 E. A. Klippel, supt. tel., O., R. & N., Portland, Ore.
 C. L. Lathrop, supt. tel., P., S. & N., Angelica, N. Y.
 L. A. Lee, supt. tel., P. & L. E., Pittsburg, Pa.
 C. M. Lewis, supt. tel., P. & R., Reading, Pa.
 T. H. Lindsey, supt. tel., N. R. R., Costa Rica, C. A.
 E. J. Little, supt. tel., Gt. Nor., St. Paul, Minn.
 R. L. Logan, supt. tel., K. C. Sou., Kansas City, Mo.
 E. E. McClintock, supt. tel., C. & W., Denver, Col.
 W. P. McFarlane, asst. supt. tel., C. & N. W., Omaha, Neb.
 J. McMillan, supt. tel., C. P., Calgary, Alta.
 M. Magiff, supt. tel., Cent. Vt., St. Albans, Vt.
 W. Marshall, supt. tel., C. P., Toronto, Ont.
 W. S. Melton, supt. tel., Q. & C., Danville, Ky.
 C. W. L. Mickley, supt. tel., I. & G. N., Palestine, Tex.
 C. A. Parker, supt. tel., D., N. W. & P., Denver, Colo.
 E. A. Patterson, asst. supt. tel., C., M. & St. P., Milwaukee, Wis.
 C. B. Phelps, supt. trans., L. & N., Louisville, Ky.
 W. H. Potter, supt. tel., Southern, Washington, D. C.
 F. S. Rawlins, supt. tel., Sou. Pac., San Francisco, Cal.
 E. F. Raymond, asst. supt. tel., Sou. Pac., San Francisco, Cal.
 Geo. Reith, supt. Virginian, Norfolk, Va.
 C. S. Rhoads, supt. tel., C., C., C. & St. L., Indianapolis, Ind.
 J. F. Richardson, supt. tel., C. P., Montreal, Que.
 Thos. Rodgers, inspector tel., G. T., Montreal, Que.
 Geo. Rooke, inspector train despr., C. P., Montreal, Que.
 J. J. Ross, supt. tel., Mich. Cent., Detroit, Mich.
 A. E. Roush, gen. foreman, P. & L. E., Pittsburg, Pa.
 W. W. Ryder, supt. tel., C. B. & Q., Chicago, Ill.
 C. Selden, supt. tel., B. & O., Baltimore, Md.
 J. B. Sheldon, supt. tel., Union Pac., Omaha, Neb.
 F. G. Sherman, supt. tel., C. R. R. of N. J., New York.
 C. F. Smith, supt. C. & A., Bloomington, Ill.
 N. E. Smith, supt. Tel., N. Y., N. H. & H., New Haven, Conn.
 F. W. Smith, c. t. despr., B. & L. E., Greenville, Pa.
 F. S. Spaford, asst. supt. tel., C. R. I. & P., Chicago, Ill.
 J. S. Stevens, supt. Tel., C. & O., Richmond, Va.
 John Tait, supt. tel., C. P., Winnipeg, Man.
 A. B. Taylor, supt. tel., N. Y. C. & H. R., New York.
 W. K. Tasker, supt. tel., P. M., Detroit, Mich.
 H. D. Teed, supt. tel., St. L. & S. F., St. Louis, Mo.
 B. F. Thompson, telph. inspr., B. & O., Baltimore, Md.
 G. C. Todd, supt. tel., N. Y. C. & St. L., Cleveland, O.
 Frank Trimble, supt. tel., T. & P., Dallas, Tex.
 H. A. Tuttle, gen. supt. tel., M. St. P. & S. S., Minneapolis, Minn.
 S. L. Van Akin, asst. supt. tel., N. Y. C. & H. R., Syracuse, N. Y.
 F. H. Van Etten, supt. tel., Sou. Ind. Chicago, Ill.
 J. M. Walker, supt. tel., D. & R. G., Denver, Colo.
 W. C. Walstrum, supt. tel., N. & W., Roanoke, Va.
 B. Weeks, supt. tel., Ill. Cent., Memphis, Tenn.
 L. S. Wells, supt. tel., Long Island, Long Island City, N. Y.
 F. S. Work, ch. opr., L. & H. R., Warwick, N. Y.
 F. T. Wilbur, supt. tel., Ill. Cent., Chicago, Ill.
 W. F. Williams, supt. tel., S. A. Line, Portsmouth, Va.
 W. H. Wright, c. t. depr., W. & M., Peshtigo, Wis.
 R. N. Young, asst. supt. tel., C. P., Winnipeg, Man.

INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.

The object of this association shall be the acquisition of experimental statistical and scientific knowledge relating to the construction, equipment and operation of fire and police telegraph, light, heat and power systems, and the diffusion

of this knowledge among the members of this association with the view of improving the service and reducing its cost; and the establishment and maintenance of a spirit of fraternity among its members.

Place of next meeting—Rochester, N. Y., 1910, at a date to be selected later.

OFFICERS FOR 1909-1910.

President, J. B. Yeakle, of Baltimore; first vice-president, J. S. Craig, of Toronto; second vice-president, A. L. W. Kittridge, of New Haven; third vice-president, A. J. Bell, of New Rochelle, N. Y.; fourth vice-president, C. S. McCosker, of Mobile, Ala.; secretary, Frank P. Foster, of Corning, N. Y.; treasurer, C. E. Diehl, of Harrisburg, Pa.

EXECUTIVE COMMITTEE.

S. W. Manning, of St. Paul, Minn.; H. G. Kennedy, of Rochester, N. Y.; S. L. Kingsbury, of Baltimore; O. M. Schafer, of Trenton, N. J.; A. S. Pierce, of Wallingford, Conn.; J. C. Simpson, of Washington, D. C.; Clarence R. George, of Houston, Tex.; C. S. Downs, of Altoona, Pa.; J. W. Kelly, Jr., of Camden, N. J.

ACTIVE MEMBERS OF THE ASSOCIATION.

H. R. Allensworth, superintendent of fire and police telegraph, Columbus, O.

Herbert W. Angier, superintendent of fire telegraph, Marlboro, Mass.

W. Arbuckle, superintendent of fire telegraph, Bayonne, N. J.

George R. Babcock, superintendent of fire and police telegraph, Oakland, Cal.

Alexis J. Balizet, superintendent of fire telegraph, Meadville, Pa.

Arthur J. Bell, superintendent of fire telegraph, New Rochelle, N. Y.

C. E. Beach, Binghamton, N. Y.

John Berry, superintendent of fire and police telegraph, Indianapolis, Ind.

P. J. Beisel, city electrician, Allentown, Pa.

B. A. Blakey, city electrician, Montgomery, Ala.

Harry A. Bowen, superintendent of fire telegraph, Cleveland, O.

Adam Bosch, superintendent of fire telegraph, Newark, N. J.

C. E. Bradshaw, city electrician, Charlotte, N. C.

Wm. Brophy, 17 Egleston street, Jamaica Plain, Mass.

Wm. H. Bradt, superintendent of fire telegraph, Troy, N. Y.

W. T. Brown, electrical bureau, Philadelphia, Pa.

H. C. Bundy, superintendent of fire telegraph, Watertown, N. Y.

Edward Burke, electrical bureau, Philadelphia, Pa.

F. A. Cambridge, city electrician, Winnipeg, Manitoba.

E. C. Chamberlain, 451 East 176th street, New York.

Abner Coleman, city electrician, Taunton, Mass.

John S. Craig, superintendent fire telegraph, Toronto, Can.

William Crane, city electrician, Erie, Pa.

Eugene N. Davis, superintendent of lights and wires, Brookline, Mass.

Wm. S. Devlin, American Union Telegraph Company, New Castle, Pa.

C. E. Diehl, superintendent of fire and police telegraph, Harrisburg, Pa.

M. J. Donohue, city electrician, Niagara Falls, N. Y.

J. H. Dorrington, 418 Orchard street, Pittsburg, Pa.

William Dodds, superintendent of fire telegraph, Waterbury, Conn.

C. S. Downs, city electrician, Altoona, Pa.

Will Y. Ellett, superintendent of fire telegraph, Elmira, N. Y.

Warren E. Fastnacht, superintendent of fire telegraph, York, Pa.

Leo D. Firman, electrical bureau, Philadelphia, Pa.

W. H. Flandreau, city electrician, Mount Vernon, N. Y.

Frank P. Foster, 136 Cedar street, Corning, N. Y.

C. F. Gall, chief operator fire department, Louisville, Ky.

Louis Gascoigne, superintendent fire telegraph, Detroit, Mich.

Clarence R. George, city electrician, Houston, Texas.

James Grant, superintendent fire telegraph, New Haven, Conn.

A. S. Hatch, Burnside, Ky.

C. C. Johnson, 44 East 23d street, New York.

P. G. Kern, superintendent American District Telegraph Company, Louisville, Ky.

W. L. Kent, city electrician, Lynchburg, Va.

H. G. Kennedy, superintendent of fire telegraph, Rochester, N. Y.

John W. Kelly, Jr., chief electric bureau, Camden, N. J.

L. L. Kingsbury, chief inspector, Baltimore, Md.

A. W. Kittredge, superintendent of police telegraph, New Haven, Conn.

John Leininger, city electrician, Canton, O.

Elmer G. Loomis, city electrician, Allegheny, Pa.

F. F. Loomis, city electrician, Akron, O.

F. E. Maize, electrical bureau, Philadelphia, Pa.

Frank C. Mason, Washington Mills, N. Y.

Joseph Maxwell, 44 East 23d street, New York.

T. F. Marron, superintendent of fire and police telegraph, Utica, N. Y.

G. F. Macdonald, city electrician, Ottawa, Can.

W. C. Matthias, superintendent of fire and police telegraph, Reading, Pa.

Geo. T. Manson, 253 Broadway, New York.

S. W. Manning, superintendent of fire telegraph, St. Paul, Minn.

Charles Marizot, superintendent of fire telegraph, Shreveport, La.

R. L. McCulloch, city electrician, Vancouver, B. C.

James McLaughlin, chief electric bureau, Philadelphia, Pa.

John W. McCarthy, superintendent of fire telegraph, Corning, N. Y.

C. S. McCosker, city electrician, Mobile, Ala.

P. H. McManus, superintendent of fire and police telegraph, Wilkes-Barre, Pa.

John McRobie, 147 Fifth avenue, Chicago, Ill.

P. W. Miller, 30 Church street, New York.

Jerry Murphy, superintendent of police telegraph, Cleveland, O.

M. Jervis Myers, superintendent of police telegraph, Syracuse, N. Y.

W. J. Neave, superintendent of fire and police telegraph, Scranton, Pa.

Chas. R. Newman, superintendent of fire telegraph, Passaic, N. J.

T. C. O'Hearn, city electrician, Cambridge, Mass.

John O'Brien, city electrician, Fond du Lac, Wis.

Price I. Patton, electric bureau, Philadelphia, Pa.

Walter M. Petty, borough electrician, Rutherford, N. J.

A. L. Pierce, superintendent Borough Electric Works, Wallingford, Conn.

F. E. Pierson, city electrician, Morristown, N. J.

Jacob B. Platt, superintendent of fire and police telegraph, Augusta, Ga.

Robert Quain, superintendent of fire and police telegraph, St. Louis, Mo.

Geo. L. Ross, assistant superintendent American District Telegraph Company, Pittsburg, Pa.

Oliver M. Schafer, superintendent of fire and police telegraph, Trenton, N. J.

Ion Simmons, city electrician, Charleston, S. C.

J. C. Simpson, superintendent of fire telegraph, Washington, D. C.

W. M. Smith, superintendent of fire telegraph, Portsmouth, Va.

R. C. Smith, Saftey Ins. Wire and Cable Co., New York.

R. A. Smith, city electrician, Norfolk, Va.

Joseph B. Smith, superintendent of police telegraph, Rochester, N. Y.

Howard L. Stanton, superintendent of fire telegraph, Norwich, Conn.

C. G. Sundquist, Municipal Electric Light Plant, Jamestown, N. Y.

Ulrich E. Taubenheim, superintendent water and electric department, Archangel, Russia.

Wm. H. Thompson, city electrician, Richmond, Va.

Joseph Trautner, superintendent of fire telegraph, Winona, Minn.

K. M. Turner, 1269 Broadway, New York.

M. S. Van Houten, superintendent of fire telegraph, Elizabeth, N. J.

James Warren, superintendent of fire telegraph, New Brunswick, N. J.

W. E. Walgamott, city electrician, Peoria, Ill.

J. W. Waggoner, superintendent of fire telegraph, Roanoke, Va.

J. B. Yeakle, superintendent of fire telegraph, Baltimore, Md.

THE GOLD AND STOCK TELEGRAPH COMPANY.

Executive offices, 195 Broadway, New York; incorporated in 1867 under the New York State laws; capital \$5,000,000.

OFFICERS.

Robert C. Clowry, president; Thomas F. Clark, vice-president; G. W. F. Atkins, vice-president; J. C. Willever, secretary; A. R. Brewer, treasurer.

George B. Scott, superintendent, 68 Broad street, New York.

The company is engaged in a general ticker service and a market quotation business, etc., the Western Union Telegraph Company's lines being utilized for the purpose.

THE AMERICAN DISTRICT TELEGRAPH COMPANY (NEW JERSEY.)

Executive offices, 15 Exchange place, Jersey City, N. J.; incorporated November 1, 1901; capital \$10,000,000.

OFFICERS.

Robert C. Clowry, president; G. H. Fearons, vice-president; C. F. Patterson, general manager; I. B. Ferguson, secretary and auditor; A. R. Brewer, treasurer; Lewis Dresdner, assistant treasurer.

SUPERINTENDENTS.

C. C. Johnson, at New York; J. McRobie, at Chicago; J. M. Maddox, at San Francisco; P. G. Kern, at Atlanta, Ga.

THE AMERICAN DISTRICT TELEGRAPH COMPANY (NEW YORK.)

Executive offices, 195 Broadway, New York; capital, \$4,000,000.

OFFICERS.

B. Brooks, general manager; D. Skelton, superintendent.

THE UNITED DISTRICT MESSENGER COMPANY.

Executive offices, 206 Broadway, New York; incorporated 1903; capital \$200,000.

M. W. Rayens, president and general manager.

THE AMERICAN TELEGRAPH AND CABLE COMPANY.

LEASED TO THE WESTERN UNION TELEGRAPH CO.

Executive offices, 195 Broadway, New York; incorporated 1880; capital \$14,000,000. London offices, 33 Broad street, House, New Broad street, E. C.

Robert C. Clowry, president; Thomas F. Clark, vice-president; J. C. Willever, secretary; A. R. Brewer, treasurer.

T. W. Goulding, European general manager.

OFFICES IN GREAT BRITAIN.

40 Mark Lane, London, E. C.; 21 Royal Exchange, London, E. C.; 48 Tooley street, London, S. E.; 109 Fenchurch street, London, E. C.; The Baltic, St. Mary Axe, London, E. C.; 1 Drapers' Gardens, London, E. C.; 5 Royal Opera Arcade, Pall Mall, London, S. W.; East India avenue (entrance); Ethingham House, Arundel street, London, W. C.; 2 Northumberland avenue, London, W. C.; 8 Rumford street and Cotton Exchange, Liverpool; Back Hall Chambers, Baldwin street, Bristol; 4 Waterloo street, Glasgow; 29 Gordon street, Glasgow; 10 Forster Square, Bradford; 1 Panmure street, Dundee; 50 Frederick street, Edinburgh; Exchange Buildings, Leith; 31 Brown street, Manchester; 1 Side, Newcastle-on-Tyne.

OFFICE IN FRANCE.

1 Rue Auber, Paris.

AGENCIES IN EUROPE.

10 Piazza della Borsa, Naples; 1 Rue Auber, Paris; VII/3 Neubaugasse, 75, Vienna; 4 Avenue de Keyser, Antwerp; 22 Binnenkant, Amsterdam; via Alfonso XII, No. 8, Madrid; 4 Princengade, Christiania; 5 Seidengasse, Zurich.

AGENCY IN CUBA.

Havana.

This system embraces a total length of cable of 7,351 nautical miles, as follows: Sennen Cove, near Penzance, England, to Dover Bay, near Canso, Nova Scotia, northern cable, 2,531 miles, laid in 1881; Sennen Cove to Dover Bay, southern cable, 2,576 miles, laid in 1882; Dover Bay to New York, 888 miles, laid in 1889.

INTERNATIONAL OCEAN TELEGRAPH COMPANY.

Capital \$3,000,000.

LEASED TO THE WESTERN UNION TELEGRAPH CO.

Robert C. Clowry, president; Thomas F. Clark, vice-president; J. C. Willever, secretary; A. R. Brewer, treasurer; J. W. Atkins, manager at Key West; Eugenio Fortun y Varona, agent at Havana, Cuba.

The total length of cable is 468 miles, as follows: Punta-Rassa, Florida, and Miami to Havana, Cuba, comprising the sections: Punta-Rassa to Key West, 120 miles, laid in 1890; Miami to Key West (twin core), 136 miles, laid in 1899; Key West to Havana, 108 miles, laid in 1886; Key West to Havana, 104 miles, laid in 1899.

ANGLO-AMERICAN TELEGRAPH COMPANY, LIMITED.

Executive offices, 26 Old Broad street, E. C., London, England; organized 1866; capital £7,000,000.

DIRECTORS.

F. A. Bevan, chairman; Sir Gerald Fitzgerald, deputy-chairman; S. Barber, Robert H. Benson, C. Burt, Henry Maitland Kersey, H. S. Leon; J. H. Carson, manager; T. H. Wells, secretary.

R. C. Smith, general superintendent, St. Johns,

N. F.; Charles Trippe, superintendent, 8 Broad street, New York; Fred. H. Waycott, manager, Montreal.

The property of the company consists of fourteen cables, and the total length of cable embraced in this system is 9,502 miles, with divisions as follows:

First Transatlantic System—Valentia, Ireland, to Bay Bulls, Newfoundland, laid in 1858; Valentia to Heart's Content, Newfoundland, laid in 1865; Valentia to Heart's Content, laid in 1866; Brest, France, to St. Pierre, laid in 1869; (these four cables have since been abandoned). Valentia, Ireland, to Heart's Content, 1,846 miles, laid in 1874; Valentia to Heart's Content, 1,890 miles, laid in 1880; Valentia to Heart's Content, 1,845 miles, laid in 1894.

Second European Communication—Cuckmere, Sussex, England, to Havre, France, 81 miles, laid in 1900.

Third Communication on American Coasts—Heart's Content to Placentia, Newfoundland, 61 miles, laid in 1873; Heart's Content to Placentia, 61 miles, laid in 1880; New Brunswick to Prince Edward's Isle, 12 miles, laid in 1856; Placentia to St. Pierre, 111 miles, laid in 1880; St. Pierre to Sydney, Cape Breton, 187 miles, laid in 1880; Placentia to Sydney, 320 miles, laid in 1873; Placentia to Sydney, 283 miles, laid in 1873; St. Pierre to Duxbury, Mass., 808 miles, laid in 1869; Sydney, Cape Breton, to Canso, N. S., 116 miles, laid in 1891.

THE MACKAY COMPANIES.

Boston office, 112 State street; New York office, 253 Broadway. Stock: Par \$100. Authorized: common, \$50,000,000; preferred, \$50,000,000. Issued: \$41,380,400; \$50,000,000.

TRUSTEES.

Clarence H. Mackay, president; William W. Cook, general counsel; George G. Ward, vice-president; Edward C. Platt, treasurer; Dumont Clarke, of New York; R. A. Smith, of Toronto; H. V. Meredith, of Montreal; M. W. Blackmar, of New York.

A voluntary association formed under the laws of Massachusetts, the agreement and declaration of trust in connection with the organization being dated December 19, 1903.

The company owns the whole or part of the capital stock of 102 cable, telegraph and telephone companies, including the entire capital stock of the Commercial Cable Company, \$23,000,000, and the various companies contributing to the Postal Telegraph system. It is also the largest holder of the stock of the American Telephone and Telegraph Company.

COMMERCIAL CABLE COMPANY.

Executive offices, 253 Broadway, New York; London office, Bishopsgate House, E. C.; organized 1883.

(See Mackay Companies.)

DIRECTORS.

Clarence H. Mackay, Col. William Jay, George G. Ward, Dumont Clarke, A. B. Chandler, E. C. Platt, Albert Beck, R. A. Smith, James Gordon Bennett, Rt. Hon. Lord Strathcona and Mount Royal, Thomas Skinner, C. R. Hosmer, George Clapperton, C. E. Merritt, S. S. Dickenson.

OFFICERS.

Clarence H. Mackay, president; George Gray Ward, vice-president and general manager; Albert B. Chandler, vice-president; Charles R. Hosmer, of Montreal, vice-president; George Clapperton, vice-president and traffic manager; S. S. Dickenson, vice-president and general superintendent; E. C. Platt, treasurer; C. E. Merritt, assistant treasurer; Albert Beck, secretary; J. O. Stevens, assistant secretary.

Manager in England, Frederick Ward.

SUPERINTENDENTS.

S. E. Austin, New York, Robert Herne, Rockport, Mass.; F. H. Putt, Boston; F. B. Gerrard, Canso, N. S.; F. Chevalier, Horta, Fayal, Azores Islands; R. J. Hughes, Waterville, Ireland; E. G. Phillips, London; J. Furze, Liverpool; Robert W. Budden, Manchester, England; H. J. Tracey, Glasgow, Scotland; Emile Ronot, Havre; Leon Crozat, superintendent of agencies, Paris, France.

Charles Priest, electrician, New York; John Gott, consulting engineer, London; F. H. Dennis, superintendent Clearing House, New York.

Frederick H. Laruder, commander, and F. H. Hamilton, electrician, cable steamer "Mackay-Bennett," stationed at Halifax, N. S.

The total length of cable embraced in this system is 16,164 nautical miles, with divisions as follows:

Waterville, Ireland, to St. Johns, Newfoundland, 1,796 miles, laid in 1884, diverted in 1909; Waterville to Canso, 2,348 miles, laid in 1884; Waterville to Canso, 2,161 miles, laid in 1894; Canso, Nova Scotia, to Horta, Fayal, Azores Islands, 1,698 miles, laid in 1900; Waterville, Ireland, to Canso, Nova Scotia, 2,238 miles, laid in 1905; Canso, Nova Scotia, to New York, 840 miles, laid in 1884; Canso to New York, 895 miles, laid in 1900; Canso to Rockport, Mass., 512 miles (twin core), laid in 1884; St. Johns to New York, 1,306 miles, laid in 1909; Havre, France, to Waterville, Ireland, 510 miles, laid in 1885; Waterville to Weston-super-Mare, near Bristol, England, 328 miles, laid in 1888; Waterville to Weston-super-Mare, 327 miles, laid in 1901; Waterville to Horta, Fayal, Azores Islands, 1,205 miles, laid in 1901.

COMMERCIAL PACIFIC CABLE COMPANY

Executive offices, 253 Broadway, New York; incorporated 1901.

(See Mackay Companies.)

OFFICERS.

Clarence H. Mackay, president; George G. Ward, vice-president and general manager; Albert Beck, secretary; E. C. Platt, treasurer.

SUPERINTENDENTS.

Benjamin W. Colby, Honolulu; D. Morrison, Midway; H. F. Harrington, Guam; E. Desnouee, Manila; John D. Gaines, Shanghai.

Basil Combe, commander cable steamer "Restorer," stationed at Esquimaux, B. C.

This system connects the United States with the Philippine Islands and China, the total length of cable being 10,010 nautical miles, with divisions as follows: San Francisco to Honolulu, Hawaiian Islands, 2,276 miles, laid in 1902; Honolulu, Hawaiian Islands, to Midway Island, 1,332 miles, laid in 1903; Midway Island to Guam, 2,606 miles, laid in 1903; Guam to Manila, Philippine Islands, 1,631 miles, laid in 1903; Manila to Shanghai, China, 1,264 miles, laid in 1906, Guam to Bonin (connecting at this point with the Japanese Government cable to Tokio, Japan), 899 miles, laid in 1906.

COMMERCIAL CABLE COMPANY OF CUBA.

Executive offices, 253 Broadway, New York; incorporated 1906.

(See Mackay Companies.)

OFFICERS.

Clarence H. Mackay, president, George G. Ward, vice-president and general manager; S. S. Dickenson, vice-president; Albert Beck, secretary; E. C. Platt, treasurer; C. E. Merritt, assistant treasurer.

John W. Lawson, superintendent, Havana, Cuba.

This system connects New York with Havana, Cuba, the total length of cable being 1,285 nautical miles, laid in 1907.

CENTRAL AND SOUTH AMERICAN TELEGRAPH COMPANY.

Executive offices, 66 Broadway, New York; organized 1881; capital \$14,000,000.

OFFICERS.

James A. Scrymser, president; W. Emlen Roosevelt, vice-president; Sebastian Camacho, resident vice-president, City of Mexico, Mex.; Robert L. McCann, general manager; Clarence Rapkin, treasurer; James R. Beard, secretary; John L. Merrill, auditor; J. Langdon Erving, purchasing agent.

DIRECTORS.

Edward D. Adams, Robert W. de Forest, J. Montgomery Hare, William Pierson Hamilton, Francis L. Higginson, Charles Lanier, W. Emlen Roosevelt, William D. Sloane, James A. Scrymser.

B. H. Reynolds, superintendent, 64 Broad street, New York city; Herbert Kingsford, superintendent; A. Davidson, electrician, and George F. Pescod, traffic manager, at Barranco, Peru; Charles Turner, superintendent Argentine and Chile land lines, Valparaiso, Chile; James Tiddy, manager, Buenos Aires, Argentina.

This company owns the cable steamer "Guardian," stationed at Callao, Peru.

This system embraces 11,693 nautical miles, with divisions as follows: First Atlantic system

—Vera Cruz, Mexico, to Coatzacoalcas, Mexico, 131 miles, laid in 1881; duplicated 142 miles, laid in 1889. Second Atlantic system—Salina Cruz, Mexico, to San Jose, Guatemala, 346 miles, laid in 1893 and 1882; San Jose to La Libertad, Salvador, 141 miles, laid in 1893 and 1883; La Libertad to San Juan del Sur, Nicaragua, 279 miles, laid in 1882; San Juan del Sur to Panama, Republic of Panama, 718 miles, laid in 1882; Panama to Buenaventura, Colombia, 413 miles, laid in 1882; Buenaventura to St. Elena, Ecuador, 543 miles, laid in 1882; St. Elena to Payta, Peru, 239 miles, laid in 1882; Payta to Chorillos, Peru, 553 miles, laid in 1882; Chorillos, Peru, to Callao, Peru, 20 miles, laid in 1891; Chorillos to Iquique, Chile, 747 miles, laid in 1891; Iquique to Valparaiso, Chile, 906 miles, laid in 1891; Salina Cruz, Mexico, to San Juan del Sur, Nicaragua, 690 miles, laid in 1893; San Juan del Sur to St. Elena, Ecuador, 1,034 miles, laid in 1893; St. Elena to Chorillos, Peru, 831 miles, laid in 1893; Iquique, Chile, to Chorillos, Peru (duplicate cable), 774 miles, laid in 1906; Iquique to Valparaiso, Chile, 903 nautical miles, laid in 1906; New York to Guantanamo, Cuba, 1,464 miles, laid in 1907; Guantanamo to Colon, Panama, 782 miles, laid in 1907; also 1,792 miles of land lines, including line from Valparaiso, Chile, to Buenos Aires, Argentina.

MEXICAN TELEGRAPH COMPANY.

Executive offices, 66 Broadway, New York; organized 1883; capital \$5,000,000.

OFFICERS.

James A. Strymer, president; Edmund L. Baylies, vice-president; Sebastian Camacho, resident vice-president, City of Mexico; Robert L. McCann, general manager; Clarence Rapkin, treasurer; James R. Beard, secretary; J. L. Merrill, auditor; J. Langdon Erving, purchasing agent; Otto Strubel, electrician.

DIRECTORS.

John E. Alexander, John W. Auchincloss, Edmund L. Baylies, J. Pierpont Morgan, Cornelius Vanderbilt, Percy R. Pyne, John J. Pierrepont, W. Emlen Roosevelt, James A. Strymer.

Charles E. Cummings, superintendent, City of Mexico; A. T. Webster, manager, Galveston, Texas.

The company owns the cable steamer "Relay," captain, Edgar Oldham, and the cable steamer "Mexican," both stationed at New York.

This system embraces 2,188 nautical miles, with divisions at follows: Galveston, Texas, to Vera Cruz, Mexico, 691 miles, laid in 1881-2; Galveston to Vera Cruz, 704 miles, laid in 1889; Galveston to Coatzacoalcas, 793 miles, laid in 1905. Also owns 738/2200 New York-Colon cable, and 265 miles of land line—Vera Cruz to Mexico City.

COMPAGNIE FRANCAISE DES CABLES TELEGRAPHIQUES.

Executive offices, 38 Avenue de l'Opera, Paris; organized 1894; capital 63,000,000 francs, (\$12,600,000). M. E. Jeramec, president; London of-

fice, 24 Royal Exchange, W. W. Howell, representative; New York office, 25 Broad street, Louis A. Lurienne, representative, United States and Canada, E. C. Sweeney, superintendent.

Other offices: London—2 Mincing Lane, New Bridge street, E. C., Baltic Mercantile and Shipping Exchange, E. C., 24 Southwark street, S. E.; Havre—40 Rue de Chillon; Brest—30-32 Rue de Chateau; Antwerp—Agency, 14 Rue Venus; St. Pierre, Miquelon; New York—Pulitzer Building, Park Row, 3 Mercer street, I Worth street, 581 Broadway, 65 Fifth avenue, 281 Fifth avenue; Orleans, Mass., Hugh Osborne, superintendent.

This system embraces 12,089 nautical miles of cable, with divisions as follows:

Franco-American system—Deolin, near Brest, France, to St. Pierre, Miquelon, 2,361 miles, laid in 1879; St. Pierre to Cape Cod, Mass., 829 miles, laid in 1879; St. Pierre to Canso, Nova Scotia, 258 miles, laid in 1879-89; Brignogan, France, to Penzance, Cornwall, England, 108 miles, laid in 1880-98; Deolin, near Brest, France, to Cape Cod, Mass., 3,173 miles, laid in 1898; Cape Cod to New York, 324 miles, laid in 1899.

South American system—Castillo de Aguadores, near Santiago, Cuba, to Guantanamo, Cuba, 50 miles, laid in 1888; Guantanamo, Cuba, to Mole St. Nicholas, Hayti, 126 miles, laid in 1888; Mole St. Nicholas, to Port-au-Prince, Hayti, 112 miles, laid in 1890; Mole St. Nicholas to Cape Haitien, Hayti, 96 miles, laid in 1888-91; to Puerto-Plata, San Domingo, 116 miles, laid in 1888-91; Puerto-Plata to Charlotte-Amelie, St. Thomas, 403 miles, laid in 1891-97; Charlotte-Amelie to Fort de France, Martinique, 361 miles, laid in 1891-97; Fort de France, to Paramaribo, Dutch Guiana, 703 miles, laid in 1890; Paramaribo to Cayenne, French Guiana, 270 miles, laid in 1891; Cayenne to Pinheiro, near Para, Brazil, 556 miles, laid in 1891-95; Fort de France to St. Pierre, Martinique, 19 miles, laid in 1891; St. Pierre, Anse a Belleville, Martinique, to Pointe-Pointe-a-Pitre, au Gozier, Guadeloupe, to St. Louis, Marie Galante, 19 miles, laid in 1889-90; Pointe-a-Pitre, Guadeloupe, to la Terre d'en Haut, Saintes, 23 miles, laid in 1897; La Terre d'en Haut, Saintes, to Basse Terre, Guadeloupe, 13 miles, laid in 1897; San Domingo to Curacao, 452 miles, laid in 1888; Curacao to La Guaira, Venezuela, 161 miles, laid in 1888; La Guaira to Puerto-Cabello, Venezuela, 76 miles, laid in 1897; La Guaira to Carenero, Venezuela, 73 miles, laid in 1898; Carenero to Guanta, Venezuela, 101 miles, laid in 1900; Guanta to Cumana, Venezuela, 30 miles, laid in 1900; Cumana to Port-la-Mar, Marguerite, 60 miles, laid in 1900; Port-la-Mar, Marguerite Island, Venezuela, to Campano, Venezuela, 40 miles, laid in 1900; Curacao to La Vela de Coro, Venezuela, 54 miles, laid in 1897; La Vela de Coro, Venezuela, to Maracaibo, Venezuela, 226 miles, laid in 1899.

Australian cable—Gomen, New Caledonia, to Bundaberg, Queensland, Australia, 793 miles, laid in 1893.

UNITED STATES AND HAYTI TELEGRAPH AND CABLE COMPANY.

Executive offices, 25 Broad street, New York.

OFFICERS.

George G. Ward, president; Ernest Thalman, vice-president; A. Beck, secretary; C. A. Ronne, treasurer; Louis A. Lurienne, general manager.

DIRECTORS.

George G. Ward, Ernest Thalman, A. Beck, George Clapperton, Louis A. Lurienne, E. C. Sweeney.

This system embraces 1,391 nautical miles of cable, laid in 1896, and extends from Coney Island, New York, to Cape Haytien, Hayti.

CUBA SUBMARINE TELEGRAPH COMPANY, LIMITED.

Executive offices, 58 Old Broad street, E. C., London, England; incorporated in 1870; capital £160,000.

DIRECTORS.

C. W. Parish, chairman; G. Keith, R. Kaye Gray, A. G. Low; James Scott, secretary.

This system embraces a length of 1,162 nautical miles, with divisions as follows: Batabano, Cuba, to Cienfuegos, Cuba, 147 miles, laid in 1891; Batabano to Cienfuegos, Cuba, 144 miles, laid in 1894; Cienfuegos to Santiago, Cuba, 420 miles, laid in 1875; Cienfuegos to Casilda, 47 miles, laid in 1895; Casilda to Tunas, 28 miles, laid in 1895; Tunas to Jucaro, 46 miles, laid in 1895; Jucaro to Santa Cruz, 81 miles, laid in 1895; Santa Cruz to Manzanillo, 59 miles, laid in 1895; Manzanillo to Cape Cruz, 51 miles, laid in 1897; Cape Cruz to Santiago, 139 miles, laid in 1897.

WEST INDIA AND PANAMA TELEGRAPH COMPANY, LIMITED.

Executive offices, Dashwood House, New Broad street, London, E. C., England; incorporated in 1877; capital £1,275,530 (£883,210 ordinary shares; £345,630 first preferred shares, and £46,690 second preferred shares).

DIRECTORS.

Walter B. Kingsford, chairman; Sir John Cameron Lamb, C.B., C.M.G., G. von Chauvin, H. Holmes, T. W. Goulding; R. T. Brown, manager and secretary.

This system embraces a total length of 4,355 knots of cable, with divisions as follows: Santiago, Cuba, to Holland Bay, Jamaica (No. 1), 160 miles, laid in 1870; Santiago, Cuba, to Holland Bay, Jamaica (No. 2), 146 miles, laid in 1878; Kingston, Jamaica, to Colon, Panama, 630 miles, laid in 1870; Holland Bay to St. Juan, Porto Rico, 683 miles, laid in 1870; St. Juan to St. Thomas, 72 miles, laid in 1871; Holland Bay to Ponce, Porto Rico, 647 miles, laid in 1874; Ponce to St. Croix, 135 miles, laid in 1875; St. Croix to St. Thomas, 48 miles, laid in 1875; St. Croix to St. Lucia, 344 miles, laid in 1898; St. Thomas to St. Kitts, 161 miles, laid in 1871; St. Kitts to Antigua,

49 miles, laid in 1871; Antigua to Basse-Terre, Guadeloupe, 73 miles, laid in 1871; Basse-Terre to Dominica, 51 miles, laid in 1871; Dominica to St. Lucia, 109 miles, laid in 1871 and 1907; St. Lucia to St. Vincent, 58 miles, laid in 1871; St. Lucia to Grenada, 154 miles, laid in 1898; St. Vincent to Barbados (No. 1), 99 miles, laid in 1871; St. Vincent to Barbados (No. 2), 94 miles, laid in 1890; St. Vincent to Grenada, 84 miles, laid in 1871; Grenada to Trinidad (No. 1), 89 miles, laid in 1871; Grenada to Trinidad (No. 2), 125 miles, laid in 1898; Trinidad to Demerara (No. 2), 344 miles, laid in 1891. The system also includes 212 miles of land lines.

THE DIRECT UNITED STATES CABLE COMPANY, LIMITED.

Executive offices, Winchester House, 50 Old Broad street, London, E. C.; organized July 17, 1877; capital £1,300,000.

DIRECTORS.

E. M. Underdown, chairman; Hon. Thos. H. A. E. Cochrane, C. E. Gunther, Sir James Pender, John Varley, H. C. B. Underdown; T. Finnis, general manager and secretary.

The property of the company consists of land lines connecting England and Ireland at Ballinskelligs, Ballinskelligs to Halifax, N. S., long section; and short section from Halifax, N. S., to Rye Beach, N. H.; land lines, Rye Beach to New York and Boston.

SUPERINTENDENTS.

A. C. Forshaw, London, England; J. H. Beswick, Liverpool, England; F. W. Topping, Ballinskelligs cable station, Ireland; S. Fenn and T. H. Chapman, assistant, Halifax, N. S.; W. J. Fraser and J. Fraser, assistant, Boston, Mass., and Rye Beach, N. H.; Clement Lee and J. N. Weisiger, assistant, New York.

PRINCIPAL OFFICES.

New York, 61 New street; 444 Broome street; 20 Spruce street.

Boston, 31 Devonshire street.

Halifax, N. S., 48 Bedford Row.

Glasgow, 4 Waterloo street.

Bristol, Black Hall Chambers, Baldwin street.

London, 39 Mark Lane, E. C.; 34 Throgmorton street; 4 Bishopsgate street (within); East India avenue, Leadenhall street; Baltic Chambers, St. Mary avenue; 50 Old Broad street.

Liverpool, D 6, Exchange Buildings.

DIRECT WEST INDIA CABLE COMPANY, LIMITED.

Executive offices, 33 Old Broad street, London, E. C.; organized 1897; capital, £120,000, (\$600,000).

TRUSTEES FOR DEBENTURE HOLDERS.

Right Hon. Lord Strathcona and Mount Royal and Thomas Skinner.

DIRECTORS.

Thomas Skinner, chairman; Lieutenant-Colonel T. G. H. Glynn, Charles R. Hosmer, George G.

Ward and Frederick Ward; general manager, Joseph Rippon; secretary, O. Rochs.

The total length of cable is 1,275 nautical miles, with divisions as follows: Bermuda to Turk's Island, 824 miles, laid in 1897; Turk's Island to Kingston, Jamaica, 451 miles, laid in 1897.

HALIFAX AND BERMUDA CABLE COMPANY.

Executive office, 33 Old Broad street, London,

TRUSTEES FOR DEBENTURE HOLDERS.

Marquis of Ailesbury and C. S. Grenfell.

DIRECTORS.

T. Skinner, chairman; Lieutenant-Colonel T. G. H. Glynn, Charles R. Hosmer, George G. Ward and Frederick Ward; general manager, Joseph Rippon, secretary, O. Rochs.

This cable, laid in 1890, connects Halifax, N. S., with Bermuda, the total length of cable being 851 nautical miles.

DEUTSCH-ATLANTISCHE TELEGRAPHEN GESELLSCHAFT.

Executive offices, 3-11 Stolkasse, Cologne, Germany; incorporated 1899; share capital 24,000,000 marks (about \$6,000,000), and 4% Debentures, 20,000,000 marks (about \$5,000,000).

Oscar Moll, managing director, and C. W. Guillaume.

This system embraces a total length of 9,653 nautical miles of cable, with divisions as follows: Borkum, Germany, to Horta, Azores, 1,888 miles, laid in 1900; Horta, to Coney Island, New York, 2,302 miles, laid in 1900; Borkum to Horta, 1,960 miles, laid in 1903; Horta to Coney Island, 2,357 miles, laid in 1904; Borkum to Vigo, Spain, (purchased by this company in 1905), 1,146 miles, laid in 1896.

PACIFIC CABLE.

British Pacific Cable Board; executive offices, Queen Anne's Chambers, Tothill street, Westminster, London, S. W., England. A. S. Baxendale, London, manager and secretary; F. J. Adye, accountant; J. Milward, manager in the Pacific, Sydney.

BOARD OF CONTROL.

Sir Henry W. Primrose, chairman; J. W. Cawston, treasury, and W. H. Mercer, C. M. G., crown agent for the colonies, representing the Imperial Government; Rt. Hon. Lord Stratford and Mount Royal, is C. M. G. High Commissioner for Canada, and Alexander Lang, representing the Government of the Dominion of Canada; T. A. Coghlan is agent general for New South Wales, and Sir Horace Tozer, agent-general for Queensland, representing the Commonwealth of Australia; Hon. W. Hall-Jones, High Commissioner for New Zealand, representing New Zealand.

SUPERINTENDENTS.

C. L. Hertslet, Suva, Fiji; D. Cuthbert, Nor-

folk Island; A. Smith, Doubtless Bay; T. C. Judd, Southport; R. G. McLachlan, Bamfield, B. C.; W. Bent, Fanning Island; W. E. Reichenheim, officer in charge Sydney, N. S. W.

The "all-British" Pacific Cable extends from Vancouver, B. C., Dominion of Canada, to Fanning Island, 3,458 miles; to Fiji, 2,043.10 miles; to Norfolk Island, 981.48 miles; to Moreton Bay, Queensland, Australia, 836.69 miles, and Norfolk Island to New Zealand, 518.74 miles, a total of 7,838.01 miles.

THE MARTHA'S VINEYARD TELEGRAPH COMPANY, INC.

Executive offices, Woods Hole, Mass. Incorporated 1900; capital \$10,000.

DIRECTORS.

H. G. Haddon, chairman; F. E. Clary, A. L. Edgecomb; J. H. Wentworth, secretary and treasurer.

The property of this company consists of 40 miles of land line and 25 miles of submarine cable, and connects the islands of Naushon, Pasque, Martha's Vineyard and Nantucket with the mainland.

The system was built by the Government in 1885, and purchased from them in 1900, and connects with the Marconi Wireless Station at Siasconset, Mass.

UNITED WIRELESS TELEGRAPH COMPANY.

Executive offices, 42 Broadway, New York City; organized under the laws of the State of Maine; charter obtained February 15, 1907; capital \$20,000,000, divided into ten millions preferred and ten millions common stock.

The Company maintains 32 land stations along the Atlantic and Gulf Coasts, from Eastport, Me., to Galveston, Texas; 42 land stations on the Pacific Coast from San Diego, Cal., to Katalla, Alaska; and 17 land stations on the Great Lakes, extending from Buffalo, N. Y., on the east to Chicago, Ill., and Duluth, Minn., on the west.

In the Atlantic and West Indian waters 135 commercial vessels are equipped and operated; on the Pacific Ocean 65 vessels, and on the Great Lakes 24 vessels.

OFFICERS.

C. C. Wilson, president; S. S. Bogart, first vice-president; C. C. Galbraith, second vice-president; Frederick I. J. Hanson, third vice-president; W. A. Diboll, treasurer; Cloyd Marshall, secretary and purchasing agent; L. C. Wallace, assistant treasurer; E. P. Davis, assistant secretary and purchasing agent.

DIRECTORS.

George H. Parker, Seattle, Wash.; S. S. Bogart, and C. C. Galbraith, New York; C. N. Fickert, San Francisco, Cal.; Rev. D. J. Starr, Columbus, Ohio; Frederick I. J. Hanson, Philadelphia, Pa.; C. C. Wilson, Denver, Colo.; Cloyd Marshall, New York; G. Ross Eshleman, Lancaster, Pa.; W. A. Diboll, Denver, Colo.

EXECUTIVE COMMITTEE.

Geo. W. Allen, chairman; S. S. Bogart, C. C. Galbraith, W. A. Diboll, C. C. Wilson, Cloyd Marshall, secretary.

OPERATING DEPARTMENT.

C. C. Galbraith, general manager, New York. Atlantic and Gulf Division: H. J. Hughes, superintendent, New York, Great Lakes and Northern Division: F. C. Anderson, district manager, Harvester Building, Chicago, Ill. Pacific Coast and Western Division: R. H. Armstrong, manager, Peoples Bank Building, Seattle, Wash.

FOREIGN OFFICES.

London, England, 70 Cornhill, E. C.; H. J. M. Ellis, European manager. Shanghai, China; Kegan and Rosencrantz, Asiatic agents.

ENGINEERING AND MANUFACTURING DEPARTMENTS.

Harry Shoemaker, chief engineer; C. D. Babcock, general superintendent of factories.

MASSIE WIRELESS TELEGRAPH COMPANY.

(Manufacturing and holding company.)

Executive offices, 4 Market Square, Providence, R. I.; incorporated 1905; capital \$300,000, actual property, stock on hand, and office and shop equipments.

OFFICERS AND DIRECTORS.

Walter W. Massie, president and general manager; Frank H. Cranston, vice-president; William R. Arnold, Jr., secretary and treasurer; James S. Kenyon, John G. Massie.

MARINE TRANSMISSION COMPANY.

(Holding exclusive right to operate the Massie system in the United States.)

Incorporated in New Jersey, 1904. Equipment consists of 26 boat installations, 6 land stations.

OFFICERS AND DIRECTORS.

Walter W. Massie, president and general manager; Frank H. Cranston, secretary and treasurer; Wm. R. Arnold, Jr., assistant treasurer; Frederic Culver, Granville Whittlesey.

THE TELEFUNKEN WIRELESS TELEGRAPH COMPANY OF THE UNITED STATES.

New York office 111 Broadway. Philadelphia office 1001 Chestnut street.

Gesellschaft für drahtlose Telegraphie, m. b. H. (Telefunken System) Tempelhofer Ufer No. 9, Berlin, Germany.

Branches in all parts of the world.

The following Telefunken stations have been installed and are in operation:

*Argentine Republic, 7 land, 25 ship and 12 portable stations. Austria-Hungary, 8 land, 16 ship and 4 wagon stations. Brazil, 4 land, 6 ship and 2 wagon stations. China, 13 land, 6 wagon and 5 portable stations. Cuba, 7 land stations. Denmark, 7 land and 10 ship stations. England, 2 wagon and 2 portable stations. Finland, 4 land stations. France, 2 land stations. Germany, 44

land, 156 ship and 16 wagon stations. Greece, 3 ship stations. Holland, 4 land, 14 ship and 2 portable stations. Japan, 1 land, 2 ship, 2 wagon and 2 portable stations. Mexico, 6 land and 2 portable stations. Norway, 4 land and 8 ship stations. Peru, 5 land stations. Philippine Islands, 2 land stations. Portugal, 1 land station. Roumania, 5 land stations. Sandwich Islands, 1 land station. Sweden, 4 land and 20 ship stations. Switzerland, 2 land and 2 wagon stations. Spain, 6 land, 6 ship and 2 wagon stations. Tunking, 2 land stations. Turkey, 2 land stations. Uruguay, 1 land station. United States, 20 land stations, 45 ship, 1 wagon and 8 portable stations. Russia, 26 land, 126 ship, 8 wagon and 2 portable stations. Kamchatka, 1 land station. Siberia, 1 land station. Total: Land stations 190, ship stations 439, wagon stations 43, portable stations 35.

The wagon and portable stations are used for military purposes.

105 additional stations under construction in Argentine to be completed by July, 1910.

MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED.

Executive offices, Watgate House, York Buildings, Adelphi, London, W. C., England; capital, £750,000, of which £250,000 are 7% cumulative preferred, and £500,000 common.

DIRECTORS.

Sir Charles Euan-Smith, chairman; G. Marconi, managing director; J. F. G. Bannatyne, H. Jameson Davis, Albert L. Ochs, Major S. Flood Page, Henry S. Saunders, H. Rial Sankey, Alphonsus Marconi, Henry W. Allen, secretary.

MARCONI INTERNATIONAL MARINE COMMUNICATION COMPANY, LIMITED.

Executive offices, Watgate House, York Buildings, Adelphi, London, W. C., England; capital, £350,000.

DIRECTORS.

G. Marconi, managing director; J. F. G. Bannatyne, Albert L. Ochs, Major S. Flood Page, Henry S. Saunders, Sir Charles Euan-Smith, Charles Roux, Edgar St. Paul de Sincay, H. Jameson Davis, H. Rial Sankey, Alphonsus Marconi.

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA.

Executive offices, 27 William street, New York; capital \$6,650,000; incorporated 1899.

OFFICERS.

J. W. Griggs, president; G. Marconi, vice-president; John Bottomley, vice-president and general manager; directors, inclusive of the officers: James M. Townsend, James W. Pike, Major S. Flood Page, Charles A. Terry, George T. Campbell, George W. Fishback, H. Jameson Davis.

MARCONI WIRELESS TELEGRAPH COMPANY OF CANADA, LIMITED.

Executive offices, 1724 Notre Dame street, Montreal, Que.; capital \$5,000,000.

DIRECTORS.

Andrew A. Allen, president; G. Marconi, vice-president; J. N. Greenshields, Robert Bickerdike, John Bottomley.

LA COMPANIA MARCONI DE TELEGRAFIA SIN HILOS DEL RIO DE LA PLATA.

Executive offices, 132 San Martin, Buenos Aires, Argentina; capital \$6,750,000.

DIRECTORS.

Dr. Manuel Quintana, president; G. Marconi, vice-president; Commendatore Tomas Ambrosetti, Ventura G. Coll, Commendatore Tomas Devoto, Henry Beauteemps, Antonio Terrarosa, Captain Guillermo Jose Nuñez, Sir Charles Euan-Smith, Colonel Sir Thomas Holdich.

LA COMPAGNIE DE TELEGRAPHIE SANS FIL.

Executive offices, 19 Rue Brederode, Brussels, Belgium; capital 600,000 francs.

DIRECTORS.

Lieut.-Col. Albert Thys, president; Maurice Travailleur, managing director; Charles Balser, Isidor Loewe, Berlin; Baron de la Chevrelière, Paris; G. Marconi, Albert L. Ochs, H. Jameson Davis, Major S. Flod Page, Gaston Perier.

LA COMPAGNIE FRANCAISE MARITIME ET COLONIALE DE TELEGRAPHIE SANS FIL.

Executive offices, 35 Boulevard des Capucines, Paris, France; capital 100,000 francs.

DIRECTORS.

Baron de la Chevrelière, managing director; John Dal Piaz, Cie Générale Transatlantique; Alfred Musnier, Charles Roux, Messageries Maritimes, G. Marconi.

Marquis L. Solari, 315 Corso Vittorio Emanuele, Rome, Italy. Branch of London Marconi Wireless Telegraph Company, Limited.

Marconi's Wireless Telegraph, Rue da Quitanda, 133-A, Rio de Janeiro, Brazil; Agency of London Marconi's Wireless Telegraph Company, Limited.

The property of the various affiliated companies of the Marconi system consists of 33 stations on the Atlantic Coast north of New York City, and on the Gulf of St. Lawrence; 37 in Great Britain and Ireland; 37 in Europe; 4 in Brazil; 3 in Chile; 3 in China; 5 in Egypt; 1 in Gibraltar; 5 in the Hawaiian Islands; 1 in Malta; 2 in Mozambique; 1 in Uruguay. There are 253 steamers and steam yachts fitted with the Marconi system. In addition to these, ships of the navies of the following countries are likewise fitted; Great Britain, United States, Italy, Brazil and the Argentine Republic.

THE MURRAY AUTOMATIC SYSTEM.

Some remarkable results have been obtained recently with the Murray automatic page-printing telegraph system.

During a trial on the Glasgow Herald private wire from London to Glasgow a speed of no less than 180 words a minute (simplex) was reached (5 letters and one space per word). The actual speed was about 200 words a minute, as a considerable number of contractions were used. Several columns of news were transmitted and successfully printed at this rate. To reach this speed the receiving mechanism had to punch 90 successive holes per second in the receiving tape. Working on short circuit, a speed of no less than 224 words a minute has been achieved, or 112 successive holes perforated in tape per second.

The typewriters are the weak point of high speed printing telegraph systems, as these machines are only constructed for hand use. Mr. Murray has constructed a special typewriter of his own, which works satisfactorily at 200 words (1200 letters) per minute, printing in page form.

Telegraph and telephone traffic was badly interrupted by the recent storms in Germany. The Berlin Tagliche Rundschau of November 27, 1909, quotes a long semi-official article from the "Deutsche Verkehrs-Zeitung" in regard to the traffic interruption, in which the following paragraph occurs:

"Great service was derived from the machine telegraph of Donald Murray, introduced some years ago, through the remarkable carrying capacity of which alone it was possible to utilize the cable connections between Berlin-Hamburg and Berlin-Frankfurt so fully as was done on this occasion. As an example, during one day more than 5700 (five thousand seven hundred) telegrams were exchanged between Berlin and Hamburg on one Murray duplex circuit."

The use of the Murray automatic system is chiefly for long lines, heavy traffic and news work.

It is hoped that it will be possible in a few months to make an announcement about a new Murray Multiplex printing telegraph that is specially suited for average traffic on average lines.

A blue book has been issued containing an appendix to the report of the International Conference on Electrical Units and Standards, of 1908, consisting of notes on the methods adopted in various standardizing laboratories, to realize the international ohm and ampere, and to prepare the Weston Normal cell. While the methods described fall within the general international specifications, the details of the procedure differ; the various methods, however, give very nearly identical results. The bulk of the matter relates to the procedure followed at the official laboratories of the United States, France, Germany and Great Britain, in the preparation of the Weston Normal cell. —London Electrical Review.

WIRELESS TELEGRAPHY AND TELEPHONY.*

BY H. S. WEBB.

Wireless telegraphy may be defined as the process of transmitting telegraphic signals between two points that are not connected together by any wires; and wireless telephony as the process of transmitting articulate speech between two such points. Wireless telegraphy has been gradually developed since about 1842, and may be divided into three classes. The first depends upon electric conduction, the second, upon electromagnetic and electrostatic induction, and the third upon the use of so-called Hertz, or electro-magnetic waves.

The term "wireless telegraphy" as now generally used, however, refers to the more recently devised methods like Marconi's, De Forest's, and so forth, in which electric or other waves, in free space, are utilized to transmit the signals between the sending and receiving stations. It is very seldom that a successful system, machine or method of any kind is entirely the invention of any one man; so with wireless telegraphy, it is impossible to say, in many cases, who invented this or that system.

Between the years 1864 and 1867 Maxwell of England predicted by a complete mathematical demonstration that electricity would be found to have the same nature as light, and hence that electrical disturbances would be propagated as waves through space with a velocity equal to that of light. The predictions of Maxwell were later proved experimentally by Hertz of Berlin. Hertz's experiments clearly demonstrated the fact that electromagnetic waves could be propagated through space and make their presence known in suitable currents hence it only remained for his successors to produce sufficiently powerful waves and to discover a sufficiently sensitive instrument that would detect such waves, in some manner, as our eyes readily detect the presence of light.

Electromagnetic waves, although identical with light waves in many respects, have different rates of vibration, different wave lengths and other different properties. For instance, while wood, brick, and many other substances are not transparent to light waves, they are transparent to electromagnetic waves. Most metal, however, is opaque to almost all waves. Our optical nerves are capable of detecting light waves but they cannot detect electromagnetic waves. On the other hand we now have various devices that are insensitive to light waves, but are sensitive to electromagnetic waves.

Research, within the last thirty years, tends to demonstrate that all electrical phenomena are due to a peculiar strain or stress of a medium called ether; that when in this condition the ether pos-

sesses potential energy, as is manifested by attractions and repulsions, by chemical decomposition, and by luminous, heating and various other effects. We do not know what electricity is, any more than we know what gravity is, we only know the effects due to it, and the laws that follow it.

Ether is assumed to be a medium having the properties of matter of infinitely small density. All space, including the most complete vacuum, the space between the planets and the stars, as well as the infinitely small spaces in the hardest crystal and the heaviest metal, in short, matter of every kind—is permeated by ether. It is comparable to an all-pervading jelly of almost perfect elasticity. An electrical disturbance produces a strain in this all-pervading jelly, or sets it into rapid vibration, thereby producing waves that travel through space and pass from one body to another with the velocity of light. When these waves in the ether reach a body sensitive to their particular rate of vibration their motion is imparted to the molecules of that body, which in their turn begin to vibrate; that is, the body becomes electrically excited. Light, heat, electricity and magnetism, are supposed to be transmitted through space by some active condition of the ether, usually in the form of vibrations.

Marconi, to whom much credit is due for the best results so far obtained in wireless telegraphy, uses in some cases electromagnetic waves generated by a powerful induction coil and a coherer which was invented by Branly about 1890, and later other devices for detecting the existence of the waves. Marconi was the first to use, for wireless telegraphy, the long wires projecting into the air at the sending and receiving stations.

To explain the action of the coherer, suppose we have two fairly clean pieces of metal in light contact connected in series with a single electric battery; a film of what may be called oxide intervenes between the surfaces so that only an insignificant current is allowed to pass, because the electromotive force of a single electric battery is insufficient to break down the insulating film of oxide. Now, if the slightest surging of electricity occurs across this contact, the film at once breaks down, perhaps not completely—that is a question of intensity—but permanently. Apparently more molecules get within range of each other and a momentary wave seems to weld them together. It is a singular variety of electrical welding. A stronger wave enables more molecules to hold on, and the change in the electrical resistance of the coherer seems to be proportional to the intensity of the electric radiation from a transmitting device. It is to be especially noted that the battery current does not cause the cohesion, but only shows that cohesion has taken place. The battery can be applied after the spark has taken place, and the resistance will be found to have changed as much as if the battery had been on all the time. The cohesion electrically caused can be mechanically destroyed.

*Abstract of paper read before the Engineers Club of Central Pennsylvania.

Any feeble mechanical disturbances such as scratches or taps are well adapted to restore the contact to its original high resistance and sensitive condition. The more feeble the electrical disturbances the lighter is the corresponding mechanical jar needed for restoration or decohesion.

Experiments of Marconi across the Atlantic Ocean seem to prove that the curvature of the earth has little or no effect upon the transmission of signals. The electromagnetic waves sent out by the transmitter seem to slide over the surface of the earth instead of following a straight line from the transmitting to the receiving station through the earth. A straight line through the earth from St. Johns, New Foundland, to Poldhu, England, would show that the summit of the ocean was about 142 miles above this line at a point midway between the two places. Either the electromagnetic waves or disturbances must slide over the surface or through the air, or else the earth must be transparent to them. Otherwise if the transmitter and receiver had to be on a straight line which would clear the surface of the ocean one or the other would have to be elevated about 650 miles. In fact the vertical wires are seldom more than 200 feet high. The best explanation seems to be that the electrical waves slide or bound in immense steps, probably about 1,200 feet high, over the surface of the ocean. It is possible that the surface of the ocean forms one reflecting surface and the rarefied atmosphere, some 1,200 feet above the surface of the earth, another reflecting surface and the waves are reflected back and forth between these two surfaces. The surface of the ocean acts apparently as a good reflecting surface and the long vertical waves seem to bound along like a marble that is thrown at an angle upon a smooth stone sidewalk.

While it is possible by suitable devices to set up disturbances in the ether, very much as disturbances can be set up in the air, nevertheless, we are still ignorant of the action of the ether when so disturbed and know nothing definitely about it.

If it is assumed that waves are radiated in all directions in space from the spark gap or antenna or both, then the electrical energy received on a surface one foot square at a distance of but one mile from the transmitter is less than one three-hundred-and-fifty millionth of the total energy radiated and furthermore the energy actually radiated as electric waves is perhaps not more than six or eight one-hundredths of the energy developed in the oscillator, the remainder being lost in the induction coil as heat and at the spark gap as heat, light, and sound. Hence, it is evident that signaling by wireless telegraphy is very inefficient compared with signaling through connecting wires in the ordinary way. Experiments show that it requires about 150 watts to signal twenty miles. To send a signal through an ordinary telegraph line wire and relay, a distance of

200 miles requires about three watts (allowing for all losses), or one-fiftieth of the power required to send a wireless signal only twenty miles.

We know that it is much more difficult to transmit electromagnetic waves the same distance over the irregular surface of the land. With the same apparatus and conditions the distance over which it has been possible to transmit messages over land has only been about one-third the distance over water.

While wireless telegraphy systems may be successfully operated over land, the largest field for its use is certainly on oceans and lakes where wires cannot be maintained.

As the field for wireless telegraphy and telephony is mostly between the shore and ships, stations are being continually constructed along the coasts and more vessels are being continually equipped with suitable wireless outfits. It is now quite common for vessels to keep in communication with the American or European coast stations all the way across the ocean, as well as with passing vessels. The United States now proposes to compel all passenger ships to carry wireless signaling outfits.

In December, 1901, the first signals, which consisted only of the letter *s* in the continental telegraph code, were sent by the Marconi system across the Atlantic Ocean from Poldhu, England, to St. Johns, Newfoundland. In February, 1902, messages were sent from Poldhu to the ship *Philadelphia*, as the latter proceeded to the United States. The signals were recorded on a Morse register. Readable messages were received up to a distance of 1,551 miles from Poldhu, and simple signals as far as 2,099 miles. In December, 1902, Marconi sent messages both ways between Poldhu and Glace Bay, Nova Scotia. Between these points this company claims to be competing to-day with the cables between America and England.

In July, 1908, messages were exchanged between Admiral Sperry's flagship and Point Loma, California, a distance of 2,900 miles, up to that date the longest distance for the transmission of a wireless message without intermediate relaying stations. The longest distance with one relaying station was from Savannah, Georgia, to the armored cruiser *Pennsylvania* on its way to Honolulu, a distance of 4,000 miles with a relay at Point Loma. The message travelled 2,070 miles over land and 1,930 over sea.

A serious fault that prevents wireless telegraph systems from competing with systems using connecting wires, is the fact that with the arrangement of apparatus so far devised it is impossible to obtain, at the same station, two independent communications; every receiver placed in the radius of action of a transmitter is acted upon by the waves sent out by that one transmitter. Various systems have been proposed to avoid this fault. If a circuit having certain electrical resistance, inductance and capacity be placed in a region in which waves are passing, so that succes-

sive waves can induce currents in it, then each wave will tend to slightly increase the intensity of the preceding wave, providing the waves have a certain frequency; that is if they are in tune with the receiving circuit. The oscillations will increase in intensity, just as small pushes given to a pendulum at the proper times will make it swing violently. In such a system the receiving circuit is said to be in tune, resonance, or sympathy with the waves and the transmitting circuit that emits the waves.

Research has shown that in some circuits the electric oscillations die away very rapidly and are said to be damped. In order to set a heavy pendulum vibrating with a large amplitude by means of small thrusts or impulses, the latter must be timed to agree with the period of oscillation of the pendulum, since otherwise its oscillations will not acquire any appreciable magnitude. The same effect is obtained in a very small fraction of a second when undamped oscillations are caused to induce electrical impulses in a circuit tuned or adjusted to the frequency of these undamped oscillations. Electrical resonance, like mechanical resonance, essentially depends on the accumulated effect of a large number of small impulses properly timed.

That under certain conditions various receivers will respond to one transmitter, even if the receivers are not in tune with that transmitter, may be due to the fact that all the energy of the transmitter is radiated in only one or two impulses that are intense enough to start sufficiently strong oscillating currents in all the receivers to operate them, whereas, if the same amount of energy be distributed in a great number of more feeble impulses, their combined effect can only operate that receiver which is tuned to respond to only that one particular frequency. The tuned receiver will not respond with sufficient intensity to the first two or three oscillations, if not too strong, but only to a longer succession of properly timed impulses, so that only after an accumulation of a number of impulses will the effect become sufficient to actuate the receiving device and cause the production of a signal.

The electrolytic wave detector consists essentially of a very minute platinum point dipping into a small metal vessel containing an electrolyte whose products when decomposed by electricity are gases. The vessel may be made of platinum or some other metal or it may be made of carbon, glass or porcelain, with a sheet or flat spiral of platinum, or some other metal as one electrode. When an electromotive force is applied to such a cell, powerful polarization or a back electromotive force ensues, so that scarcely any current passes, if the electromotive force is kept below a certain critical value. When electric oscillations pass through this cell, the resistance is decreased and the current is momentarily increased, only to return to normal conditions as soon as the oscillations cease.

The cell made by the National Electric Signal-

ing Company is said to consist of a minute platinum cup, containing the electrolyte into which dips a platinum point about .002 millimeters in diameter. This platinum wire, called a Wollaston wire, is drawn with a coating of silver and the silver is finally dissolved in acid, leaving the very fine bare platinum wire. The potential applied to the circuit containing this electrolytic cell may vary from 1 to 2.7 volts, but the best pressure across the cell seems to be 1.6 volts. For the electrolyte, a fifty per cent. solution of hydrochloric acid, a twenty per cent. solution of nitric acid or a thirty per cent. solution of sulphuric acid may be used. The hydrochloric acid seems to be the most sensitive. The resistance of the detector for small alternating currents varies from about 20,000 to 400 ohms, according to the polarizing electromotive force applied by means of the battery. When the electromotive force is changed .02 volts, using a solution of hydrochloric acid, the resistance changes 13,000 ohms.

The audion, so-called by De Forest, consists of an exhausted incandescent lamp, preferably a four to six-volt tantalum lamp, to which is added two metal parallel wings. The battery must be suitable to keep the filament incandescent and for the battery enough dry cells must be used to give from six to eighteen volts. De Forest, in 1906, said that tuning with his audion was sharper than with any other form of detector, and that the same signals for practical distances were louder than with the electrolytic detector. The oscillating waves passing from the wings to the filament reduce the conducting power of the attenuated gas between them, and hence the current through the relay is decreased.

In addition to those already considered there are quite a number of other devices for detecting the waves produced by wireless telegraph or telephone transmitting apparatus. The carborundum detector consists of a crystal of carborundum clamped between two adjustable springs. This detector is connected in the circuit in the same manner as the coherer, but a telephone receiver is used to receive the signals in place of a relay.

The silicon detector consists of a piece of pure silicon held with suitable pressure between two low-resistance metal electrodes. The incoming oscillations in passing across the contacts heat one silicon-metal contact more than the other, thereby causing a direct thermoelectric current impulse for each oscillation and producing a sound in a telephone receiver as long as the oscillations persist. The silicon detector requires no battery in the telephone receiver circuit although some state that it works much better with a battery and is claimed to be twice as sensitive as the carborundum detector and about as sensitive as the electrolytic detector. Tellurium, fused sulphide of copper, the natural variety of the latter called, chalcosine, sulphide of molybdenite, and Becquerel's alloy (10 parts of bismuth and 1 part

of antimony) may each be used in the same way, requiring no battery. These thermo-electric detectors respond, not in accordance with the variation of potential, but in accordance with the mean energy impinging upon the system.

Most oscillations produced by wireless telegraph transmitters are very much damped, that is, succeeding waves decrease greatly in amplitude, so that only the first few waves have sufficient intensity to affect the distant receiver. Poulsen has succeeded in producing waves that are so much less damped that they are called "undamped waves." Undamped oscillations are very desirable for selective or tuned systems, but it seems to have been difficult to produce damped waves that are as powerful as undamped waves. Poulsen's transmitter for producing undamped waves, is a so-called singing or flaming arc maintained between a positive copper and a negative carbon electrode. When the capacity and inductance that shunt the arc are suitably adjusted, rapid oscillations of nearly uniform amplitude are produced in the circuit, including the antenna and ground. The energy emitted by this method is low, but will undoubtedly be increased by improvements.

Wireless Electric Power.

In a recent newspaper interview Mr. Nikola Tesla discussed the subject of wireless transmission of electric power, a subject upon which he has been working since 1893.

The popular idea, he said, is that the wireless system of transmission is just one invention, but the fact is that it involves in its present state of perfection six fundamental discoveries, or inventions, in combination. They are as follows:

First.—The method and apparatus for transforming ordinary currents into electrical oscillations of great intensity.

Second.—The apparatus for intensifying those vibrations immensely, so that they penetrate into the distance.

Third.—A receiving apparatus which collects and focuses energy which a transmitter supplies to a large territory. For instance, if such a receiver, properly constructed, be placed in Ireland it will collect practically the entire energy conveyed to that country from the transmitter.

Fourth.—The method and apparatus for making the electrical impulses secret and non-interferable. That is to say, making it impossible to prevent their passage or to read them. The energy of the transmitter, which is collected by the receiver, only can be released by a sort of safety lock or combination.

Fifth.—The production of stationary waves. That is, waves which excite the entire earth and pass through it under a vibration much the same as though you were to draw a string tight and then strike it. With these waves the distance is absolutely eliminated, as the effects are the same whether the receiver is thousands of miles away or close to the transmitter.

Sixth.—A number of inventions which cannot very well be described in a short interview, but which go together to make the system practically operative.

With a plant constructed under the observance of these principles, it will, he said, be just as easy to telephone from here to Melbourne, Australia, as across a room, and there will be absolutely no distortion of the voice, such as is observable now in communicating by wire. This, he added, is not a theory, but a fact absolutely demonstrated by his experiments, which have shown that the current passes without loss over the entire extent of the globe and through the globe. He has carried the construction of such an installation very far and hopes to be able to complete its construction during the coming summer. From that moment every telegraphic, telephonic as well as every wireless station will, he said, be ever so much more valuable, as they will be able to receive messages from any part of the world. All this will be done without the slightest change in the existing equipment.

"Will it be necessary under your plan, Mr. Tesla, to build high towers on the shores of the countries using it, and also in interior points?" the inventor was asked.

As to large towers these, he said, are comparatively ineffective. The tower he has built near Port Jefferson, L. I., is only 187 feet high, but the plant will produce an effect which can be pushed up to a rate of 1,000,000,000 horse-power, which is more than all the wireless plants that have been put up so far altogether. This enormous activity is secured by the use of certain artifices on which he also bases a confidence that it will be possible to flash signals through interplanetary space.

As to his wireless system for the transmission of electric power, he said that if had not been for unfortunate circumstances a plant of this kind would long ago have been in operation. Just one single plant of, say, 10,000 horse-power, would be sufficient to drive several thousand flying machines, aeroplanes and dirigibles anywhere in the world. While supplying them with wireless power it also would keep them in constant touch with the earth by wireless telephone and telegraph.

Referring to interplanetary signals, he said he had in his experiments in Colorado discovered certain planetary disturbances, and attained with his transmitter activities which surpassed in power in many ways those of lightning. In his present plant he will be able to reach a rate of energy-delivery of about 1,000,000,000 horse-power. A simple calculation will, he said, convince any expert that with such an intensity and energy reaching a certain area of the planet Mars, it is ample to produce a perceptible effect in a delicate instrument there.

In answer to a question as to return signals, he said he believed that these signals are being flashed now and waiting for us to answer.

The Military Telegrapher in the Civil War.

PART XXXIII.

Among those prominently connected with the military telegraph service during the Civil War was William G. Fuller, who was identified with this important branch of the army through the entire war, being at one time in charge of the Department of Tennessee, and at the close of the war having supervision of the Department of the Gulf. In writing to Colonel William R. Plum, historian of the United States Military Telegraph Corps in 1878, Mr. Fuller told in part the following story of his war time experience:

"At the outbreak of the Rebellion I was in charge of the telegraph lines from Grafton, in West Virginia, to Cincinnati, O., on the Baltimore and Ohio, and Marietta and Cincinnati railroads. In May, 1861, the Confederate forces occupied Grafton, taking possession of the telegraph office. This force was understood to be in command of Colonel Porterfield. In common with the citizens of Marietta, O., my place of residence, I was much alarmed at the threatening aspect of affairs. Reports came to us that the Confederate forces were moving towards the Ohio River, threatening Parkersburg. A meeting of citizens was called and a committee sent to Columbus to urge upon Governor Dennison the importance of organized forces to protect our homes. The telegraph at this time was the center of attraction, and the principal agent in facilitating operations. For two or three weeks I scarcely slept at all, watching every movement night and day. The committee sent to Columbus returned with Captain Barnett's battery of six guns from Cleveland, O. On May 26 the Fourteenth Ohio Volunteer Regiment, Colonel James B. Steedman commanding, arrived from Toledo. On the same day I received a despatch from Colonel Anson Stager instructing me to take the first train for Cincinnati. Monday, May 27, I spent part of the night at General G. B. McClellan's house, learning the use of the first army cipher to be used in telegraphing. Tuesday, May 28, I entered West Virginia at Parkersburg with Colonel Landers of General McClellan's staff. Mrs. Fuller endeavored to obtain a promise from me before leaving home on Monday, that I would not go to West Virginia. I replied that I could promise nothing, as I was a public servant. So anxious was she in regard to the matter that she followed me on the next train to Cincinnati to endeavor to prevent me from taking such a step. Not being advised of her movements we did not meet. I went home to say good-bye, but my wife was not there. She did not see me until six weeks had passed.

"We followed the troops out along the line of the railroad, repairing the wires and keeping open communication with Cincinnati. The night after our troops started along the line of the railroad was very dark. I was in the office at Parkersburg watching for communication from the front when there were several muskets fired across the

Little Kanawha River. Colonel Landers came rushing into the office, pistol in hand, apparently much alarmed, and said: 'Fuller, are you armed?' I said, 'No, I have had no time to procure arms.' He said, 'I believe we are attacked. I want some one to go with me to see what it is. Here, take this pistol and follow me.' I took the pistol and followed through the long dark depot to the bridge and across the Little Kanawha, where he turned laughing and said, 'Well, I see you are not badly frightened. I just wanted to try you. We will go back.' Many of the railroad bridges having been burned and the telegraph wire destroyed, the progress was slow towards Clarksburg. We finally reached that place June 18, and Webster Station, June 20, when I met Mr. T. B. A. David, who had advanced with the forces under Colonel Kelly from Wheeling, W. Va. From Webster we commenced extending the wire to Phillipi, but the first real skirmish at that place being over this line was abandoned, and Mr. David and myself returned to Clarksburg. Mr. David took charge of the operating of the lines and I took the advance towards Buckhannon. When about twenty miles out Mr. David took the advance and I returned to Clarksburg. He had reached a place within two miles of Rich Mountain with the wire July 9 when that battle occurred. After the battle the line was extended to Beverly, where an operator was left in charge, and Mr. David returned to Clarksburg. This exhausted our immediate stock of building material.

"While waiting for more building material the battle of Bull Run was fought. This gave the foe great encouragement, but it made our troops very determined. General McClellan was ordered east and General Rosecrans succeeded to the command in West Virginia. The bringing up of troops and supplies so overcrowded the limited and disjointed means of transportation that our supplies were very much delayed. Both Generals McClellan and Rosecrans gave us every possible facility for our operations, at once recognizing the importance of the telegraph to hasten military operations. An Indiana regiment coming up the road shot our wires in two in several places, but we could not ascertain who the offender was. General McClellan thereupon issued an order forbidding all firing from trains, and making the shooting at the telegraph wires punishable with death. This checked the matter. We had received orders to construct a line to Weston, a distance of twenty-four miles, as soon as our material should come to hand.

"We started this line on Friday, July 26, proceeded three miles and exhausted supplies, waited until Sunday noon, then went three miles further. Monday we went seven miles; Tuesday, seven miles, and on Wednesday reached Weston. This line was on a turnpike road and in several places we had to haul poles three and four miles, there being no trees that we could use. At Weston we halted for orders, the country beyond being infested with bushwhackers, who sent threats to us

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H. DURANT CHEEVER, } *Managers.*

GEO. T. MANSON, *General Supt.*
W. H. HODGINS, *Secretary.*

that if we attempted to extend the wires they would shoot us from the rocky hills and mountains. General Rosecrans detailed a company from the Fifth Ohio Infantry, under command of Captain Theophilus Gaines, to act as our escort and flank the road as we proceeded with the wire. This company was composed of machine shop, foundry and rolling mill hands from Cincinnati, O., and they were very efficient soldiers, being light and pluck to the core. Captain Gaines had a misunderstanding with Colonel Dunning, commander of the regiment, which was the immediate, and to us, very fortunate cause of our securing so efficient a company to escort and assist us. I remember one of our first despatches was from a captain who had been sent by General Rosecrans to disperse a band of unarmed Confederates at a rendezvous somewhere in Gilmer County, W. Va., stating that he had learned that said Confederates had received arms and were marching in large numbers, intending to surround and capture his force; that he was on a hilltop and entrenching, and would hold out until General Rosecrans could send him assistance. In a moment this reply came back:

Sir: You were sent into the field to become a terror to the enemy, and not to be terrified by them. March out of that entrenchment and disperse the enemy and report at these headquarters.

(Signed) W. S. Rosecrans,
Brigadier-General Commanding.

The following despatches will explain my movements during the next few days following this incident:

Clarksburg, W. Va., August 10, 1861.

To W. G. Fuller, Superintendent Military Telegraph, Weston, W. Va.

Proceed with your lines. Tell Captain Gaines to scout well in front of you and keep the road well flanked.

(Signed) W. S. Rosecrans,
Brigadier-General Commanding.

Clarksburg, W. Va., August 13, 1861.

To W. G. Fuller, Superintendent Military Telegraph, Near Imboden's.

Proceed with line cautiously. Tell Captain Gaines to scout well in front until you arrive at Bulltown. By the time you get there I think the country will have been well cleared out.

(Signed) W. S. Rosecrans,
Brigadier-General Commanding.

Clarksburg, W. Va., August 14, 1861.

W. G. Fuller, Superintendent Military Telegraph.

The Commanding General directs me to tell you to halt your company at Bulltown. Send forward the despatches to Colonel Smith and await the arrival of Lieutenant Colonel Mathews by order.

(Signed) George S. Hartsuff,
Assistant Adjutant General.

"While at Bulltown our wire was cut at Imboden's and about a mile of wire taken away. Captain Gaines and I went down to examine into the matter. Old man Imboden professed innocence, claimed that he knew nothing about it, or who did it. We simply told him that we would give

him until ten o'clock next morning to find and return the wire; if not found we should burn his home, and shoot him if we could find him; that if the wire was not permitted to stand there should be no houses or inhabitants left in that section of the country. We returned at ten the next morning and found the wire in the woods near by. The line was not disturbed again in that vicinity as long as I remained in charge. This Imboden was father of the famous Confederate general by that name.

Clarksburg, W. Va., Aug. 21, 7:20 p. m.

W. G. Fuller, Superintendent Military Telegraph, Bulltown, W. Va.

General Rosecrans wishes you to continue line to Flatwoods, W. Va., and then await orders.

David.

Clarksburg, W. Va., August 27, 1861.

W. G. Fuller, Superintendent, Flatwoods.

Proceed with telegraph line to Sutton with all possible speed.

(Signed) George S. Hartsuff,
Assistant Adjutant General.

Sutton, W. Va., August 28, 1861.

Brigadier-General Rosecrans, U. S. A.,
Clarksburg, W. Va.

General: I have the honor to report that we broke the camp at the Flatwoods Mountains yesterday at two o'clock and reached this place with the wire at two o'clock to-day.

Very respectfully,

(Signed) W. G. Fuller,
Superintendent Telegraph.

"We remained at Sutton some days until General Rosecrans with his army had arrived, when the orders were given to proceed towards Summerville with the wire. Two companies of infantry were sent in advance of us to clear the road and protect us from attack. We started at day-break with instructions to push the work as the column was expected to move forward the next morning. About five o'clock in the afternoon we found the two infantry companies in camp nine miles from Sutton. We requested them to advance, but they refused. Captain Gaines said: 'Mr. Fuller, if you want to go further I will scout the road until dark.' He did so. The next morning we started early and reached the summit of the small mountain between Little Birch River and the ford of Big Birch. Here a citizen informed us that the Confederates were at Birch Ford, and that their pickets left where we now were about two hours before. I put on my instrument and sent the following report:

To Brigadier-General W. S. Rosecrans, Sutton, W. Va.

General: I have the honor to report that we are on the summit of Little Birch Mountain and my instrument is on the rock occupied by the Confederate pickets last night. There is a Confederate force reported at Birch Ford, four miles ahead of us. We have not seen the two infantry companies since passing them at five o'clock last night in camp. What are your orders?

Respectfully,

(Signed) W. G. Fuller,
Superintendent Telegraph.

Sutton, W. Va.

To W. G. Fuller, Commanding Telegraph.

Keep your teams hitched ready to fall back at a moment's notice and await further orders.

(Signed) W. S. Rosecrans,
Brigadier-General Commanding.

"A few moments after receiving this despatch the wires were cut behind us. We started a party back to examine. They soon returned and reported the enemy in the road four miles back. In this situation we remained that night watching the Confederates down the mountain.

"About four o'clock the next morning we heard a force coming up the mountain. We were prepared to give them the best reception we could, but we soon discovered that they were cavalry sent to our relief. We remained here until noon, when General Rosecrans dined with me on a rock. We had chicken, potatoes and other vegetables procured by our scouts on the side of the mountain where spots were under cultivation. The road being very narrow our work was much delayed by the column passing us, but we did our best to keep up and were about four miles back when the battle at Carnifax Ferry was fought on September 10. After that battle we were instructed to continue the line to Gauley bridge. On reaching Cross Lanes I received permission to return to Clarksburg to adjust my railroad and commercial business, which had been neglected.

"I returned to Clarksburg over the line in company with a cavalry lieutenant, leaving the charge of extending the line with Captain Gaines and his company. On the first night out we stopped with a family, who had assisted me and I thought we were safe, telling them that we wished to start at four o'clock in the morning. We retired to a small room in the log cabin with one small square window and one door. We were awakened in the night by strange noises. The Lieutenant was alarmed, and thought we were betrayed. We looked out of the window and saw a man some distance down the hillside, moving about the stable where our horses were. The dog was walking around the house growling, and we could hear whispering in the house, but not loud enough to hear what was said. We barricaded the door and prepared to make as good a fight as possible at the window, and then stood guard for an hour until morning began to dawn. We then found that the man at the barn was feeding our horses, and the women were dressing and cooking chickens for our early breakfast, and to give us for lunch the next day. Between this and Sutton, however, in the vicinity of Birch River we passed dead soldiers in the road shot by bushwhackers, but we were not molested; we stopped at Sutton that night, took dinner next day with my friend Imboden, near Bulltown, and reached Weston next evening, where we left our horses and took coach and went through to Clarksburg.

"I continued the line down the Kanawha to Charleston, then went to Point Pleasant and laid

the cable across the Ohio River, first covering the cable with wire at the Fair Grounds near Gallipolis in Ohio.

Cleveland, O., December 10, 1861.

To W. G. Fuller.

Can you go into Kentucky for three or four weeks? If so, please come here Tuesday morning prepared to go direct to Kentucky.

(Signed) Anson Stager.

In response to this message I reported at Cleveland and arranged with Captain Samuel Bruch, whom I now met for the first time, to go into Kentucky with him, Mr. T. B. A. David remaining in charge of affairs in West Virginia with Captain Gaines and his company at General Rosecrans' headquarters, and a Mr. Cushman, sent by Mr. Stager to complete the line between Charleston and the cable at Point Pleasant."

(To be Continued.)

United States Military Telegraph Corps.

Colonel William Bender Wilson, of Holmsburg, Philadelphia, Pa., president of the Society of the United States Military Telegraph Corps, sent out the following letter of holiday greeting to the surviving members of the corps:

Dear Comrades:

In the spirit of the season and the affectionate impulses of my heart, I dearly wish that the remnant of a fast disappearing band who gallantly and exceptionally served their country in the hours of its greatest need may have a "Merry Christmas" and spend a "Happy New Year."

Lovingly,

William Bender Wilson.

To this David Homer Bates, secretary of the society, added:

To my Comrades of the United States Military Telegraph Corps:

The undersigned heartily joins in our beloved President's holiday greetings and wishes you another year of life and all the comfort and happiness you are entitled to receive in return for the loyal and valuable service rendered by you to your country in your early days.

Let us cherish more tenderly than ever before the memories of those stirring and eventful times as one by one we drop from the ranks.

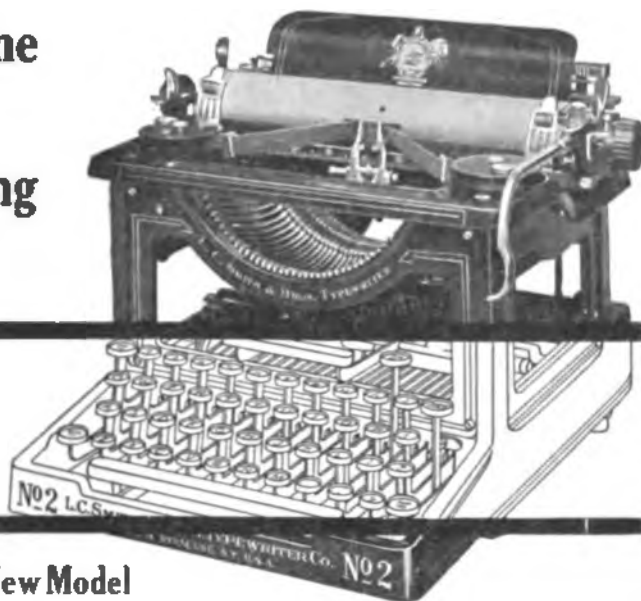
Cordially yours,

David Homer Bates.

On Monday evening December 20 the Pennsylvania Reserve Association held its forty-eighth anniversary in commemoration of the Battle of Dranesville, Va., in 1861, at Odd Fellows' Temple in Philadelphia. Captain John Jack presided and paid a glowing tribute to Morse's invention of the telegraph and to its invaluable assistance in war. Colonel William Bender Wilson, president of the Society of the United States Military Telegraph Corps, responded in his well-known enthusiastic vein, illustrative of his loyalty to his old craft and to the interests of the military boys.

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Every operating device inbuilt where it should be—under the operator's hand. Shift-key, shift lock, space-bar, tabulator, spacer, back-spacer and margin-release—all handy, convenient, right at your fingers' ends.



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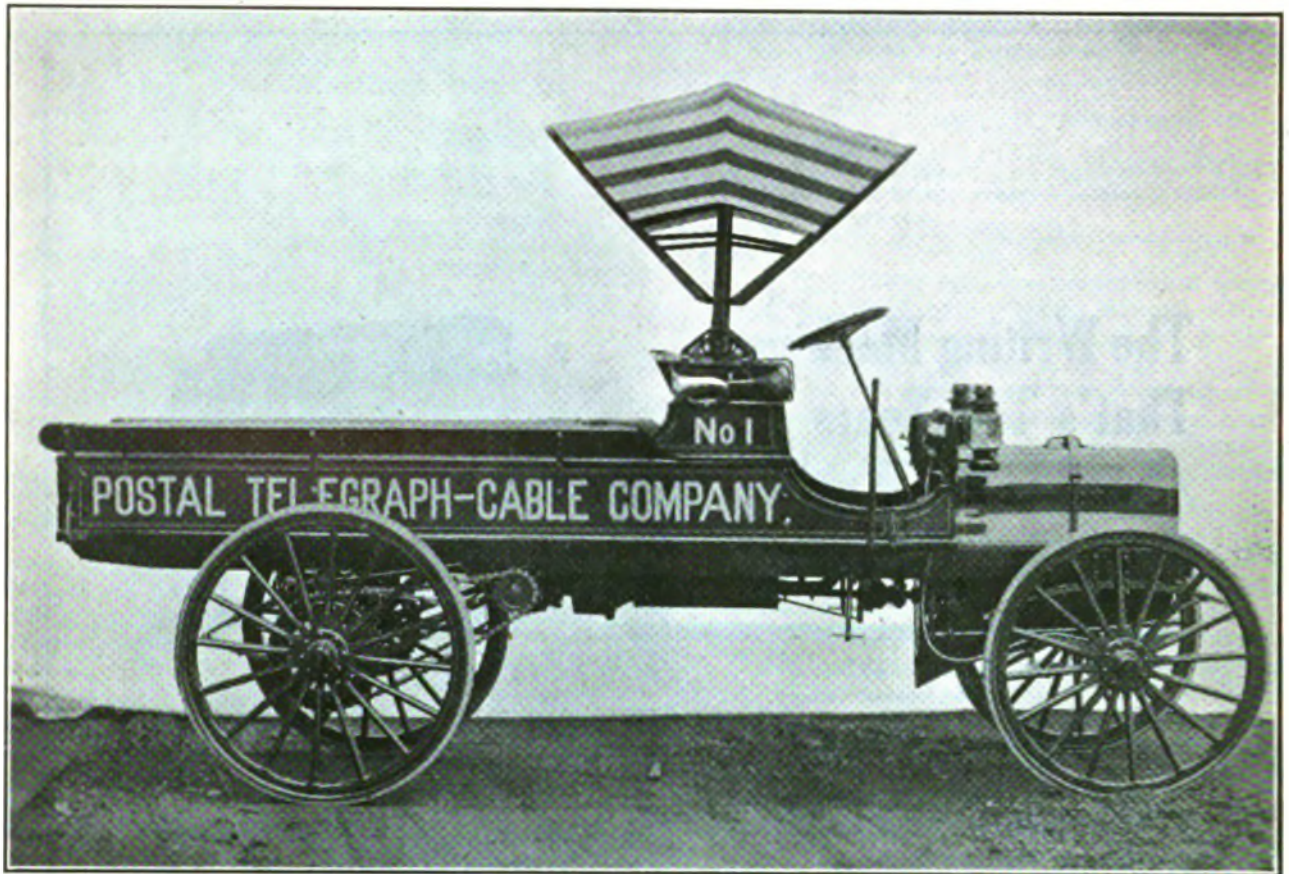
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has sprung so surely, so rapidly into popular use is the fact that typewriter users and typewriter buyers are recognizing, more and more every day, the need for a writing machine that measures up *at every point* to the highest scale of modern business needs. All the writing *always* in sight, ball-bearings at every frictional point, a biller inbuilt, a quicker automatic ribbon reverse—four only of many equally vital advantages that make this machine the *first favorite always* of the person who has to pay for it and the person who has to use it.

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The CHASE has a valveless two-cycle, air cooled motor which has more than two hundred fewer parts than the ordinary motor.

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The CHASE is extremely easy to operate. The lineman can learn to run it in an hour and is just the man to make it give maximum service at minimum cost.

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The CHASE MOTOR WAGON will do considerable more than twice as much work as a horse at about one-half the cost of maintenance. The Leyland Motors, Ltd., the largest manufacturers of heavy commercial vehicles in England, recently placed an order for 1,200 Chase Motor Wagons, after a careful investigation of all makes of commercial vehicles both in America and abroad. This order, amounting to nearly \$1,000,000.00, is the largest ever placed in the commercial vehicle field. If you value efficiency and economy in making your line repairs, investigate the CHASE.

Catalogue FREE.

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Dept. G.,
SYRACUSE, N. Y.

Thomas A. Edison Makes a Speech.

Mr. Thomas A. Edison, at a dinner tendered him by the representatives of the moving picture companies, given at the Plaza Hotel on December 20, did something out of the ordinary. Mr. Edison actually made a speech, which is something he had never previously attempted, no matter what the occasion was. In the course of his remarks he told his friends what sort of a financier he had been in his early days.

He told them how he had come from Newark to Wall Street one day with a faint hope of being able to market his first invention of the duplex system in telegraphy. He knew nothing of Wall Street or its methods, but he had the acquaintance of General Lefferts, of the Seventh Regiment, then at the head of the ticker service, in the days when there was plenty of excitement in the gold market.

The General did not see his way to do anything with the duplex patents and Edison, disconsolate, was waiting around to see the General again when the ticker broke down as Edison was watching it. Consternation prevailed in the office and presently brokers came rushing in to find out what was the matter that they did not receive the quotations. General Lefferts was as much distressed as anybody else. Pretty soon Edison, who had been studying the mechanism, told the General that he thought he could fix it so that it would work again. Lefferts told him to go ahead and try. Edison succeeded, to the immense relief of the General and the local community.

The next day General Lefferts sent for Edison and told him that he thought the company could employ him and offered him \$400 a month, a sum that staggered the inventor, as the largest pay he had received up to that time had been \$100 a month. The stagger was the greater because he had felt himself down and out. While in the employ of this company Edison set himself to perfecting details in its mechanical instruments in connection with his other studies in the line of practical invention, and the next he knew General Lefferts sent for him and wanted to buy his patents in telegraphy. Edison was stumped, for he had no idea what value to set upon his inventions. He also had a wholesome dread of Wall Street, knowing it only by reputation.

He had never even had a bank check nor had he ever been inside a bank. He went home and spent the night awake thinking the matter over and finally arrived at the conclusion that the most he dared to ask for his patents was \$5,000. When he went back to see General Lefferts the next day he did not dare speak this figure aloud, and when General Lefferts asked him what he had decided on he was silent, trying to screw his courage up. General Lefferts finally broke the silence and offered him \$40,000.

Staggered, Edison pulled himself together as soon as he could and agreed that he thought that would be a fair amount for his patents. Lefferts

prepared a contract for him to sign, and he was so agitated that he signed it without even reading it. The General presently gave him a check for \$40,000, and Edison, not having seen a check before or at least not having had occasion to use one or see one used, did not even know what to do with it. He even thought that he had been buncoed, receiving a piece of paper for all his work.

He asked General Lefferts what to do with it and the General advised him to go to a bank with it and open an account. Edison went to the bank and did not even know what window to go to, but finally went to one where his piece of paper was accepted and taken away. As nothing was said to him he presently departed, sure this time that Wall Street had buncoed him, and wended his way back to his friend the General, who smiled and sent him back to the bank.

Edison was now awfully sore, as he said, and he was perspiring freely although the thermometer recorded five degrees below zero. Back at the bank they laughed at him, but the president came out and asked him how he wanted his money. He responded in any way that was convenient to the bank and they gave it to him, the whole \$40,000, in small bills, which Edison took home in bulging pockets, only to sit up all night with it in his anxiety.

Then on advice he went back to the bank and opened an account.

"And," said he, "I bought a lot of machinery that I thought I wanted and in six weeks I was down and out again without a cent. That's the kind of a financier I was in those days."

Mr. F. N. Roberts, chief operator of the Postal Telegraph-Cable Company's main office at Chicago, in the "Postal Telegraph" for December gives the following scraps of good advice to those in the service, but most of which apply equally well to those in other lines of endeavor:

"Do your work well and cheerfully.

"Do not give too much thought to the present.

"Give some thought to the future.

"Do not think your superior officer does not notice good work.

"The worker requires recreation, but recreation does not provide for the future.

"Map out a future where recreation and study will combine, not conflict.

"Many young men starting out in life see nothing but the present.

"The young boy enters the service as a check clerk. Because present advancement is not fast enough or on account of too much recreation and not enough application to study, a change in work is made. The result: In the future, no trade, no steady position, no savings.

"The boy who fights the battle of the present bravely wins out with a steady position, work all the year and promotion.

"Let us be cheerful and pleasant with our present duties."

Meeting of Technical Publicity Association.

The Technical Publicity Association, of New York, held its regular monthly meeting on December 9. After the usual informal dinner a lively discussion ensued over the subject of circulation and the introduction of a proposed uniform advertising contract for trade papers. The attendance was large, and the participation in the discussion of the prominent technical advertising men and trade paper publishers who were present made the session a most profitable one.

William H. Taylor, treasurer and manager of the Iron Age, opened the discussion, giving it as his opinion that the true measure of a publication is its editorial quality. He said there was no more discriminating class of people in existence than subscribers to a publication.

Mr. Taylor said that advertisers should put themselves in the proper frame of mind in approaching the circulation question. He granted their perfect right to know how many and who read a publication, and he said no good publication refuses such information. The trouble has been, he said, not that the publishers have been ashamed of their circulation, but that wrong deductions may be made when a reputable publisher's statement is placed in comparison with an untruthful one. Mr. Taylor made the first public announcement of the circulation of the Iron Age.

H. L. Aldrich, publisher of International Marine Engineering and The Boiler Maker, exemplified his papers as an instance of necessarily small circulation with intensified buying power in which quality was by far the greater consideration.

C. S. Redfield, advertising manager, Yale and Towne Manufacturing Company, and president of the Technical Publicity Association, here explained how members considered the circulation statements of publishers, being in some cases absolute sworn statements, also the possibility of detecting the liars.

John McGhie, of the American Machinist, told about the passing of old-time advertising solicitation in which the hypnotic eye played an important part, and said that after trying all other policies, publishers have learned that the truthful policy is the best. He said the advertiser buys reputation and editorial force quite as much as circulation.

O. C. Flann, advertising manager of the National Lead Company, said that every good advertising man was perfectly aware of the value of quality in circulation, but said that, nevertheless, it came down to quantity after all, but based on judgment of that quantity from a quality standpoint.

F. R. Davis, of the General Electric Company, said that many publishers seemed to feel that advertising men know their own business, and tried to lead them into unprofitable contracts.

H. M. Swetland, publisher of Automobile, said it was his purpose as a publisher to furnish maximum quantity, but that for a class paper to go beyond a certain quantity was simply to vitiate it-

self. A phenomenal solicitor, he said, once got a thousand subscriptions within a radius of twenty miles, but after two years only one more subscriber was on the list for that district than there was prior to his solicitation.

J. George Frederick, managing editor of Printers' Ink, spoke for known circulation, and the good prospects for a uniformly high standard of circulation statement.

The question of a uniform advertising contract was then taken up with a great deal of interest. A committee of the Association, headed by H. M. Davis, distributed the proposed uniform advertising contract. The matter will be taken up for final action at the next meeting January 21.

The President's Message and the Press.

Long in advance of its transmission to Congress the annual message of the President of the United States becomes public property for pretty much everybody except the newspapers, says the New York Times. Mr. Taft's message, sent in Tuesday, and published Wednesday, was no longer news. Wall Street had it the week before; some parts of it were on the tape.

Printed copies had been passed from hand to hand, and no trust magnate anxious for early news about the attitude of the Administration toward the corporations, no broker or speculator concerned about his present or future market commitments had been at all in the dark as to the recommendations in the message.

To the newspapers the message is delivered some days in advance by the Associated Press under the seal of confidence, which they uniformly respect. Mr. Taft's message had been in the offices of the newspapers belonging to that organization for four days. Although information concerning its contents had been readily accessible to them from other sources, and had been continually given, they had respected that pledge to say nothing about it until it was released at Washington.

This is not just to the newspapers or to the general public, who must depend upon them for knowledge of the document. It would appear that a reform is necessary. If the President of the United States—not this President particularly, for these breaches of confidence have for years been habitual—is unable to guard his communications to Congress from such irregular disclosure, it would appear that he ought to subject to rigid revision the list of persons at Washington whom he takes into his confidence and intrusts with advance copies of the message.

Perhaps it would be found necessary to abolish the custom of sending out advance copies altogether. Rather than that the present loose practice should continue, the newspapers would much prefer that the entire message be telegraphed from the capital simultaneously with its reading in Congress, and not before.



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THE STANDARD OF EXCELLENCE**

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KERITE INSULATED WIRE AND CABLE CO.

INCORPORATED BY W. R. BRIXEY

Hudson Terminal, 30 Church Street, New York

Western Representative:

WATSON INSULATED WIRE CO.

Railway Exchange, Chicago, Ill.



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THE PEOPLE
WHO HAVE
USED IT."**

Sole Manufacturer

KERITE INSULATING

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KERITE

KERITE has proven by the only real test—the test of time—that it is the most durable, efficient and permanent insulation known.

KERITE has been demonstrating for years the fact that it gives more service per dollar of expenditure than any other insulation.



WIRE AND CABLE COMPANY Hudson Terminal, 30 Church St.
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INCORPORATED BY W. R. BRIKEY

ATSON INSULATED WIRE COMPANY Railway Exchange, Chicago, Ill.



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Insulated Wires and Cables.

KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

Efficiency and safety in electrical installations depend chiefly on insulation. For fifty years KERITE insulation has been the standard of excellence.

Results count. KERITE wires and cables installed half a century ago are in service to-day. The wonderful durability of KERITE insures the highest safety and economy.

Initial tests determine the properties of an insulation only at the time they are made. They do not determine how well it will do its work years afterward.

The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

Experience of others should be useful to you. Insure your service by using KERITE.

KERITE INSULATED WIRE AND CABLE COMPANY

INCORPORATED BY W. R. BRIDEX

Sole Manufacturer

Hudson Terminal 30 Church St.,
NEW YORK

WESTERN REPRESENTATIVE,
WATSON INSULATED WIRE CO.
Railway Exchange, Chicago, Ill.



The Railroad.

The January meeting of the Western Division of the Association of Railway Telegraph Superintendents will be held in Chicago January 19 or 20, probably in the office of Superintendent Wm. Bennett, of the Chicago and Northwestern Railway. At this meeting a further report of the high tension wire crossing committee will be presented and discussed together with such other matters as may be of interest.

The Grand Trunk Railway has authorized the equipment of three telephonic despatching circuits as follows:

North Parkdale Junction to Burlington, Ont., via Allendale, 148 miles, twenty-one stations, with despatcher located at Allendale. Allendale to Nipissing Junction, 160 miles, twenty stations, with despatcher located at Gravenhurst. Midland to Belleville, Ont., 164 miles, nineteen stations, with despatcher located at Lindsay. The lines will be of 210 pound copper transposed every quarter of a mile.

The Pennsylvania Railroad will within a short time equip the main line of their road between Altoona and Philadelphia with telephone circuits for train despatching, for block signaling and for local message work.

For block signaling purposes there will be a separate telephone circuit between each two offices. Selectors will be used, but on short lines on which there are not more than four or five offices, bells will be used in the ordinary way. For messages to be transmitted long distances, as from headquarters of one division to that of another, the telegraph will be used.

The Norfolk and Western Railroad has recently placed orders for four complete telephone train despatching circuits from Norfolk to Crewe, twenty-seven stations, 130 miles; Crewe to Roanoke, thirty-three stations, 126 miles; Williamson, West Virginia, to Portsmouth, Ohio, twenty-two stations, 113 miles; and Portsmouth, Ohio, to Columbus, Ohio, twenty-two stations, 100 miles. These circuits, in addition to the two circuits now in operation between Roanoke and Bluefield and between Bluefield and Williamson, West Virginia, will complete the telephone train despatching equipment for the entire main line between Norfolk, Va., and Columbus, Ohio, approximately 700 miles, with about 125 stations equipped. Mr. W. C. Walstrum, superintendent of telegraph, reports that the two circuits now in operation are giving excellent service.

The Indiana Railroad Commission has issued a circular calling attention to dangers arising from wires crossing the railroad tracks and common causes of defects in the construction of overhead wire crossings. They also quote the following extract from the statutes of that State: "All telegraph, telephone, electric light and all other wires of any kind hereafter constructed over the tracks of any steam railroad within the State of Indiana

shall be supported by good, substantial wooden poles of a size not less than twelve inches in diameter at the bottom and not less than six inches in diameter at the top, or iron or steel poles not less than five inches in diameter at the bottom and three inches in diameter at the top, such poles to be set in the earth to a depth of not less than six feet, and to be well tamped. All such wires shall clear the top of the rails at least twenty-five feet, and shall be secured to the poles in such a manner as will properly hold them; provided, that in case of the trolley feed and other wires of any electric railway extending over the tracks of any steam railroad in this State the height of such wires above the tops of the rails of such steam railroads shall be not less than twenty-two feet."

New York Central Pension System.

President W. C. Brown, of the New York Central Lines, announced after a recent meeting of the directors of the New York Central and Hudson River Railroad Company, the Lake Shore and Michigan Southern Railway Company and the Michigan Central Railroad Company, that the boards had adopted a plan for a pension system for the employes of all these lines. Its extension to the other principal lines of the system is also under consideration.

More than 100,000 employes will come within its provisions and it means an expenditure by the system of \$500,000 annually.

Under the plan employes on becoming seventy years old will be retired. If they have been in the service of one of the companies continuously for ten years immediately preceding their retirement they will be entitled to a pension. An employe who has been twenty years in continuous service and has become unfit for duty may be retired with a pension, although he has not reached the age of seventy years.

The amount of the pension is one per cent for each year of continuous service, based upon the average rate of pay received for the ten years preceding retirement.

This means that an engineer, for instance, whose salary has been \$1,500 a year and who has been in the service forty years, will receive a pension of \$50 a month, or \$600 a year. And it does not in any way restrict his future activities. He may go into any business he chooses to.

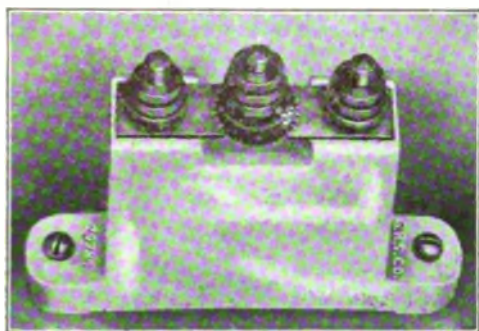
The pension system becomes effective January 1, and within the next year 1,765 men will be retired.

There have been pensioners on the New York Central, but they were taken care of at the discretion of the Board of Directors. There has been no system. The one adopted is similar to that of the Pennsylvania Railroad.

The idea, it is stated, originated with E. H. Harriman. The resolution calling for the creation of the fund was introduced by J. Pierpont Morgan.

An Effective Lightning Arrester.

The pictures herewith illustrate a new, low-priced lightning arrester which has a most remarkable record; 1,400 of them having been in use for the past three years without a failure due to lightning. That lightning protection is required is indicated by the condition of the plates, many of which show unmistakable evidence of heavy discharges. This remarkable service is on automatic block signal circuits, and has resulted in the exclusive use of this arrester by three of the most prominent Western railway systems, on one of which the record is still being made.



GENERAL VIEW OF ARRESTER.

The arrester is designed for use on signal, telephone, telegraph, crossing alarm or any other circuit using a small volume of current. It is small (15-16" x 4 3/4" x 3 3/4"), simple and easily installed, and may be assembled in banks on 15-16" centers.

It has no delicate or easily broken parts. The reactance coil (No. 29283) is connected in series between line and instrument, is exceptionally



DETAILS OF ARRESTER.

efficient, and is so constructed that it does not saturate under service conditions. Its ohmic resistance to alternating current within the range of frequencies of telephonic talking current is negligible, while its resistance to the frequencies of lightning discharges is higher than that of any other small current arrester on the market.

The use of a carbon ground plate prevents bridging the air gap to ground under lightning discharges, and grounding through the accumu-

lation of carbon dust is prevented by providing ample space for all dust to fall clear of the ground and line plates.

All binding posts are one-quarter of an inch in diameter and provided with knurled nuts. All connections are in front. The connectors, 29728, form a buss bar of ample carrying capacity for all ground plates and require but one ground connection for any group.

The arrester is manufactured by the General Railway Signal Company, of Rochester, N. Y. Bulletin No. 106, giving a complete description, will be sent free upon request.

New Home of Rock Island Battery Company.

From a handsome, modern, new factory The Rock Island Battery Company, of Cincinnati, is sending New Year greetings to their customers and the trade in general. The rise of the Rock Island has been phenomenal. From a modest start in the Illinois city, from which the dry cells take their name, the Rock Island Battery Company accepted the opportunity to broaden its field of business activities and went to Cincinnati. In that Ohio city the company has grown and prospered. Increasing demand made several changes of quarters imperative until necessity compelled the abandonment of the down-town plant and the acquisition of a steel and concrete structure on Spring Grove avenue at Winton Place, within Cincinnati's suburban limits.

The new factory is five stories in height and the main building covers 150 by 50 feet. It is well lighted on all sides by seven foot windows, arranged on pivots and located three feet apart all around the building. This insures plenty of air as well as light. The general offices on the second floor are conveniently equipped.

Besides this main factory, there are two adjoining buildings, which increase the total floor space to approximately 100,000 square feet. The company will have shipping facilities that are not excelled. Their own private switch runs to the doors of their factory and is directly connected with the Baltimore and Ohio, Big Four and Cincinnati, Hamilton and Dayton Railroad tracks, while the belt line enables quick transfer to every fast freight line out of Cincinnati. They will have their own Postal Telegraph branch office, and the Winton Place Postoffice is within 300 feet of the factory.

The Telepost Company gave a demonstration of their system recently at Detroit, a temporary line being used between the Mayor's office and the Chamber of Commerce, to demonstrate the operation of the Delany system.

The United States Civil Service Commission will hold an examination on January 19 at various places throughout the United States to secure eligibles to fill a vacancy in the position of telegraph operator (male) at the Navy Yard, Pensacola, Fla., at \$2.80 per day.

TRAIN MANAGEMENT BY TELEPHONE :: ::

Has been proven an unlimited success with the

KELLOGG SYSTEM

The Kellogg insures safety in the handling of trains, saves time and is the most economical to maintain.

Our illustrated literature describes in detail the Kellogg system.

Write today for bulletin No. 37 and booklet describing Kellogg Portable railway telephone.

**KELLOGG SWITCHBOARD
& SUPPLY CO. :: :: ::**
C H I C A G O



\$ \$ SAVED

Superintendents of Telegraph and Telephones desiring to lower cost of maintenance can get quick action by using

Rock Island Dry Cells

instead of Gravity Cells. There's no guess-work about this. The truth of this has been demonstrated so often we've worked over-time filling orders for people who like the experience.

No. 6 (2½ x 6 in.) and

No. 8 (3½ x 8 in.) are

our Standards.

Give us a chance to tell you. Ask for Battery Booklet F—FREE. Write TODAY.

**THE ROCK ISLAND
BATTERY COMPANY**

Winton Place Station, Cincinnati, O.



The Gamewell Fire Alarm Telegraph Co.

Fire Alarm and Police Telegraphs For Municipal and Private Plants

Over 1500 Plants in Actual Service

Executive Office
19 Barclay St. New York

Agencies

178 Devonshire St., Boston, Mass.
165-163 Randolph St., Chicago, Ill.
1309 Traction Building, Cincinnati, Ohio
731 Wabash Building, Pittsburg, Pa.
608 Dwight Building, Kansas City, Mo.
915 Postal Building, San Francisco, Cal.
326 Central Building, Seattle, Wash.
Utica Fire Alarm Telegraph Co., Utica, N. Y.
The Northern Electric & Mfg. Co., Ltd., Montreal, Can.
General Fire Appliances Co., Ltd., Johannesburg, South Africa
Colonial Trading Co., Ancon, Canal Zone, Panama
F. P. Danforth, 1060 Calle Rioja, Rosario de Santa Fe, Argentine Republic

UNITED WIRELESS TELEGRAPH CO.

General Offices: 42 BROADWAY, NEW YORK

Cable, "Aerogram New-York"

Manufacturers, Sellers and Installers of Wireless Telegraph Equipments. Operates complete chain of stations along Atlantic, Gulf and Pacific Coasts and the Great Lakes.

System now installed on 239 vessels of 64 steamship lines, and private yachts. Constantly being extended. In use by prominent governments.

This Company furnishes estimates and equipments for land stations, ship installations and portable sets at reasonable prices. Two fully equipped factories. Prompt deliveries.

Correspondence Invited

SURVIVAL OF THE FITTEST

Most or all of the spurious sending machines incited to life by the phenomenal success of the MECOGRAPH have been consigned to oblivion by the law of the "SURVIVAL OF THE FITTEST."

THE FIRST MECHANICAL TRANSMITTER ON THE MARKET—THE MECOGRAPH—SURVIVES



Patented Feb. 13, '06; May 28, '07; May 5, '08; Nov. 9, '08.
Over 60 per cent. more movements required to send on a Morse key than on a MECOGRAPH.

More MECOGRAPHS are in use than all other automatic transmitters combined.

THE BEST TELEGRAPHIC TRANSMITTER IN THE WORLD.

Sending on a Morse key is an exception to the rule "Practice Makes Perfect," for a large per cent. of operators filling good positions get telegraphers paralysis—the glass arm—the nightmare of operators.

A writer in the RAILROAD TELEGRAPHER of October, 1909, referring to the typical operator, said: "In middle life he is confronted with a physical breakdown, the result of the continuous drafts upon his mental and nervous energy."

Practice sending on a Morse key instead of making his sending perfect, ruins it.

THE REMEDY

Use a sending machine!
NOT A SINGLE OPERATOR EVER INJURED HIS ARM OR NERVE USING A SENDING MACHINE.

Be sure to get the very best transmitter—the MECOGRAPH.

Don't wait till your arm and nerve fail you before getting one.

The best time to save nervous energy is while you have plenty of it.

The time to take care of your arm is while it is SOUND.

Price of MECOGRAPH, \$7.50 Carrying Case, \$1.00 extra SEND FOR OUR NEW CIRCULAR

WE WANT A GOOD LIVE AGENT IN BOSTON

CAUTION—We shall continue to prosecute to a finish all infringers of the rights we have already established with four strong patents and three broad U. S. Court decisions.

MECOGRAPH COMPANY MANUFACTURERS OF TELEGRAPH INSTRUMENTS
321 FRANKFORT AVE., - CLEVELAND, OHIO, U. S. A.

GENERAL RAILWAY SIGNAL COMPANY.

ROCHESTER, N.Y.



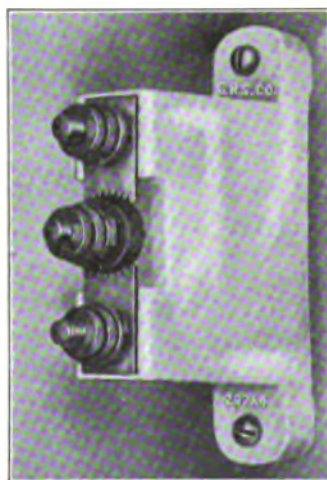
Model I, Form A, Lightning Arrester

Designed especially for Telegraph, Telephone, Signal, and similar circuits

**EFFICIENT
COMPACT
INEXPENSIVE**

May be assembled in banks with
Bus bar connection to ground.

Write our nearest office for price
and Bulletin 106.



15-16 in. wide; 4 3/4 in. high; 3 3/4 in. deep

This Arrester is standard in the signal departments of several prominent western railway systems, on one of which 1,400 have given perfect protection for three years. Not a single instance of instrument trouble due to lightning has occurred, although numerous unmistakable evidences of heavy discharges have been found.

CHICAGO
1339 Monadnock Block

MONTREAL
605 Eastern Townships Bank

NEW YORK
708 Night and Day Bank

OLD AND RECENT TOURNAMENTS.

General Information as to Early and Late Speed Trials, with Incidental Comments on the Persons Concerned in Them, and Unnecessarily Complete Reports, Perhaps, as to the Part I Myself Played in Them and in Other Related Events.

BY WALTER P. PHILLIPS.

(Continued from page 862, December 16, issue.)

Five years later, in May, 1898, the Grand National Morse Telegraph Tournament took place in Madison Square Garden, New York. The New York Electrical Society was holding its electrical exhibition there, and T. Comerford Martin, editor of the Electrical Engineer, and chairman of the Auxiliary and Educational Committee, asked Mr. Catlin to manage a telegraph tournament for which he would guarantee the financial support of the Electrical Exhibition Company. Elaborate preparations were made, the J. H. Bunnell Company and the Manufacturers and Inventors' Electric Company kindly contributing all kinds of necessary apparatus in the way of keys, sounders, repeaters, megaphones, etc. The judges' room from whence the messages were sent by the contestants was at one side of the main hall, and here during the progress of the contest were seen during the evening session many of the leading lights of the telegraph companies, including Thomas A. Edison, who was riveted to a chair convenient to a good sounder to which he turned his resonator stick and remained an eager listener during the whole session. Mr. Edison could "take anything any wire could fetch," as Pat McCauley once described his ability to A. S. Brown when questioned as to his capacity as an operator. And there was not lacking sufficient evidence of Mr. Edison's ability to fill perfectly the position of judge, as back in the sixties he used to copy Manager Catlin, who was in his prime, without a break. When Mr. Edison was asked to act with the judges in this tournament, he answered the summons in his usual characteristic way, as follows:

Orange, N. J., April 9, 1898.

Friend Catlin:

Yours of March 30 received. I may come over and act as a judge of fifty-word-a-minute Morse, but I am afraid I would not understand it. The Morse that I was brought upon was about as perfect as the record slip on a deep sea cable. But if such fossils as Bunnell, Brown, Delany and Martin are going to pretend to read copper-plate Morse, then I may come over and look wise.

Yours,

Edison.

Mr. Edison said the best of the senders had not rushed him a bit, and that he had just had the time of his life, that it was splendid stuff, etc. There were also in the judges' room, Hon. James D. Reid, Colonel A. B. Chandler, A. S. Brown, E. A. Leslie, F. W. Jones, Thomas F. Clarke, P. J. Tierney, Frank J. Scherrer, J. H. Bunnell, T.

Comerford Martin, and many others. Prizes for contestants were all in cash, amounting to \$1,500, of which the Postal and Western Union companies each contributed \$250.

Seth M. Barrett, ably assisted by George Worzel, had charge of the electrical arrangements, which were admirably managed, and Mr. Tierney, of the Central Cable office, attended to the adjusting of repeaters and condensers, and taking of the phonetic records by a machine which was sent by Mr. Smith, of the Manufacturers' and Inventors' Electric Company.

The judges were: Thomas A. Edison, William Maver, Jr., E. H. Curlette, Charles Shirley, S. F. Austin, Gardner Irving, F. F. Norton, E. W. H. Cogley, A. E. Marr, P. B. Delany, A. S. Brown, P. T. Brady, A. E. Sink, W. D. Weaver, J. B. Taltavall—Master of ceremonies, Thomas J. Smith; official timer, A. E. Sink. Transmissions were of five minutes' duration, and the matter used was "The Command of Gideon."

Afternoon Session—Ladies' Class—Miss J. McManus, 239 words, eight errors, superior Morse, first prize.

Miss Emma R. Vanselow, 241 words, eight errors, good Morse, second prize.

Miss McManus was a Postal, and Miss Vanselow a Western Union operator.

Other contestants in the Ladies' class were:

Rose Feldman, L. Phillips, Alice Mead, M. Baxter, K. Newman, Mrs. T. V. Brice, M. Welton.

230 Word Class, for all who have not a record of more than 230 words in five minutes.

Charles F. Edney, 233 words, one error, excellent Morse, first prize.

F. M. McClintic, 242 words, five errors, good Morse, second prize.

David C. Grant, 225 words, made a very fine showing; no third prize.

Mr. McClintic was with the Associated Press at Memphis, and Mr. Edney with the same association in New York, and Mr. Grant with the same association in Toledo, Ohio.

Other contestants in the 230 Class were:

E. V. Wedin, Jr., Fred E. Keene, and L. F. Jamison.

240 Class (Limited)—J. D. Hinnant, 252 words, four errors, good Morse, first prize.

F. M. McClintic, 243 words, five errors, good Morse, second prize.

D. C. Grant, 229 1-2 words, excellent Morse.

Mr. Hinnant was from the Anglo-American Telegraph Company, New York.

P. J. Faulkner, Fred E. Bunnell, Frank English and David C. Grant also sent in the 240 Class, and Mr. Grant, who sent 229 words, 3 characters, was again praised by the judges for excellent Morse.

EVENING SESSION.

Receiving Class—Frank L. Catlin, sent the 50 messages in 32 minutes. H. V. Emanuel won first, and P. J. Faulkner, second prize. The work

of each was highly praised by the judges, but Mr. Emanuel got first prize, as he added the month and year to each message, as it came along.

J. Rosenbaum won the third prize, under difficult circumstances, using an old No. 1 Smith Premier typewriter so badly worn out that fourteen of the letters were no longer visible on the buttons. His facility with the machine was so great that he spelled out the names of all states that were abbreviated by the sender and indulged in other elaborations that violated the rules and counted against him as errors.

Mr. Emanuel was with the Western Union Company in Philadelphia, and Mr. Faulkner from the American Telephone and Telegraph Company, New York.

Other contestants in this class were: E. J. Hart, G. W. Dickinson, R. Scales, J. M. Purcell, F. W. Dunn, W. I. Taylor, J. B. Waddell, J. C. Bishop, J. P. Conway, W. N. Butt, W. C. Evans, T. F. Kelhoe, W. H. Miles, J. P. Mitchell, and J. M. Ryan.

Phillips Code Class (new matter)—G. W. Conklin, 345 words, with two errors, first prize.

William M. Gibson, 330 words, with two errors, second prize.

Mr. Conklin was with the Laffan Bureau, and Mr. Gibson with a broker.

In the Code Class, C. F. Edney sent 279 words, and was complimented by the judges for his excellent Morse.

Championship Class (sending). Matter used, "The Command of Gideon." W. M. Gibson, 254 words, one error, perfect Morse.

Frank L. Catlin, 253½ words, one error, perfect Morse.

Mr. Catlin was with the Municipal Telegraph and Stock Company, at Albany.

Other contestants in this class were:

J. E. Kane, F. M. McClintic, Frank English, J. D. Hinnant, David C. Grant.

Mr. Hinnant received favorable mention by the judges for his excellent Morse.

Championship (receiving)—E. H. Curlette, three errors, first prize.

P. J. Faulkner, five errors, second prize.

Mr. Curlette was with the Postal Company, of New York.

J. E. Walsh, C. F. Edney, E. J. Hart, J. M. Purcell, W. I. Taylor, J. B. Waddell, M. E. Moser, R. Scales, H. Peters, Melville Fisher, James P. Mitchell, F. W. Dunn and H. G. Martin were also contestants in the Receiving Class.

The work of Mr. Martin in this class was most highly commended by the judges. He was unfortunate, through a misunderstanding, in omitting to copy the names of the senders on his sheets, which caused him to be charged with six errors.

David C. Grant, of Toledo, also received most favorable mention for his fine work in receiving.

Four years later, in March, 1902, a large gathering of the fraternity from all points of the

country, met at Atlanta, Ga., to witness or participate in a tournament given under the auspices of the American Telegraphers' Tournament Association. W. B. Stuart, chairman.

The following named gentlemen officiated as judges:

Charles C. Adams, Horace G. Martin, John Scott and I. N. Miller.

AFTERNOON SESSION.

Meeting called to order by chairman of the executive committee. Addresses of welcome. Governor Allen D. Chandler, Mayor Livingston Mims, S. A. Duncan for the Telegraphers. Response by S. M. English, of Dallas, Texas.

Conditions of the various events, with results:

First Event—Straight Morse sending. To the fastest and most perfect sender for five minutes, formation of letters, and spacing, being conditions of judgment.

First prize, championship gold medal and \$35 cash, won by E. E. Bruckner, of Dallas, Texas.

Second prize, silver medal and \$15 cash, won by F. M. McClintic, of Dallas, Texas.

Second Event (message contest.) To the fastest sender of messages of not more than ten words for five minutes, messages to be numbered and timed, and quality of Morse as condition of judgment.

First prize, championship gold medal and \$35 cash, won by E. E. Bruckner, of Dallas, Texas, with nine messages of ten words each.

Second prize, silver medal and \$15 cash, won by F. G. Johnson, of Louisville, Ky.

Third Event (special.) The Atlanta Journal Gold Medal for the cleanest copy on a typewriter of five minutes' receiving by the Phillips code.

F. M. McClintic won this event.

EVENING SESSION.

First Event (transmission according to the Phillips code.) To the fastest sender for five minutes, of matter by the Phillips code, grouping of letters and spacing being conditions of judgment.

First prize, championship gold medal and \$35 cash, won by F. M. McClintic, of Dallas, Texas, 326 words.

Second prize, silver medal and \$15 cash, won by F. C. Matthews, of the Associated Press, Atlanta, Ga., 300 words.

W. C. Murray, Associated Press, Atlanta, was third, with 288 words.

Second Event (receiving of messages on typewriter)—To the person receiving the greater number of not over ten-word messages in thirty minutes, copy considered, and all messages to be timed.

First prize, championship gold medal and \$35 cash, was won by H. V. Emanuel, of Philadelphia, with fifty and a half messages in 30 minutes, breaking the world's record.

Second prize, a silver medal and \$15 cash, won by E. E. Bruckner, of Dallas, Texas. The mes-

sages were sent by C. W. White, of Richmond, Va.

Third Event (special)—The Atlanta Constitution Gold Medal for the most rapid straight Morse sending, to be governed by conditions of the first event. Won by F. M. McClintic, with 252 words, in five minutes.

Fourth Event (special)—To the best "all-round" telegrapher, sending and receiving. The Carnegie Diamond Medal, valued at \$400, contributed by Andrew Carnegie.

Mr. McClintic won this event, sending 517 words in ten minutes, and he also scored the greatest number of points in the various classes for all-round telegraphic work, and was therefore awarded the much-coveted prize as his just desert from every point of view.

C. W. White, of Richmond, was second, with 503 words, and F. G. Johnson, of Louisville, Ky., third, with 490 words.

J. I. Hilliard, of Memphis, won the consolation prize—a Graphophone Grand, valued at \$100, presented by Walter P. Phillips.

Mr. Carnegie takes much interest in matters telegraphic, having also subscribed liberally to the prizes at the Hardman Hall Tournament of 1890, when he and J. D. Reid expressed much interest in the ladies' class. This was a distinctively McClintic tournament. The young man from across the border line took the gathering by storm, his phenomenal work being the main topic over the wires for days and months to come. It was a popular victory everywhere, and especially so to Mr. Carnegie, the donor of the medal, who wrote from Skibo Castle:

June 1, 1902
SKIBO CASTLE,
ARGAY,
N. B.

Heartly Congratulations
My Dear Mr McClintic
upon your great victory
In fact it's a Mc. that
won the Medal, much
to be hatched blood in the
Victor - 4734

Yours always
Andrew Carnegie

(To be continued.)

Obituary.

Andrew S. Barber, an old-time telegrapher, died at Auburn, N. Y., on December 5.

John W. Haines, identified with the telegraph at Macon, Ga., died at Chattanooga, Tenn., on December 15.

Mr. John H. Ryan, aged thirty-two years, formerly an operator employed by the Western Union Telegraph Company at Denver, Colo., died at that place on December 17.

Michael Smith, a member of the United States Military Telegraph Corps, who was employed as a lineman during the Civil War, and who has since been in the Western Union service, died on December 16, at Jersey City, N. J.

W. S. Evans, editor of the Orrville, Ohio, Courier, and formerly in the telegraph service at Toledo and at other places, was shot and killed while hunting on December 3. His body was found hanging over a fence, and it is supposed that while climbing the same his gun was accidentally discharged.

James F. Cunningham, of Brooklyn, N. Y., formerly operator in the Cotton Exchange office of the Postal Telegraph-Cable Company of New York, and for many years past identified with Hubbard and Brothers, died at Saranac Lake, N. Y., on December 19 after an illness extending over the past four years, during which time his employers saw to it that he wanted for nothing to make him comfortable.

Serial Building Loan and Savings Institution.

The annual meeting for the election of officers and directors of the Serial Building Loan and Savings Institution will be held January 18 at the office of the corporation, 195 Broadway, New York. The following have been nominated: President, J. C. Barclay; vice-president, James R. Beard; treasurer, E. S. Butterfield; secretary, E. F. Howell; directors, J. B. Taltavall, F. J. Scherrer, C. A. Kilfoyle, M. J. O'Leary, G. W. Blanchard, W. H. Jackson, T. M. Brennan, F. D. Giles, W. J. Quinn, M. W. Rayens, M. S. Cohen, T. J. Laidlaw, E. E. Brannin, J. F. Nathan, F. C. Leubuscher, E. Reynolds, P. J. Casey, H. A. Konninger, and R. J. Marrin.

The twenty-fifth anniversary of the organization of this institution will be celebrated at a dinner to be held at the Hotel Astor on Thursday, January 20.

LETTERS FROM OUR AGENTS.

CLEVELAND, O., WESTERN UNION.

Mr. Harry D. Jones, formerly chief clerk in Superintendent E. P. Wright's office, also under Superintendent C. Corbett, in this city, was a recent visitor in this office, being called to Cleveland by the death of his mother. Mr. Jones holds the position of chief clerk in Superintendent May's office in San Francisco.

PHILADELPHIA, WESTERN UNION.

About three months ago the Philadelphia Times announced that they would give away prizes amounting to \$4,500 to guessers in a motto contest consisting of pictures representing mottoes which were to be translated by the guessers. The contest was very animated, thousands joining in the guessing. Among the prizes was a lady's diamond back set gold watch won by Miss Kathryn C. Leahy of the clerical department of this office. Another prize was a lady's diamond set bracelet won by Mr. H. Wobensmith, chief clerk.

NEW YORK, WESTERN UNION.

A son was born to Martin O'Donnell, of the Southern Division, December 21.

James L. Young, employed in the office of Superintendent Skelton, of the American District Telegraph Company, had a daughter born to him on December 21. Mrs. Young was formerly Miss Josephine Hopkins, of the Long Island Division.

The wife of W. H. Hoyt, assistant Southern wire chief, died on December 20.

OTHER NEW YORK NEWS.

John B. Moran, recently of this department, and who was formerly connected with the Race Bureau, died at his home in this city on December 18.

John Topping, for many years employed in the Jersey Division, and at one time stationed at Sag Harbor, N. Y., as agent for the Long Island Railroad, died on December 20, at his residence in Brooklyn.

All makes of typewriters \$10 up to \$55. Rentals \$2 and \$3 monthly. ALL rental applies on purchase. Rebuilding and repairing at moderate prices. Central Typewriter Exchange, 203 Broadway, New York.

Assessment No. 502 has been levied by the Telegraphers' Mutual Benefit Association to meet claims arising from the deaths of George F. Durant, at Boulder, Col.; Derrell C. Sanders, at Adams Run, S. C.; Silas W. Rankin, at Springfield, Mass.; Thomas H. B. Van Keuren, at Toledo, O.; Stephen B. Russell, at Augusta, Ga., and Henry F. Higginbotham, at St. Louis, Mo.

Telegraphers' Aid Society Quarterly Statement.

The New York Telegraphers' Aid Society's financial statement for the quarter ended December 6, 1909, is as follows:

Balance on hand September 6, 1909.....	\$24,108.92
Receipts	1,768.00
Total	\$25,876.92
Disbursements:	
Sick benefits	\$781.45
Death benefits	300.00
Expenses	166.96
Balance on hand December 6, 1909.....	24,628.51
Total	\$25,876.92

Relief Fund.

Balance on hand September 6, 1909.....	\$4,138.17
Receipts	530.40
Total	\$4,668.57
Disbursements	42.40
Balance on hand December 6, 1909.....	4,626.17
Total	\$4,668.57

Trade Notes.

Mr. H. Seaman, who has been connected with the Electric Storage Battery Company of Philadelphia for several years, and for the past two years as manager of their Atlanta office, has accepted a position as assistant manager of the electrical department of the H. W. Johns-Manville Company at New York.

Another telephone switchboard order from the far East, in addition to that of the Chinese Government for two telephone exchanges for the city of Peking, has been placed with the Western Electric Company. The Japanese Department of Communications is the purchaser in this case the apparatus being used to extend the service in the capital city of Tokyo.

Holiday Greetings.

During the Christmas season just passed we have received an unusually large number of Christmas cards and other tokens from all parts of the world, from far away Japan, Australia, England, Ireland and many other foreign countries, as well as a great number from our friends at home. One which was sent by the Association of Irish post office clerks is especially worthy of mention because of its unique design. Wires stretch around the card from poles at each corner and upon the wires at the top is placed the word "greetings." Another very attractive card was one received from the officials of the Postal Telegraph-Cable Company of New York, and having the signatures of twenty-one of the officers of the company.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, in common with other institutions of the same character, has enjoyed a large measure of prosperity during the past year. This association is an institution of the purely co-operative type, is run solely for the members, and has started hundreds of men and women both in saving and home owning.

Leg Pattern \$3.50
Legless Pattern 4.00
P. O. B. Columbia, Pa.

THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,

Columbia, Pa. - R. F. D. No. 1



Telegraph and Telephone Age

No. 2.

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Twenty-seventh Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Concerning Quadruplex Disturbances.

The following letter from an Iowa subscriber is herewith published, not because there is really anything new in the action which puzzles him, but because his experience is of so common an occurrence; and furthermore for the reason that every new quadruplex attendant is at first perplexed in a similar manner. A few suggestions may be helpful to the latter, as without proper instruction it often requires a great deal of time and experience for them to ascertain the true source of a disturbance.

"I would like to ask the following question through the columns of your valuable paper if it is considered of enough importance to all concerned to be worthy of the space.

"The question has to do with the irregularities of certain quadruplex circuits and is as follows:

"With all home keys closed and the transmitter open at the distant station, the signals will come light or heavy, as the case may be, on our polar side when the home pole changer is reversed. The signals can be evened up by inserting from one to four hundred ohms in the rheostat, but this throws the home neutral relay just that much out of balance, and in order to

work the common side satisfactory it is necessary to keep the home transmitter open. With transmitters closed or open at both stations, the signals will come even, but as soon as the home transmitter is closed, the signals from the distant office on the polar side will be light or heavy, as regards the position of the home pole changer. Can a ground balance be made to overcome this evening up feature, and how can it be done?"

In reply to the correspondent we will state that the real source of the peculiar results obtained by his reversals is due to an improper balance. That is the true explanation. The problem for him to solve is, "What causes the discrepancy?", and "Where and how can he find the defect?"

As a rule false balances are caused principally by a defective ground coil at the distant station; an unevenly wound relay; a line wire that is carrying a leakage current from another source, or due to some condition that develops trouble only after both batteries are cut in.

Without being on the ground it is rather difficult to determine just which of the disturbing elements is perplexing our friend, but it is probably due to one of the sources mentioned. He can determine this point himself, if he possesses an ammeter, in the following manner.

First ascertain the condition of the wire by inserting the ammeter in the circuit while both the home and the distant station are grounded. If the wire is clear the needle will not be deflected. If the needle shows a current the latter is going to cause a disturbance in a degree measured by its volume. In wet weather and on many circuits exposed to the influence of trolley and other high electric pressures there is nearly always to be found a slight current of this kind, but if its strength is not greater than 4 or 5 milliamperes the multiplex apparatus may be adjusted over this fault, with, of course, just that ratio of reduced working margin. In passing we might say that to-day there are but few wires along our big trunk lines that do not show more or less current due to outside influences in wet weather.

Second, a false balance may be due to a defective ground at the distant end, because the latter may contain more resistance than that of the distant battery resistance which is supposed to be the same value as that of the ground coil you balance to. In this event after the distant battery is cut in, the home station is out of balance in degree measured by the discrepancy between the "ground" and the battery resistance. Hence the necessity of altering the plugs in the home rheostat in order to compensate the difference existing under the actual working conditions of the circuit.

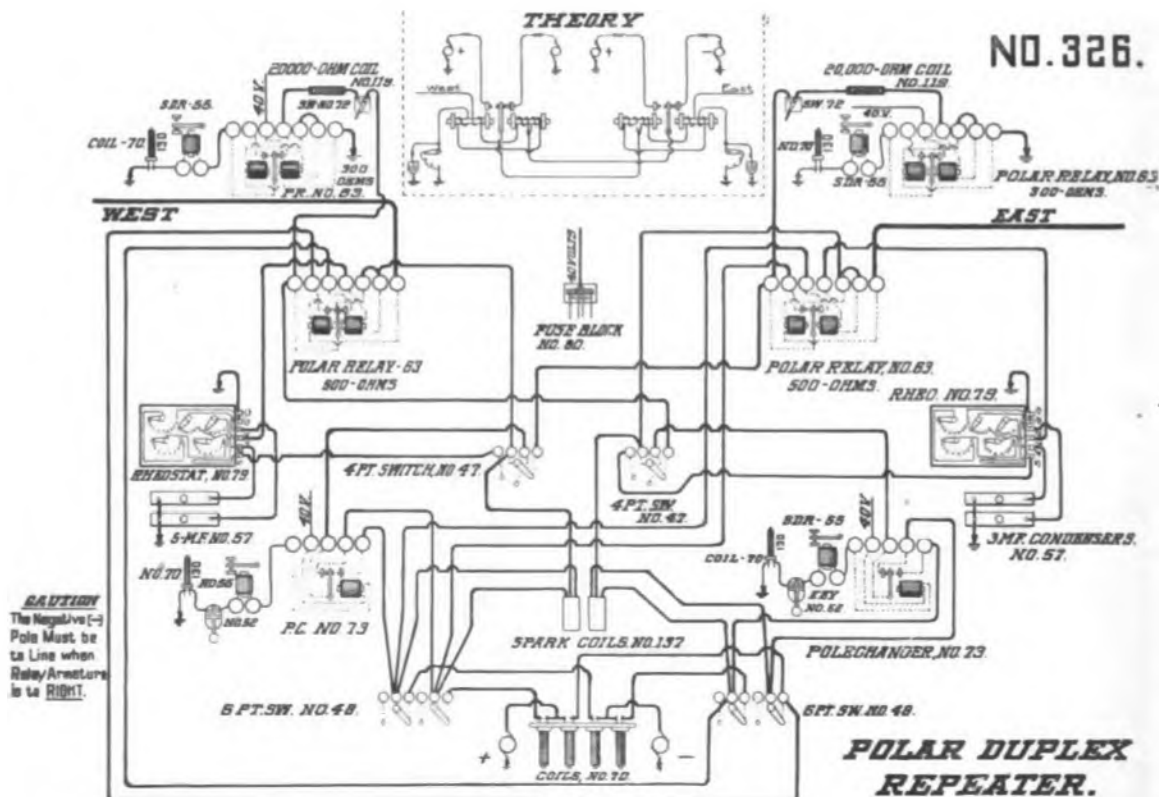
Third, a false balance may be due to an unevenly wound polar relay, because in this event it requires more current in the coil possessing the fewer number of turns of wire than it does in the companion coil to make them both magnetically equal.

If the neutral relay is evenly wound it is obvious that the home current is stronger both in volume and magnetic strength in one coil than in the other when the balance is false. Hence that relay is out of balance and necessarily must be affected by the home current to a certain extent. That is to say, by the difference between the values of the two volumes of current flowing through the main and the artificial line. When our friend readjusted the rheostat to even up the neutral relay coils he obtained a true balance.

and then in the main line circuit. If the current in each is not of the same value the polarized relay may be justly suspected. The evidence of a defect in that instrument will be still stronger if in addition to the discrepancy in current volumes the rheostat must be altered in order to even up the neutral relay coils.

On the other hand should the two currents be equal and a rheostat alteration become necessary to prevent home reversals interfering with the neutral relay when the spring of the latter is turned down low the number two relay is probably at fault.

Of course there are other sources of multiplex disturbances that bring about similar effects, but those we have mentioned cause nearly all the trouble we experience in daily practice.



but he threw the polarized relay out of balance magnetically to the same extent. As the polarized relay possesses quite a wide degree of working margin a defect of this kind is not always fatal, provided the unevenness is not too great. A little bias to one side given the lever will usually offset this weakness and render the polarized instrument still workable.

A quadruplex attendant may easily determine which relay is defective in the following manner without removing them from the circuit.

After a true balance to the distant ground coil has been obtained (assuming that the wire is clear), before asking the distant station to cut in insert the ammeter first in the artificial line

Postal Telegraphic Apparatus.

BY JOHN F. SKIRROW.

Associate Electrical Engineer of the Postal Telegraph-Cable Company, New York.

POLAR DUPLEX REPEATER.

The accompanying diagram shows the latest standard method of wiring a polar duplex repeater. It will be noted that the repetition is made directly upon the relay points without the use of locals. A polar relay in a leak circuit is used upon each side of the repeater for reading the passing signals.

The switches are arranged so that communication may be maintained from the repeater station in one direction, while a balance is being taken in the other direction.

Recent Telegraph and Telephone Patents.

A patent, No. 942,885, for a method of and apparatus for repeating telephone-currents, has been taken out by Percy A. Campbell, of Bloomfield, N. J.

A patent, No. 943,033, for a telephone-receiver support has been awarded to William J. Mo-gridge, of Spokane, Wash.

A patent, No. 943,081, for a telephone-call-registering system, has been secured by Willard J. Kibbe, of Canandaigua, N. Y.

A patent, No. 943,149, for a mouthpiece for telephone-transmitters, has been granted to John A. Jameison, of Harrison, N. J.

A patent, No. 943,386, for a sanitary telephone-transmitter, has been issued to Marvin Y. Calcutt, of Seattle, Wash.

A patent, No. 944,259, for an insulator, has been awarded to A. G. Denner, of East Hampton, Conn. For telegraph wires. The usual insulator has a groove for the main line wire, converging slots intersecting the groove for receiving a tie wire.

A patent, No. 944,460, for a selecting apparatus for telephone systems, has been taken out by C. E. Nichols, of Columbus, O.

A patent, No. 944,540, for a heat coil, has been secured by W. L. Coursen, of East Orange, N. J.

A patent, No. 944,545, for an electric signal, has been granted to A. F. Dixon, of Chicago, Ill. For telephone toll trunks.

Personal.

The wife of J. W. Crews, general commercial superintendent of the Southern Bell Telephone Company at Richmond, Va., died January, 3.

Mr. E. C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company is in New York on business connected with the service.

Mr. W. C. Furness, manager, of the Great North Western Telegraph Company, at London, Ont., and one of the best known old-timers in the Dominion, is confined to his home by serious illness.

Mr. Charles R. Underhill, the well-known electrical engineer and author, of New York, has accepted a position as telephone and coil engineer for the American Electric Fuse Company, of Muskegon, Mich.

Mr. C. R. Hosmer, director of the Canadian Pacific Railway, and formerly general manager of the telegraph department of that system, accompanied by his wife and daughter, is spending the winter in Italy. Mr. Hosmer will soon have erected an additional pavilion to the Alexandra Hospital, Montreal, to be used for the treatment of erysipelas.

Mr. Isaac McMichael, vice-president and general manager of the Great North Western Telegraph Company, Toronto, is stopping a month or two at his Florida orange grove, located at Alamoonte Springs. Mr. McMichael celebrated his seventieth birthday on January 7. A number

of his friends took occasion to send him congratulatory telegrams. Though he has reached three score and ten, Mr. McMichael is still hale and hearty, and gives evidence that he will be able to take an active part in business affairs for many years to come. He is regarded as one of the ablest telegraph executives in the service to-day.

Canadian Pacific Railway's Telegraph.

Mr. F. C. Robertson, chief operator at Toronto, has been appointed Inspector of the Ontario Division, with headquarters at Toronto. Mr. H. J. Lillie, assistant wire chief, succeeds Mr. Robertson as Chief Operator of the Toronto office, and Mr. M. J. Bayley succeeds Mr. Lillie as assistant wire chief. Mr. H. A. Shambrook has been appointed manager of the Toronto office vice Mr. D. G. Sturrocks, resigned.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. B. Pillsbury, general superintendent of the Eastern Division, has returned from a trip of inspection to the Western part of the state.

Mr. S. B. Haig, superintendent of traffic, is making an inspection trip to Washington, Columbus and other cities in the South and Middle West.

Mr. H. A. Tuttle, president and general manager of the North American Telegraph Company, spent a few days in New York the first of the month.

The wife of Mr. Isaac Smith, superintendent of tariff, died suddenly, January 13, at her home in Little Falls, N. J.

Mr. William M. Fitzgerald, manager of call circuits and burglar alarms at Philadelphia, was a recent New York visitor, coming here to inspect the call circuits in this city.

Among the recent executive office visitors were E. S. Washburn, wire chief at Buffalo; J. W. Weed, manager at Syracuse, N. Y., and W. J. Martan, manager at Niagara Falls, N. Y.

The new tariff book which has just been issued contains over forty pages of matter more than the previous one. Mr. Isaac Smith, superintendent of tariff, has introduced several new features which tend to convenience in using the book. Information concerning the money transfer service is printed on green paper; the rules and instructions concerning cablegrams are printed on pink paper, and the rules of the company are printed on yellow paper. The color of the cover has been changed to a dark blue, which will not be easily soiled upon handling. Taken as a whole, the work reflects great credit upon Mr. Smith.

RESIGNATIONS AND APPOINTMENTS.

Mr. V. Galas wire chief at New Orleans has been appointed acting chief operator, vice E. E. Cord, deceased. Mr. L. L. Apperson, chief operator at Mobile, has been appointed wire chief at New Orleans and not chief operator as recorded in our January 1 issue.

Mr. Frank H. Jacobs, chief operator at Peoria, Ill., has been appointed manager to succeed S. S. Lacey, who on account of ill health has resigned to accept a position at Galveston, Texas, in the telegraph department of the Gulf, Colorado and Sante Fe Railway. Mr. Jacobs entered the telegraph service in 1876 as operator on the Burlington system. His connection with this company dates from 1890, when he became chief operator at Peoria.

Mr. W. L. Meeker, manager at Clarksville, Tenn., has been appointed manager at Paducah, Ky., vice W. B. Harris. Mr. R. O. Forbes succeeds Mr. Meeker at Clarksville.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Frank Jaynes, general superintendent at San Francisco; Mr. Theodore P. Cook, general superintendent at Chicago, and Mr. Jacob Levin, general superintendent at Atlanta, were in New York during the past week holding a conference for the good of the service.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, entertained at dinner at the University Club on the evening of January 13 the general superintendents who are visiting New York together with several of the other telegraph officials.

Among the recent executive office visitors was Mr. P. G. Kern, superintendent of the American District Telegraph Company, at Louisville, Ky.

RESIGNATIONS AND APPOINTMENTS.

Mr. E. E. Robinson, manager at Charlottesville, Va., has been appointed manager at Bristol, Tenn.

Mr. Frank R. Webb, night manager at Philadelphia, has been appointed chief operator, to fill the vacancy caused by the death of Mr. James P. McLoraine. Mr. Webb learned telegraphy with the old Franklin Telegraph Company in Philadelphia in 1875, and was afterwards with the American Rapid and the Bankers and Merchants Telegraph Companies, and with a broker. In 1887 he joined the forces of this company and by reason of his good work, was appointed night wire chief, which position he filled with great credit to himself and the company. In 1902 he was appointed night manager, which position he has since filled.

Mr. William C. Shugar has been appointed night manager to succeed Mr. Webb. Mr. Shugar began his telegraph career with the Philadelphia and Reading Telegraph Company in 1879, and was employed by that company until 1886, when he accepted a position with this company. In 1903 he was made wire chief, which position he filled so acceptably that he was selected to fill the vacancy caused by the promotion of Mr. Webb.

Mr. S. S. Peck, who has been an assistant to Mr. Shugar as wire chief, has been appointed night wire chief.

Miss D. McNeece has been appointed manager at Plymouth, Mass., vice W. J. Waterson, who has been transferred to the management of the Barre, Vt., office, vice C. M. Howell, resigned.

The Cable.

Charles A. Gill, manager of the office of the Commercial Cable Company at 16 Beaver Street, New York, died at his home in Brooklyn, January 2, aged forty-nine years. Mr. Gill was born in Canada, and had been in the service of the Commercial Cable Company for the past twenty-five years.

T. Finnis, general manager and secretary of the Direct United States Cable Company, London, England, died January 1, aged fifty-nine years. Mr. Finnis entered the employ of the Eastern Telegraph Company at the age of sixteen, and in 1877 became accountant for the Direct United States Cable Company. In 1887 he became secretary, and in 1899 general manager.

President Clarence H. Mackay, of the Commercial Cable Company, in honor of the twenty-fifth anniversary of the company on December 27, gave a dinner to the staff at London. On the same day representatives of the company at Liverpool, Manchester, Bradford and Newcastle-on-Tyne gathered at Liverpool, and members of the staff in Scotland dined at Glasgow in commemoration of the same event.

A cable despatch from London states that the central board of the Imperial Pacific Cable Company is making satisfactory progress in its work. It is at present engaged in an attempt to carry out proposals for taking over the land telegraphic line across the Dominion of Canada. It is anticipated that the scheme will shortly be approved by all the co-partner Governments which will be responsible for the cable.

The Western Telegraph Company has filed a protest with the Brazilian Government against the concession made recently to Mr. R. J. Reidy for a submarine cable connecting Para, Fernando de Noronha, Algoas, Rio de Janeiro, Sao Paulo and Chuy. It is claimed that this concession is an infringement of their rights. According to a Consular report the concession authorizes the establishment and maintenance of a coastwise cable service extending from the mouth of the Amazon to the southernmost point of the Brazilian coast. Such a cable service, if actually established, will prove a serious competitor of the Western Telegraph Company, which now enjoys the exclusive privilege for submarine cable service along the Brazilian coast, except for the telegraph service of the Government.

The concession provides for making land connection necessary to the operation of the service and also for connection with the government telegraph company's lines. The term of the concession is to be twenty-five years, the first section of the cable, from Para to Nitheroy, to be in operation within three years, and the rest of the line nine months later.

The concessionaire must pay to the Government for each word transmitted in international messages two cents and one cent if the message is official. The rates must be authorized by the Government. The Company may reduce its rates without authority, but to increase them again it must have government sanction. Government messages must be given preference over others and will be sent at 50 per cent. discount over regular rates. The concession provides that authorization to no other concern shall be given to establish submarine cable communication between Para, Fernando de Noronha, Alagoas, Rio de Janeiro, Sao Paulo, and Rio Grande de Sul, or between any points of the coast of Brazil and Rio de Janeiro, or between the latter port and any foreign port, during the term of the concession or so long as communication by the lines authorized is properly maintained. The company is prohibited from combining in any way with other similar concerns now operating in Brazil without special authorization by the Government. All privileges and favors granted by the Government to other similar companies operating in Brazil are conceded also to the concessionaire of the new company.

Municipal Electricians.

The contract for installing a fire alarm telegraph system at Ilion, N. Y., has been awarded to the Utica Fire Alarm Telegraph Company.

Plans have been completed for a new fire alarm system at Palo Alto, Cal., and bids will soon be advertised for.

A patent, No. 944,575, for a combined telephone and protective alarm system, has been granted to J. G. Nolen, of Chicago, Ill. Makes use of an ordinary telephone line to act as a fire alarm. The ordinary bell and line signal give the alarm.

Morse Electric Club.

The annual election of officers of the Morse Electric Club occurred January 12. The officers elected were: J. B. Van Every, president; J. C. Barclay and B. Brooks, vice-presidents; F. J. Scherrer, secretary, and R. J. Murphy, treasurer. The directors are: Gardner Irving, M. H. Kerner, M. J. O'Leary, John A. Hill, P. J. Casey and A. G. Saylor. The next annual dinner of the club will take place at the Hotel Savoy, Fifth Avenue and Fifty-ninth street, Saturday evening, February 5, when it is expected that a large gathering will be present.

Election of Officers of Magnetic Club.

The election of officers of the Magnetic Club occurred January 13, at the annual meeting held at 253 Broadway, New York. The following were the officers elected: Mr. Charles P. Bruch, president; Mr. Marston R. Cockey, first vice-president; Mr. B. M. Downs, second vice-president; Mr. D. W. McAneeny, third vice-president; Mr. Theodore L. Cuyler, Jr., fourth vice-presi-

dent; Mr. W. H. Mathews, secretary; Mr. J. J. Cardona, treasurer; Governors J. J. Whalen, E. P. Tully, Isaac Smith and C. F. Leonard. The governors whose terms of office hold over to another year are: W. H. Baker, E. B. Pillsbury, F. E. McKiernan and Charles Shirley.

Military Telegraphers' Pension Prospects.

BY COLONEL WILLIAM BENDER WILSON,
Holmesburg, Pa.

In response to your letter making inquiry as to the status of Congressional legislation relative to the pension claims of those telegraph operators who served in a military capacity during the civil war I would state:—

The agitation of those claims is going on and will go on until the last survivor has passed away. The difficulty at present which postpones action rests in the fact that the policy of the House of Representatives as now organized is adverse to the extension of the pension laws to any persons not now eligible to their benefits, that there are a number of different groups more or less entitled to consideration demanding recognition, and that the expenditures of the Government must be scaled down to come within the revenues or close to them. If the military telegraphers were the only claimants it is more than probable that a relief bill would be passed for the sum of money involved granting them their rights. This would be small, but if it was passed the leaders fear that action in their case would establish a precedent for the other claimants to demand recognition of their claims.

There is no doubt that the claims of the military telegraphers are based on as solid grounds as the enlisted men stood upon, but the advocates in Congress of the other groups would seriously and effectively prevent any bill passing which did not embrace their clientele, for the leaders and controllers of legislation will not permit the passage of an omnibus bill extending the pension laws.

Such is the condition, but the military telegrapher must not despair, on the contrary he should put on a bold front and be more clamorous than ever for the recognition of his rights. He should see his Congressman whenever he can, write to him at all times, and enlist all his friends in doing the same. If to that could be added the united voice of the telegraph operators in America of to-day demanding that justice be done those veterans of their craft who rendered exceptional service to their country in the most perilous hour in its history there would such a volume of influential sound reach Congress that proper legislation would ensue. The people are all powerful and the voice of the telegraph people would be a power indeed.

Several bills are in preparation to be presented to this Congress, for it is essential that no break must be permitted in the continuity of the demands. Agitation, however, and agitation in its strongest expression is the duty of the hour.

The Telephone.

Articles were filed in the office of the Secretary of State of New Jersey on December 30 completing the merging of the New York and New Jersey Telephone Company with the New York Telephone Company.

The Delaware and Atlantic Telephone and Telegraph Company, operating in New Jersey, filed an amended charter with the Secretary of State December 31, increasing their capital stock from \$400,000 to \$10,000,000.

At the weekly luncheon of the Chicago Electric Club, December 22, Mr. J. B. Ware, of Grand Rapids, Mich., secretary and treasurer of the National Telephone Association, gave an address on "Telephone Development and the Benefits of Competition."

Employees and officials of the Southwestern Telegraph and Telephone Company have organized a club at Dallas, Texas, which has for its object the improvement of the service and the cultivation of a better relation between the public and the company.

The board of directors of the National Independent Telephone Association have elected Mr. Frank H. Woods, president of the Lincoln Telephone and Telegraph Company of Lincoln, Nebraska, president of the Association, and Mr. Joseph B. Ware, Grand Rapids, Mich., secretary and treasurer.

On December 15 an interesting experiment in long-distance telephoning was successfully carried out between Washington and New York. In the former city were Commander Peary, Andrew Carnegie, Dr. Alexander Graham Bell and Admiral Chester, as speakers, and in the latter eighty-two people who were dining with the directors of the Associated Press. Every New York auditor used a watch-case receiver. The service over 225 miles was perfect. The strength of the current was augmented at Philadelphia by repeaters in the circuit.

The United States Telephone Company and the Cuyahoga Telephone Company, of Cleveland, the majority of the stock of which was purchased recently by J. P. Morgan and Company of New York, have been reorganized and representatives of Morgan and Company have been elected to the directorate of both companies. Mr. F. A. Davis, president of the Columbus Citizens' Telephone Company, has been elected president of the United States Telephone Company, which controls the long distance telephone lines connecting the various local companies in which Morgan and Company have a controlling interest.

Figures issued by the American Telephone and Telegraph Company and its associated companies for the past year show that on December 31 about 5,000,000 telephones were included in their system. 3,500,000 of these were directly owned, and 1,500,000 were controlled by sub-licensees. The increase for the past year amounts to about 600,-

000 telephones. The total mileage of wire at the end of the year was 10,250,000, about 400,000 miles of which was added during 1909 and over half of which was underground.

The Continental Telephone and Telegraph Company has obtained control of the Rochester Telephone Company, the Syracuse Telephone Company and several other smaller independent companies operating in New York State. This gives the Continental company control of all the important independent telephone systems in Pennsylvania, New Jersey and New York, with the exception of the Federal Telephone and Telegraph Company of Buffalo, and the Keystone Telephone Company of Philadelphia.

One advantage of the union of telephone and telegraph interests was shown recently when the telegraph wires in some of the Western states were broken down by a severe wind storm. The business rapidly piling up, the telephone wires were utilized to patch out the bad spots in the telegraph wires in no less than a dozen cases, thereby making clear circuits. Thus wires from New York to Cincinnati and Chicago via Pittsburgh and Louisville were "patched" with telephone wires in several places, permitting telegrams to be transmitted without interruption that would otherwise have had to wait until the damaged wires could have been repaired.

Unless additional evidence, not now known of, is forthcoming, it is unofficially announced that there will be no suit by Attorney General Deussen, of Ohio, to dissolve the sale of stock of the independent telephone companies to J. P. Morgan and Company, on the theory that the American Telephone and Telegraph Company is the real purchaser of these properties. This decision has been reached by reason of the direct assurance of J. P. Morgan and Company, President L. G. Richardson, of the Central Union Telephone Company, with headquarters at Indianapolis, and President Theodore N. Vail, of the American Telephone and Telegraph Company, that there is no agreement or understanding of any kind by which the Bell interests will ultimately procure control of the independent companies.

It appears from statistics presented in a recent number of a German publication that there were in January, 1909, more than twice as many telephones in the United States as in all the rest of the world together. The proportional preponderance is not, however, being maintained, for, according to the figures, there were in 1900, or nine years previous, three times as many telephones in the United States as in all other countries combined. In regard to the recorded use of telephones, there is little relative difference, for the figures allotted to the United States and to the rest of the world. Each telephone was credited with 1730 annual conversations in the United States, and of 1945 annual conversations in all other countries together.

Radio-Telegraphy.

At a meeting of the Pittsfield section of the American Institute of Electrical Engineers, held on December 21, Dr. A. E. Kennelly presented a paper on "The Mechanism of Wireless Telegraphy."

It is reported that the British post office telegraph engineers and the officials of the Marconi Wireless Telegraph Company are making extensive experiments with the use of wireless for inland telegraphy.

It is announced that the United Wireless Telegraph Company will soon establish a factory in the neighborhood of Liverpool, England. This action has been rendered necessary because of the British patent law requiring them to manufacture their patented goods in that country.

A patent, No. 943,969, for space telegraphy has been granted to L. DeForest, of New York. A space telegraphy system provided with a discharger for an opened or closed circuit, an electrical condenser which shall permit of a regular and constant spark frequency.

A patent, No. 943,960, for a system of directed wireless telegraphy, has been awarded E. Bellini and A. Tosi, of Paris, France. A wireless system employing electromagnetic waves and which permits a receiving station provided with a plurality of dirigible aerials to radiate mainly in any given direction without it being necessary either to turn the aerials or to employ a great number thereof.

Mr. Willis L. Moore, chief of the United States Weather Bureau, stated recently that when all the nations of the earth should agree upon one central autocratic wireless station that would have complete power over the whole Atlantic Ocean to determine when vessels in certain portions of the ocean should send, and when they should keep quiet, it would be possible to get a weather map of the ocean and to transmit and receive messages to and from any place desired. He did not believe, however, that any such international agreement would ever be effected. He feared that we would soon have such a babel of wireless voices on the ocean that most messages would be drowned out.

At a recent conference between representatives of Australia, New Zealand and the Fiji Islands, the subject of a wireless system to bind up all of the British possessions in the Pacific was discussed and a recommendation made that high-power stations, to be controlled by the British Government, be established at Sydney, Doubtless Bay, New Zealand, Suva, the capital of the Fiji group, and Ocean Island, and medium-power stations in the New Hebrides and Solomon Islands.

In England all operators of wireless stations afloat or ashore are required to pass an examination in the elements of their duties, and to receive a certificate of capability. They likewise conform to an international code of regulations controlling the reception, transmission and delivery of messages.

Secretary of Commerce and Labor Nagel has recommended the passage of a bill requiring wireless installations on passenger steamers carrying more than a certain number of passengers over more than a given distance. Of the 282 steamships that carried steerage passengers to and from the United States during the first half of 1909, 143 were equipped with wireless telegraph apparatus. Of the 167 prominent coastwise vessels 97 are provided with wireless equipment.

In a paper which was delivered recently before the Institution of Electrical Engineers, London, Professor J. A. Fleming described "Some Quantitative Measurements in connection with Radio-Telegraphy." One of the most important measurements necessary for a study of radio-telegraphic circuits is that of the high frequency resistance. Professor Fleming explained the apparatus which he devised for making such measurements. He also discussed the measurement of wave length, spark frequency and overall efficiency of a transmitter.

A contract has been entered into between the Compania Espanola de Telografia sin Hilos and the Spanish Government whereby wireless telegraph stations will be established at Cadiz, Vigo, Barcelona and the Balearic and Canary Islands, including six of the principal of the last named, which, with the Santa Cruz de Tenerife and Gando stations, will embrace a radius of 2,500 kilometres, thus establishing communication with Cape Verde, and thence with Pernambuco in South America. The company has just completed the erection of a station at Santa Cruz.

In a recent paper delivered before the Institution of Electrical Engineers, London, by W. H. Eccles and A. J. Makower upon the "Efficiency of Short Spark Methods of Generating Electrical Oscillations," the authors described apparatus which they used for measuring the efficiency of the form of dischargers used in the Lepel system. They also explained their method of making the tests. The overall efficiency, which is obtained by dividing the energy radiated by the energy taken from the direct current mains, they found to be as high as 14.4 per cent under certain conditions. As the current taken increased, however, the efficiency rapidly decreased.

Serial Building Loan and Savings Institution.

The twenty-fifth anniversary of the organization of the Serial Building Loan and Savings Institution will be celebrated by a dinner at the Hotel Astor, Thursday January 20. This should be a most interesting and enjoyable affair for every member and it is hoped that there will be a large attendance. The committee having charge of the arrangements consists of George W. Blanchard, chairman, F. D. Giles, E. E. Brannin, J. F. Nathan, M. W. Rayens, E. S. Butterfield and M. S. Cohen. A meeting of the shareholders to consider several amendments to the constitution will be held January 31 at the office of the corporation, 195 Broadway, New York.

Heroes of the Telegraph Key.

The article in Everybody's Magazine for December entitled "Heroes of the Telegraph Key" contains several interesting stories of men who have risked their life in the service, in addition to the story of Richard Spillane, which we published in our December 16 issue. Among these the story of Edward V. Wedin, who is now a gray-haired employe of the Western Union Telegraph Company at 195 Broadway, New York, and his action in going voluntarily to New Orleans to what seemed almost certain death at the time of the yellow fever epidemic in 1878 is one which reflects great credit upon the profession and is well worth reprinting. The story is as follows:

"Another great historical catastrophe, in which telegraphers played a heroic part, was the yellow fever epidemic which swept New Orleans, Memphis, and Grenada in 1878—the most frightful epidemic in the history of our country—when thirty thousand went down in the grip of "Yellow Jack" and six thousand died in less than sixty days.

"About the middle of August of that year it was feared that the entire South would be swept by the pest, and the announcement was made that a cordon of guards with shot guns would be stretched around the affected districts. The stampede that followed the announcement beggars description. Within less than ten days the white population of Memphis was reduced from forty thousand to less than thirty-five hundred. In the mad scramble for self-preservation sons fled stricken mothers, wives abandoned doomed husbands, and mothers deserted their dying children. Clergymen, physicians, nurses and town officials fled in terror of being pent up in the live rat trap, leaving their duties to a few brave ones who stayed behind, or to outside volunteers.

"To risk entering this circle of death was all but certain destruction. More than four thousand were attacked in a single week and taken to makeshift hospitals where nurses with glassy eyes and fire-red faces trembled with the "shakes," but stayed until the black vomit overtook them. More than six hundred died in a single week. They died so fast that coffin makers and gravediggers could not keep up with them. Trenches forty feet long were scooped out with horse scrapers, and victims were buried four bodies deep, without coffins and without even a relative to stand by and murmur a prayer.

In this gigantic charnel house, abandoned by the Government through the cutting off of the mails, eleven out of fifteen Western Union Telegraph operators who had stuck to their posts were under ground by August 20, while messages piled up on the four survivors—messages of heartbroken mothers, wives, and sisters pleading for scraps of information about children, husbands, and brothers; messages of anxious mothers, wives, and sisters in the city of death

trying to assure loved ones without that they were still alive; messages from convalescents begging for money; messages from the Howard Relief Association clamoring for doctors and volunteer nurses, and for drugs, cots, supplies, and funds; messages from newspaper correspondents describing the plight of the sufferers and the horrors of the Yellow Death, and appealing broadcast for help. How long the four operators would last before the thousands in the pest crater would be cut off from sending cries of distress to the outside world, was problematical. Therefore the company issued from its New York headquarters a general call for volunteers.

"But sticking to one's key in time of danger was one thing, volunteering deliberately to expose one's life another. Out of fifteen hundred operators in New York only one responded—Edward V. Wedin, twenty-two years old, a slim, slightly built, quiet young man, a crackerjack operator who feared not man, pest, nor devil. On August 28 he stepped aboard the train bound for New Orleans, an army of friends grasping his hand for a last good-bye.

"Gazing from the car window as the train neared the fever district, Wedin could see for himself the ravages of the epidemic. Entire villages were deserted, half-starved dogs the sole signs of life. Doors and windows of houses stood wide open, showing bodies stretched under sheets, candles burned to their sockets in the sole death watch. Graveyards he saw that looked like newly planted truck farms, with white sheets of lime covering the mounds to "keep the poisons down."

"When he stepped off the train in New Orleans, the station was deserted. At the telegraph office the men were thunderstruck to see him. Work had piled feet high in the short-handed office, and he sat down at once in front of a key. He sent more than five hundred messages at his first sitting. Food and drink were brought to him, and he ate with one hand and worked with the other, worked for twelve hours, until his wrist ached, and the copy danced before his eyes, and he had to sit on the arm of a chair to keep awake, worked until his arm was as if paralyzed to the elbow, and he fell forward on his key fast asleep. For two hours they left him there because they could not waken him; then they aroused him and he staggered home through the night, through the sickening stench with which the epidemic reeked to heaven, past trucks, express and farm wagons jouncing dead bodies to graveyards, past hundreds of bonfires of stumps and tar, burning, for disinfection, in front of houses where people had just died.

"The next morning, and the next, and the next, other volunteer operators arrived from other cities—young men like Wedin, for the most part without family ties. They dropped like flies. One of these arrived of a morning and by twilight of the next day they were covering him up in the trenches. Others lasted only forty-eight hours.

Some dropped on their way home after work and lay dying in the streets; others who went home of an evening in seemingly good health failed to report the next day and were found dead in their beds. Numbers were stricken in the office. The wire chief alongside Wedin collapsed early one afternoon and was lifted out of his seat, his lifeless hand still clutching the key.

"Yet only once did Wedin falter. That was when this man who had unflinchingly looked death in the face found himself unexpectedly talking to his sister, hundreds of miles away in his own cool North. Lord! It was as if suddenly her soft, cool fingers were laid across my forehead, he said. He himself took this message, sent from Jersey City:

"Is Edward V. Wedin still alive? His death is reported. His sister waits here in the office for answer."

"Tell her Ed himself is answering this. Tell her God bless her and that Ed sends her a kiss," Wedin answered, hot tears welling from his eyes.

"Throughout September to the first of October the dread weeks dragged; and then there came an early, sharp frost—and men fell into each other's arms and wept and raised haggard faces in thanksgiving, and church bells pealed joyously, for this was the death of Yellow Jack.

"Of all the men who sacrificed and risked their lives in the epidemic, Wedin is most famed; as he says, solely by virtue of escaping unharmed. A list of men who died about him would read like the absent list of a regimental roster after a hot skirmish. In unmarked Southern graves they lie; but memory of their names is green among their brethren, for they died the death of heroes of the key in Honor of the Service."

Office Management.

No manager or head of a department can hope to make a satisfactory showing for his particular office or department, in these days of strenuous competition, unless the methods of himself, as well as his subordinates, be systematic.

By system it is not to be understood that every manoeuvre or transaction of the office must be burdened with so-called "red tape," as this latter item used too excessively will prove a hindrance rather than a help in facilitating prompt and satisfactory handling of business matters.

By injecting a proper amount of system into the work, cutting out the non-essentials, the office man may not only economize in the matter of time and money for his employer, but will save in addition much wear and tear to his own physical health as well as to whatever gray matter there may be stored in the labyrinths of his attic.

The office end of a business requires regulation just as essentially as any other branch of that business; the best methods should be adopted for facilitating and improving the work, the of-

fice force should be lined up so that each individual member thereof may do his full duty, and any "dead-wood" that may be permitted to exist will only serve to retard the smooth and successful operation of that office the same as a broken cog on a mighty wheel will throw out of gear the balance of the machinery.

In adopting a system, plan something that will suit the conditions and necessities of that particular business, a system that will accomplish in the shortest and most simple manner possible the ends desired; avoid all elaboration that will tend toward a duplication of action not only as regards the large items of the business, but also the minor details as well, as unnecessary use of either time, labor or material, means just that much waste of money.

Great care should be exercised in handling all the details of correspondence. Letters should be addressed in manner refined and courteous to all correspondents, they should be accurate in description and detail, be as concise as possible, but not so brief as to rob the communication or leave in doubt any of the essential facts intended to be conveyed; all unnecessary information, however, which is foreign to the subject, should be omitted. Make one letter cover the subject in hand, and if another subject needs attention write a separate letter.

To successfully handle the affairs of an office connected with a business of any magnitude the men in charge must be on the job every minute, they must be energetic, tactful, faithful to their trust, courteous, punctual, and capable to perform the duties required of them.

The work of a good office man very readily shows itself that man's capacity for holding his position. A glance at his desk will indicate just how he does the stunt; you will not see his papers all piled and jumbled up in a miscellaneous mass, but you will note the evidence of system; his correspondence will be neatly arranged, every subject to itself with every letter in proper sequence; you will find on his desk only such implements as are necessary for his work, and will note the absence of gaudy pictures and bric-a-brac which might be an attraction on the mantel at home, but not serviceable on the desk of a busy man.

The good manager is invariably a hustler, he is awake not only to the duties of his particular position, but he is in touch with other things both in the business and out of his line of work; he is socially a good fellow, and commands the respect not only of his superiors but also his subordinates as well.—W. Magill in Michigan State Gazette.

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JANUARY 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Insulation of Telephone Lines.

The prediction of Mr. Theodore N. Vail that within a short time we would be able to talk successfully from New York to San Francisco, while it may seem visionary to some, is, if we reflect seriously and consider the march of progress in the past decade, even in the improvement of telephonic communication, a result that is bound to be attained. Telephone engineers are working to bring this about, and with the many brainy men employed in solving this problem there is no reason why the desired results should not soon be attained. One thing which has seriously hampered the development of long distance communication by telephone is low insulation on the lines. With the ordinary glass insulators in use the insulation of a long line is so low even in dry weather that a large percentage of the feeble telephone current fails to reach its destination.

European engineers discovered long ago the superiority of porcelain to glass for insulating purposes, and even though it was much more ex-

pensive, equipped their lines with porcelain insulators, with the result that low insulation is not the bugbear to them that it is to engineers in this country where, in contrast to the operation of the Government controlled public service utilities of Europe, the demands of commercialism have prevailed, and the chief aim has been to construct as cheaply as possible a line that would work after a fashion most of the time, and not to build a line that would give the best possible service at all times.

The telephone engineers working upon the long-distance problem are now taking cognizance of this situation and are considering the equipment of lines with porcelain insulators. While the expense of building lines in this manner is considerably greater, there is no doubt but that the increased efficiency of the line and the improvement in the service gained will justify the additional expense in many cases, and it is probable that within the next few years we will see most of the long-distance telephone lines insulated much better than at present. Thus one condition necessary for the fulfilment of Mr. Vail's prophecy will be brought about.

For many years past telegraph engineers in this country have recognized the superiority of porcelain insulators, but have not been able to persuade the financial management of their companies that the improvement to be gained would justify the added expense.

Twenty-fifth Anniversary of Commercial Cable Company.

Upon another page we give an account of the celebration of the twenty-fifth anniversary of the establishment of the Commercial Cable Company. This was an event of which the entire force in charge of this system ought to be proud. The guiding hand of Mr. George G. Ward has managed the affairs of this company from its inception, when the first cable was laid and a little band of invited guests gathered at the cable hut at Coney Island on October 16, 1884, to witness the ceremonies incident upon landing the cable. Now that cable hut accommodates a score of cables and the system radiating from it is practically world wide in extent. President Clarence H. Mackay is to be congratulated upon the great success which has been the lot of the cable company of which he is the head, and Mr. Ward and his able lieutenants are to be congratulated upon the fact of their active connection with such a flourishing enterprise, made possible by their loyalty and the indomitable courage and perseverance of the late John W. Mackay.

The watchword of the company has always been "progress," and this has been clearly demonstrated during the past year, when the company has spent a large amount of money and gone to a great deal of trouble merely for the sake of increasing the speed of operation of one of their cables. Some wireless enthusiasts pre-

dict that within a few years the cables will be rendered useless by reason of the perfection of wireless communication. Personally, we do not share in this opinion, but believe, on the other hand, that the usefulness of the cables is going to increase as a result of increasing harmony and closer trade relations between the different nations. We trust that this will be the case, and that twenty-five years hence this company may celebrate its golden anniversary, after having enjoyed another quarter century of abundant prosperity.

Favorable Comments Upon Our Change in Name.

In the many favorable comments which we have received from our friends upon the enlargement in the scope of our publication we feel that our action in giving the telephone interests recognition in our columns has been completely vindicated. In fact, many of our readers have asked why we did not take such a step long ago. They point out the fact that many telegraph men have occupied prominent places in the telephone field for a long time, and for this reason alone the community of interests between the two industries has been great enough to justify us in devoting our energies to both fields. Among the names which might be mentioned in this connection of those who have left the telegraph and taken an active part in telephone affairs are Theodore N. Vail, president of the American Telephone and Telegraph Company; Bernard E. Sunny, president of the Chicago Telephone Company; H. J. Petten-gill, president of the Southwestern Telephone and Telegraph Company; William T. Gentry, president of the Southern Bell Telephone Company; L. B. McFarlane, president of the Bell Telephone Company of Canada; E. C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company; J. G. Splane, vice-president and general manager of the Pittsburgh and Allegheny Telephone Company; Charles H. Wilson, general superintendent of the American Telephone and Telegraph Company, and a host of others too numerous to mention.

In spite of this great number who have transferred from one field to the other the telephone and telegraph have remained distinctly separate in their operation. When only recently the obstacles in the way of a closer alliance between the two industries had been surmounted it seemed to us that the opportune time had come for extending our field to include the telephone. We believe that we will be able to serve those interested in telephone operation as efficiently as we have served their telegraphic brethren in the past and bespeak their hearty co-operation in our efforts.

Regulation of Telegraphs and Telephones in New York.

Governor Hughes of New York, in his annual message to the Legislature again recommends that the Public Service Commission law be ex-

tended so as to bring telegraph and telephone companies under the jurisdiction of the commission. "The events of the past year," says the Governor, "have served to emphasize the importance of adequate supervision and regulation."

Control of the operations of telegraph and telephone companies to the extent that these operations affect the public (viz., in the matter of rates and service) by the public service commissions, but freedom from control in their financial management, will be recommended by the legislative Committee which was appointed at the last session for the purpose of investigating the advisability of putting these corporations on the same basis as other public service concerns as regards Government supervision.

It may be several weeks before the committee renders its final report and submits the draft of a bill to carry out its recommendations to the legislature. In the meantime it is not believed that the recommendations of the committee will go far enough to meet the ideas entertained on this subject by Governor Hughes.

Members of the Legislative Committee, however, feel that the recent decision of the Court of Appeals limiting the powers of the Public Service commissions in passing upon the financial management of railroads has furnished ample ground for relieving the telephone and telegraph companies from the supervision to which other public service corporations have been subjected since the public service commissions law went into effect.

It has been intimated that the decision to exclude the finances from supervision was due partly to the complexity of the problem which confronted the committee and the lack of time to devise a suitable scheme of regulation on the financial side of the operations of such companies.

The number of telephone companies operating within the State is very large. Many of them are in a stage of formation, and naturally have exerted all the influence at their command to escape supervision, which may hamper them considerably in developing along the lines planned. In addition to this, the committee is said to have found a baffling lack of uniformity in the respective charters of the many small local companies in the field.

Troubles of the Telephone Companies.

In an address before 400 members of the New England Telephone Society December 14, Edward K. Hall, attorney for the New England Telephone and Telegraph Company, told of some of the difficulties encountered by that company. "Most of our troubles," he said, "do not come from actions of the company as a corporation, but are the result of individual carelessness and failure to carry out the rules of the company. Questions like telephone rates do not cause one-quarter the trouble occasioned by impertinent operators and slipshod workmen."

OLD AND RECENT TOURNAMENTS.

General Information as to Early and Late Speed Trials, with Incidental Comments on the Persons Concerned in Them, and Unnecessarily Complete Reports, Perhaps, as to the Part I Myself Played in Them and in Other Related Events.

BY WALTER P. PHILLIPS.

(Continued from page 63, January 1, issue.)

On October 30th and 31st, 1903, the second contest under the management of the American Telegraphers' Tournament Association took place in the National Export Exhibition Building in Philadelphia, the leading feature of the affair being the struggle of the giants for possession of the Carnegie medal for best all-round telegraphic work, which was won by F. M. McClintic, at Atlanta, in March, 1902. The officers of the association were: Clarence A. Stimpson, chairman; C. B. Wood, secretary; A. S. Weir, chairman committee on prizes; D. A. Mahoney, chairman finance committee.

Secretary Wood made an address of welcome and read letters of regret from Thomas A. Edison, Col. Robert C. Clowry, Col. A. B. Chandler, Clarence H. Mackay, W. H. Baker, and others. After a very interesting speech by Mr. Weir, the regular business began.

The gentlemen most actively associated in the undertaking were John Winthrop, vice-president, who also represented the president; W. A. Connor, who was absent; Clarence A. Stimpson, C. B. Wood, A. S. Weir, F. E. Maize, D. A. Mahoney, G. W. Dunn, R. C. Murray, Jr., E. C. Abrahams, J. P. Altberger, L. Lemon, C. M. Shaeffer, C. M. Lewis, S. S. Garwood, C. E. Wilson, F. M. Griffin and others. J. W. Benckert did the electrical work, which was managed without a hitch.

The following were the general rules for the guidance of judges:

Speed, formation of letters, spacing, and adherence to copy, will determine the winners in all sending contests.

Cash prizes aggregated \$1,600. Prizes also given were a handsome loving cup, valued at \$100 by the New York Consolidated Stock Exchange, won by George W. Conkling; Fay-Sholes typewriter, won by H. V. Emanuel, and a handsome roll top desk, won by W. C. Murray, of Atlanta, second prize in the thousand-word receiving contest.

First Event (railroad operators.) Sending and receiving 20 railroad messages.

Sending Class—First prize, R. C. Bartley, Pennsylvania office, Philadelphia.

Second prize, C. J. Cone, Pennsylvania office, Pittsburg, Pa.

Receiving Class—J. W. Harrison, Pennsylvania office, Philadelphia, first prize; G. A. Hodgson, Pennsylvania office, Philadelphia, second prize.

Judges—Andrew Keiser, J. L. Osmond, S. W. Graham, C. M. Lewis, J. J. Mishler, all of Philadelphia.

Ladies' Contest—Class A (sending twenty commercial messages.

First prize, Miss K. N. Stetson, Postal Telegraph Company, New York, 14 minutes, one second.

Second prize, Mrs. B. V. Gillespie, 15 minutes, five seconds.

Class B (receiving the same.) First prize, Miss R. Feldman, New York, Postal.

Second prize, Miss L. McKenna, New York, Western Union.

Judges were: M. A. Baker, J. A. McNichol and H. C. Robinson, Philadelphia, and A. C. Thomas and F. E. Crawford, of Chicago.

Third Event (Old Timers, 60 years of age or over.)

Class A—No entries.

Class B—Receiving ten messages and 300 words of press on machine, won by I. D. Maize, of Philadelphia.

E. Payson Porter, "the veteran" from New York, was second.

Judges—F. G. Lamb and J. W. Dwyer, of Philadelphia, and J. F. Ahearn, New York.

Carnegie Medal—Fourth Event (for best all-round operator.) Sending twenty-five messages and 500 words of press and receiving the same. The contestant having the highest total average to be declared the winner.

First prize, Carnegie medal and \$300 cash; second prize, \$150.

Entries were: F. M. McClintic, of Dallas, Texas; W. M. Gibson, New York; E. E. Bruckner, Chicago; Harvey Williams, Philadelphia; W. C. Murray, Atlanta, Ga.; G. W. Conkling, New York; C. J. Chryst, New York; D. Roy Newcomb, Boston.

First prize, William M. Gibson. Time sending press, 9 minutes, 52 seconds, and 25 messages, 13 minutes, 49 seconds.

Second prize, E. E. Bruckner. Time sending press, 10 minutes, 39 seconds, and messages, 14 minutes, 20 seconds.

The judges were: J. V. Berger, L. Lemon, C. E. Bagley, A. Higgins, S. S. Garwood, F. G. Lamb, J. A. Moran, and V. G. Hudgins, of Philadelphia; Thomas R. Taltavall and Frank Kitton, of New York.

Fifth Event—Phillips Code. Class A (sending one thousand words.) Won by George W. Conkling. Time, 15 minutes, 55 seconds.

Other contestants were: W. M. Gibson, George B. Pennock, W. C. Murray, F. M. McClintic and D. Roy Newcomb. Honorable mention was made of the work of W. C. Murray and F. M. McClintic.

Class B (receiving one thousand words from hand transmission, by George W. Conkling.)

First prize, F. M. McClintic.

Second prize, W. C. Murray.

Other contestants were: A. A. Gilson, Louis-

ville; H. R. Clark, New York, and D. Roy Newcomb.

The judges were: E. C. Boileau and J. J. Belzer, Philadelphia; A. E. Marr and G. R. Allen, New York.

Sixth Event (for broker operators.) Sending ten minutes.

Entries: W. T. Dawson, Harvey Williams, R. C. Taft, Philadelphia; W. M. Gibson, Frank L. Catlin, New York.

Won by Harvey Williams. Judges: A. S. Weir, A. W. Wallace and R. C. Mcreedy, Philadelphia.

Seventh Event (Yetman transmitter, special.)

Class A—Sending press, won by C. P. West, New York Postal.

Other contestants were: A. A. Gilson, Louisville; J. B. Stilwell, Karl E. Wilcox, E. C. Watkins, J. P. Gallagher, New York; C. J. Cone, Pittsburg; H. N. Babcock, Atlanta, Ga.

Class B (receiving 30 messages on any typewriter.) Messages sent by George W. Conkling with Yetman transmitter. Won by J. P. Gallagher, of New York.

Judges: J. P. Williams, Robert Morton, J. T. Collins, A. E. Marr and Fred Catlin, New York.

A Yetman transmitter was presented to winners in each class of this event.

Eighth Event—Championship of America. (Sending 500 words of straight matter, hand transmission.)

First prize, Harvey Williams; time, 11 minutes, 30 seconds.

Second prize, George W. Conkling; time, 12 minutes, six seconds.

Other contestants were: E. F. Dougherty, C. H. Labonte, W. M. Gibson, D. C. Lawrence, Frank L. Catlin, George B. Pennock, J. D. Hinant, J. M. Becker, and Frank E. English, New York; F. M. McClintic, Dallas, Texas; A. A. Sullivan, Pottsville, Pa.; W. C. Murray, Atlanta, Ga.; Harry C. Martin, Baltimore; E. E. Bruckner, Chicago; Earl L. Boner, Tamaqua, Pa.; J. H. Abdill, R. C. Mcreedy, H. P. Hemingway, Philadelphia.

Judges: F. G. Lamb, J. W. Reed, A. H. Spracklin, Philadelphia; H. A. Yoell, W. H. Jackson, T. A. McCammon, George H. Usher, J. J. Ghegan, Sid. H. Flagler, New York.

Ninth Event (receiving commercial messages, 30 minutes' trial.) Sent by George W. Conkling with a Yetman transmitter. Fifty-three messages were sent in 30 minutes.

First prize—J. P. Gallagher, New York.

Second prize—H. V. Emanuel, Philadelphia.

Messrs. Gibson, McClintic, Bruckner, Murray, West, Wilcox, of New York; Babcock, of Atlanta, and Lenahan, of Philadelphia, were also contestants.

Tenth Event—A special contest was arranged for the handsome silver loving cup presented by members of the New York Consolidated Stock Exchange, to be awarded to the best Morse sender. The entries were: George W. Conkling,

Harvey Williams, F. M. McClintic, W. C. Murray, and E. E. Bruckner, and the prize was won by Mr. Conkling. More than a thousand persons attended the sessions of the tournament, which was a great success in every respect. New matter was used by the senders, so that no exact comparisons with the work at other contests can be made, though by counting the thousands of characters used it might be pretty closely approximated.

In December, 1904, a telegraphic contest was held in Madison Square Garden, New York, which was limited to feats in typo-telegraphy. While the prizes were small as compared with former telegraph speed tests, much interest was noted, and a very creditable showing was made by some of the contestants.

Judges were: A. P. Velie, S. J. Small, W. J. Ryan, J. H. Nance, and S. C. Dodd.

F. M. McClintic won first prize and R. I. Smith second in the Philips Code Class. The matter was sent to the receivers from a Yetman machine, and the rate of speed was 58 words per minute.

In the Message Receiving Class, F. M. McClintic won first and D. J. Ellington second prize—50 messages in 31 minutes.

D. J. Ellington sent 500 words in 10 1-2 minutes to F. M. McClintic, C. P. West, T. L. Elder, J. P. Gallagher and R. I. Smith. First prize won by F. M. McClintic; second divided between J. P. Gallagher and R. I. Smith.

Mr. McClintic sent on trial, 25 messages in 13 minutes, the same that was sent at Philadelphia the year before in 13 minutes, 49 seconds.

P. A. Gersbach, expert manipulator on the Martin Vibroplex, sent 49 words per minute, perfect Morse, for fifty consecutive minutes.

Boston was the scene of the next tournament, which was held in the early summer of 1906, under the auspices of the International Telegraphers' Tournament of New England. The Carnegie diamond medal, held by W. M. Gibson, of New York, which he won from F. M. McClintic in 1902 at Philadelphia, was not put up for competition, but a new emblem from Mr. Carnegie, known as the Carnegie International Trophy, a cup valued at \$250, was the much-coveted prize for which the giants strove under about the same conditions which governed the contest for the Carnegie medal at Philadelphia. The object of the tournament was the endowment of a hospital bed, and it proved most successful. The officers of the meeting were: President, James J. McGarty; vice-president, Michael J. Reidy; electrician, J. P. Donohue, of the Postal Company; Sid. F. Shirley, manager. Mr. Reidy acted as master of ceremonies. Mayor Fitzgerald made a speech of welcome in the happiest strain, which was appropriately responded to by the master of ceremonies. Visitors were present from many cities, and the occasion was a most enjoyable one. A delightful trip on the bay in a palace tug laden with refreshments, placed at their dis-

posal by the Mayor, was another feature of the occasion. Results follow:

Railroad, Class A (sending 20 messages.)

First prize, typewriter, Richard C. Bartley, Philadelphia; second prize, mecograph, James F. Beegan, Everett Junction, Mass.; winner's time, nine minutes, 36 seconds.

Railroad, Class B (receiving same.)

First prize, typewriter, William F. Bannister, Pennsylvania Railroad, Philadelphia; second prize, mecograph, James W. Harrison, Pennsylvania Railroad, Philadelphia.

Brokerage Class (sending brokerage and financial business, 10 minutes.)

First prize, solid silver punch bowl, presented by the association, David J. Ellington, Postal, New York; second prize, \$40, Harvey Williams, Philadelphia, (broker); third prize, F. M. McClintic, New York, (broker).

Team Match (sender transmitting twenty-five commercial messages to his receiver.)

First prize, solid silver cups, donated by Clarence H. Mackay. Won by David J. Ellington, sender, and H. J. Finn, Postal Company, Boston, receiver; time, 11 minutes, 44 4-5 seconds; second prize, \$40, Edward Dougherty, of the Logan and Bryan broker firm, New York, sender, and J. P. Gallagher, same concern, receiver; time, 12 minutes, 7 4-5 seconds; third prize, won by Charles F. Edney, of H. W. Poor and Company, Boston, sender, and John J. Bell, of Wrenn Brothers, Boston, receiver.

Press, Class A (sending 350 words, straight press matter.)

First prize, \$100 gold, won by D. J. Ellington, New York, perfect Morse; time, eight minutes; second prize, \$40, won by Charles F. Edney, Boston, superior Morse; time, seven minutes 54 1-5 seconds; third prize, won by F. M. McClintic, New York.

Press, Class B (receiving 350 words straight press matter, sent by George W. Conkling, of New York.) Time, eight minutes, 56 1-5 seconds.

First prize, chest of solid silver, valued at \$150, donated by Gen. Charles H. Taylor, of the Boston Globe, won by Charles F. Edney, Boston; second prize, typewriter, won by F. E. Howe, New York, (broker); third prize, P. J. Faulkner, New York.

Press, Class C. (receiving 500 words, Phillips Code.)

First prize, \$100, won by Edward J. Coleman, Providence, R. I.; time, nine minutes, 31 1-5 seconds; second prize, Willard E. Brown, Boston Herald; third prize, F. M. McClintic, New York.

Mr. Ellington having received a majority of the points, five for each first prize, and one for each third, was declared the winner of the world's championship for all-round telegraphing. Mr. Ellington, having won the most points, as prescribed by the International Telegraphers' Tournament Association, (under whose auspices the tournament was held), was declared winner of the Carnegie international trophy for the championship of the world, a cup valued at \$250.

Judges in the various classes:

Railroad, Class A—R. P. Lindsley, C. E. Mahoney, Boston; George W. Conkling, New York.

Railroad, Class B—A. D. Price, J. F. Mickler, F. S. Hollis, of Boston.

Brokerage Class—H. A. Hanley, of Charles Head and Company; James P. Seeley, of Harvey Fisk and Sons; J. Stewart Carr, Hornblower and Weeks; James J. Benelisha, of Towle and Fitzgerald, all of Boston.

Team Match—George D. Boursey, of Lee, Higginson and Company; F. B. Travis and J. A. Coughlan, Postal Telegraph Company; George H. Bell, Long Distance Telegraph Company, Boston; Robert Murray, Jr., of the Western Union Company, Philadelphia.

Press Sending—George F. Thuman, Long Distance Telephone; J. H. Johnson, Associated Press, Boston, and C. B. Wood, Western Union Telegraph Company, Philadelphia.

Press Receiving—C. A. Richardson, Allen Woodle, and Fred N. Bassett.

Phillips Code—Chester D. Rodgers, and Frank B. Dumas, Boston; George R. Allen, New York.

All of the matter used by senders was new.

(To be continued.)

An Unusual Request.

A young man entered a New Jersey telegraph office recently and said to the operator in charge with as little concern as though he were buying a newspaper, "I want you to click off a message for \$1,000,000 to a firm in New York."

"What?" asked the telegrapher, in surprise.

"Come now, there is no reason why you should grow excited over the matter of a paltry million. Here, have a cigar. It may settle your nerves."

"Let me understand this," said the telegrapher. "Do you want to send a million or do you want the million sent to you?"

"Oh, the money is coming to me from a firm in New York," replied the man who said he was Roscoe Conkling. "The firm doesn't mind a little thing like a million. Besides, I need the money."

The telegrapher, however, thought it a case for the police and called an officer. The next day when questioned in court the alleged Conkling said he had been cutting down trees in a nearby town for telegraph poles.

Fearing that he might wish to continue this work with the shade trees in that vicinity the stranger was requested to leave town without delay.

The telegraph is an important factor in operating a large business, but employing it to run a family is something of a novelty and also represents a large item of expense. In a marital unpleasantness which is being aired in court down on Long Island, it appears that the husband was in the practice of directing household affairs by wire and that the wife was also a generous patron of the telegraph. Tolls amounting to \$10,000 figured in the exhibit.

The Telephone in Chicago.

Mr. Bernard E. Sunny, president of the Chicago Telephone Company, Chicago, Ill., was a speaker at the weekly meeting of the Chicago Electric Club, December 15.

As an indication of the conditions to be found in the early days, Mr. Sunny read the list of rules and regulations printed in the telephone directory of 1878. These rules, which required the calling party to wait ten minutes before repeating a call if unsuccessful in obtaining the desired party, and which specified various rings of the signal bells for different purposes, etc., afforded much amusement.

In 1878 Chicago was served by two telephone companies, namely, the Bell Telephone Company and the Western Union Telegraph Company, which was also engaged in the telephone business at that time. Each of these companies had in operation one exchange. Reasonable progress was made during the succeeding years until 1882 when the two existing companies were consolidated and the present Chicago Telephone Company organized.

That the growth of the telephone business in Chicago since that time has been phenomenal was demonstrated by statistics presented by Mr. Sunny, showing that there are at present 205,000 telephones in use with over thirty exchanges.

To accommodate subscribers in various financial circumstances, and also for the purpose of classifying according to the needs of the subscribers, the telephone service in Chicago is divided into the following classes: Ten-party lines, four-party lines, two-party lines, single-party lines and private branch exchanges. Each division, with the exception of the ten-party lines, which are now almost obsolete, represents 85,000, 31,000, 43,000 and 4,375 subscribers, respectively. The latter figure represents the number of private exchanges, to which an average of forty separate lines are connected.

During the average day approximately 1,300,000 calls are handled, which necessitates the services of 3,750 operators. The average speed in answering calls is four seconds, although this varies greatly according to the nature of the call, and the total time required to complete a telephone connection is about twenty-five seconds.

To show that the efficiency of the service has increased in proportion to its growth, Mr. Sunny gave some very interesting statistics. For the average day 78.5 per cent. of the calls handled are completed satisfactorily; thirteen per cent. receive the busy signal; three per cent. receive the wrong number; and 1.5 per cent. are unable to be connected due to errors on the part of the subscribers.

Another interesting phase of the subject which demonstrates the greater efficiency of the service now as compared with that of a few years ago is the number of complaints reported. During the present year, out of 1,250,000 cases received by the general manager, upon investigation resulted

in there being only 452 cases of actual trouble. Mr. Sunny gave figures showing the increased amount of trouble reported from lightning during heavy storms in the summer, and also demonstrated the damaging effects of heavy storms in the winter. The former is being overcome to a large extent by the installation of efficient protective devices which, with few exceptions, have performed their functions entirely satisfactorily.

Other interesting data given was that the busiest part of the telephone day is between ten and eleven o'clock in the morning, the operators handling during this hour about ten per cent. of the entire day's business. The number of requests for the time of day has reached 60,000 in a single day, the larger per cent. of these calls coming in between seven and eight o'clock in the morning.

Regarding the question of a public service corporation's having a monopoly on the business, Mr. Sunny expressed the opinion that such corporations should have a monopoly. He stated that the Chicago Telephone Company is a municipally controlled monopoly, its bookkeeping department being under the direction of the City Comptroller and its service being under the supervision of the Commissioner of Public Works. By reason of an ordinance passed not long ago the city has reserved the right to purchase the telephone company in ten years and again in fifteen years after the date of passing the ordinance. Also after thirty months from the date of the passage of this ordinance the city will appoint a committee to regulate the service of the telephone company for a period of five years, and it was Mr. Sunny's opinion that this committee, co-operating with the telephone company, would establish a system of rates which would be fair to the subscriber, fair to the telephone company, and would result in the general betterment of the entire service.

Electric Current Direct from the Sun.

The production of electric current from the direct heat of the sun is a problem which has engaged the attention of many inventors, and the claim of G. H. Cove, a British experimenter, that he has succeeded in transmitting sunshine into electric energy for his workshop must re-awaken old visions.

His apparatus as described consists of a steel framework which receives the solar rays. This is divided into sixteen squares of one foot each, and each square contains sixty-one metallic plugs of a secret composition, which are set with one end under glass, the other being exposed to the air and screened from the sun.

The difference in temperature between the two ends of the plugs generates a thermo-electric current, which charges a storage battery.

When the voltage drops below that of the storage cells, on the setting of the sun or its passage behind a cloud, the plugs are cut out automatically.



GEORGE GRAY WARD,
Vice-President and General Manager, Commercial Cable Company,
New York.

Presentation to George G. Ward.

December 24, 1909, marked the twenty-fifth or silver anniversary of the opening of the Commercial Cable Company's cables. The officers and staff of that company, to make known their high regard and esteem for Mr. George Gray Ward, who, as vice-president and general manager, has piloted the company throughout its successful career, December 24 presented him with a handsome silver centerpiece purchased by voluntary contributions from the members of the staffs at all the company's stations and the officers of the cable steamer "Mackay-Bennett." The presentation address was made by Mr. Thomas M. Drew, and was attended by a committee of about forty employees who have been with the company almost since its inception.

Mr. Drew's address was as follows:

"Mr. Ward, a committee representing the members of the different staffs, and departments throughout our service, including our friends on board the 'Mackay-Bennett' has highly honored me by selecting me as their spokesman.

"It was intended that this little ceremony was to have taken place at our Annual Staff Dinner; but on account of the company's coming celebration, the plans for our dinner have been temporarily put aside. As the matter which we have in hand is one which concerns the employee's, it occurred to the committee, that there could be no better or more appropriate time for us to pay our respects to you than the present, it being Christmas Eve, and the twenty-fifth anniversary of your connection with our company.

"Twenty-five years ago to-day, you opened the Commercial Cable Company to the public and which, under your management and firmly established principles, has developed into one of the most important commercial institutions in existence, and which will be looked upon for all time as a creation of your skill and diplomacy.

"It would be futile on my part to attempt any praise of your twenty-five years' service with us, before the gentlemen present. They are acquainted with your unparalleled achievements and have observed with pride, the masterful way you have handled problems, in the history making of our company.

"The world owes you a great debt for what you have done in the way of bringing great nations more closely together, and for the many benefits derived from the present methods of exchanging intelligence between the old and new world.

"We must not forget the important field for labor which your policy of expansion has created, not only with the cable systems, but the land line systems as well, for I believe that had it not been for the Commercial Cable Company and your advice the public would not have the excellent telegraph facilities which they have in the Postal Telegraph Company to-day.

"While in latter years, your duties have somewhat prevented you from coming in contact with

the members of the staffs, as was your custom in the early struggles of the company, the sentiment has not changed. There is never a time that you take a trip abroad but what your return is anxiously awaited, and there is a feeling of rejoicing when we know that you are back home safe and sound.

"It is that interested feeling which your men have for you that brings us together this afternoon. On more than one occasion, men of high rank have seen fit to honor and reward you for your fidelity, and now your men wish to honor



Silver Center Piece presented to Mr. Ward.

you by showing their appreciation of your administration and your efforts in their behalf and on behalf of the employees of the Commercial Cable Company from New York to good old Dundee, and from sturdy St. Johns to sunny Havana, I take great pleasure in presenting you with this token of their friendship, love and esteem in honor of your twenty-fifth anniversary with our company. It has been purchased by voluntary contributions, and the feeling with which it is given is as sterling as the metal of which it is cast. It is quite emblematical of the things that have figured so prominently in your life's work. The sea, which you have crossed so often on delicate and important missions, and old Mother Earth, which you have so skillfully and successfully girdled with our lines. We hope that this gift will not only be an ever pleasant reminder of your own noble acts and achievements, but a constant reminder of the deep feeling

of regard which your men have for you, and now, Mr. Ward, on behalf of the men of the service allow me to congratulate you upon this your twenty-fifth anniversary with our company. It is our sincere wish that you will be with us for many years to come and we all join in wishing you and your family all the compliments of the season, long life, prosperity and happiness."

The presentation came to Mr. Ward as a complete surprise, and the true spirit of loyalty and friendliness manifested in the message which Mr. Drew brought from the staff filled Mr. Ward with too much emotion to make anything but a brief acknowledgement. His remarks in substance were as follows:

"Gentlemen—I can find no words to express my appreciation for this beautiful present and your kind thoughts and complimentary remarks. I am sure you all understand how such a surprise as this must affect me. It deprives me of the power to thank you as I should like to. I would be untruthful if I were to accept the whole credit which you wish to bestow upon me for the building up of this institution. Its success was in a larger measure due to your ability, devotion and perfect co-operation with the management. When I recall the early days of our existence and the struggle we all went through, when we had practically no land lines in this country and were greatly discriminated against in Europe, I think we can all claim some credit for the present prosperous condition of the company. The work of the rank and file, perfectly in union with the management, made a force which spelled success and broke down all barriers impeding its progress. My thanks are due to you for your splendid support at all times, and I give them to you from the bottom of my heart.

"I feel, my friends, that I can say no more under the circumstances, except to again ask those present, as well as your absent colleagues, to accept my grateful acknowledgement for the great honor you confer upon me to-day by this presentation, which makes this the proudest moment of my life, fifty years of which I have now spent in the telegraph and cable service."

Ocean Cables and Trawlers.

Much has been said and written about the great damage to ocean cables occasioned by steam-trawlers upon the fishing grounds west of Ireland, where the ocean cables have been broken forty times in the last ten years and at other points near the European coast. A description of the methods of operation of these fishermen may be of interest at this time. The boats are generally about 120 feet long, with a few hundred tons displacement, and with engines of eighty horsepower. They operate either singly or in fleets of half a dozen, all over the shallow waters of western Europe, from the Arctic circle to the southern limit of Morocco. They have gradually increased their range of working until now they operate at depths of 300 fathoms or

over. Each boat usually carries a crew of nine men.

The methods employed to keep a steam-trawl net moving over the sea bottom are very interesting. The net is commonly about sixty feet wide at the bottom, and is fastened to two boards, one at each end of the foot-rope, or lower edge of the net. These boards, called otter boards, are about the size of a billiard table, and are made up of wood slabs, some three inches thick, rimmed with iron. They are water kites, being held near the center of one face by a steel rope and fastening. The steel rope forms the kite string, the otter board the kite, and the trawl net the kite tail. When the steamer goes over the ground at a speed of two and a half or three knots the two otter-boards skim over the bottom, each towed by a steel rope. They keep nearly in a vertical plane and tend to pull apart like a pair of kites heading away from each other, but kept in harness by the trawl net between and behind them. Such fish as come within the scope of the advancing net are unable to escape the rush of water, and are finally hauled up by winding in the steel ropes.

The trawlers naturally work along and across the numerous ocean telegraph cables, the nets and otter-boards passing over them hundreds of times without any interference. Occasionally, however, an otter-board engages a cable. This is either because there is some slight projection on the edge of the board, or possibly because the cable may be festooned from one submarine hillock to another, thus permitting the otter-board to work underneath the cable. When a trawler is unlucky enough to engage a cable it is a battle between rope and rope. The trawler winds in her warps as best she can. If the cable is very strong and taut, and the water deep, the warps break and the trawler loses net, catch, otter-boards and warps, to say nothing of time and temper. If, however, the cable is not very strong, the warps may hold and the cable may break, involving the cable company in much loss of money for traffic and repairs. Or the cable may be raised to the surface and be disengaged by the fishermen without rupture, but yet be injured, and put out of working order, by reason of the sawing and chafing it is subjected to under the plunging of the trawler in a heavy sea.—*Electrical World*.

The Nobel prize for physics has this year been awarded to William Marconi for his extended researches and developments of wireless telegraphy, and also to Professor F. K. Braun of Strasburg University, Germany, for his researches in radio-activity. The Swedish Academy of Science, to which is given the duty of annually selecting the scientists and great public leaders whose work has been of the greatest value to the human race, was unable to decide in regard to the prize for physics between these two men, and therefore decided to award the honors between them. This prize amounts annually to about \$10,000. Since it was divided this year, each of the two recipients will receive \$20,000.



CLARENCE H. MACKAY.
President Commercial Cable Company,
New York.

CELEBRATION OF TWENTY-FIFTH ANNIVERSARY OF ESTABLISHING OF COMMERCIAL CABLE COMPANY.

Mr. Clarence H. Mackay, president of the Commercial Cable Company, gave a dinner to the New York officers and staff of the Commercial Cable Company on Saturday evening, January 8, at the Hardware Club, Postal Telegraph Building, to commemorate the company's twenty-fifth anniversary. The dinner was to have been held on December 27, but on account of the death of Mr. Dumont Clarke, a director of the company, it was postponed.

While it was essentially a staff dinner, a few of Mr. Mackay's personal friends were invited guests.

The occasion was a most enjoyable one. Its completeness in every detail was characteristic of the way Mr. Mackay does things.

The dining room was decorated with a profusion of flowers and festoons of smilax. Flags and shields of all nations adorned the walls. Two large illuminated translucent geographical globes showing the Commercial's cable systems were hung from the ceiling about fifty feet apart and were connected by five silver cables, emblematical of the five transatlantic lines of the Commercial Cable Company.

Messages of congratulation and sentiment were exchanged with the Company's stations in Europe and the Far East, by means of a special wire operated in the dining room, connected to the Atlantic and Pacific cable systems of the company. The rapidity with which messages can be flashed from one end of the world to the other was exhibited. A message was sent to Europe and a reply received thereto in less than three minutes. A similar message sent to the Philippines and China was answered in five minutes.

The table decorations were particularly suggestive of the occasion, everything possible being finished in silver.

The menu cards were of a very handsome and appropriate design, richly embossed. An orchestra, screened by palms, played popular tunes that helped to bring good cheer to the diners.

Several favors were given, the most interesting and unique of which was a small piece of the Commercial Company's original cable, which was recently recovered from the bottom of the Atlantic, after having been submerged twenty-five years. Although the cable has been lying in water under a great pressure for so many years, very little deterioration has taken place, and the sheathing wires are in almost as perfect a condition as the day the cable was laid. A finely illustrated brochure, giving the history of the company was also presented to each one present.

After coffee had been served Mr. Mackay arose and proposed a toast to the President of the United States and the King of England. After this had been drunk, he said:

"Gentlemen of the Commercial Cable Company, and guests of the evening:—I esteem it a great

privilege to bid you welcome on this, the twenty-fifth anniversary of the Commercial Cable Company. The occasion is one for which we have every reason to rejoice, and it is with the warmest feeling of good will to you all that I extend to you my heartiest greetings.

"Twenty-five years brings great changes in the march of Time, and no better illustration can be drawn than that of the organization of which we are so justly proud, the Commercial Cable Company. I do not propose at this time to retrospect or recite the evolution of the company, for its history and development I will leave to others who have been connected with the company since its inception. Time has thinned our ranks; the founder of this company has been taken from us, his spirit has passed beyond the Great Divide, and only recently Death has laid its heavy hand on two of our number,—Mr. Dumont Clarke, associated with this company for nearly twenty years, a loyal, staunch and trusted adviser,—and Mr. Chas. A. Gill, who joined the company in 1885 and remained at his post until the day of his death, leaving a record unsurpassed for fidelity and trustworthiness. Gentlemen, I wish to propose a silent toast: 'To those who have passed from us, and whose memory we will revere for all time.'

"As I look around this room tonight, I see gathered about me the familiar faces of those whom it has been my good fortune to come in daily contact with for a number of years, men whom I have learned to admire and respect for their loyalty, zeal and uprightness. Never has any company had an abler or finer executive staff than that of the Commercial Cable Company. For bringing together and moulding an organization such as I see here tonight, the credit belongs more to one man than to another, and that is, to George Gray Ward.

"Gentlemen, you should be proud of George Gray Ward, as I am. For twenty-five years he has devoted himself untiringly to the interests of this company, and by that I mean your interests. In good times or bad, in sunshine or storm, he has always been imbued with the same spirit, to zealously safeguard the interests of the company, and to see that every man was given a square deal. To you, Mr. Ward, I give credit in a large measure for the results that have been achieved by this company, and I am glad, old and trusted friend, of the opportunity to pay you this tribute tonight, for, gentlemen, to know him is to love him."

Mr. Ward then spoke as follows:

"Mr. President, and gentlemen, we are assembled here to-night, by the invitation of our President, to celebrate the company's twenty-fifth or silver anniversary. As I look around the tables, it is pleasant to see so many familiar faces, and especially those whose qualities and devotion

to the company's interests in the early days of its existence, helped so materially to establish the company as an important factor in Atlantic telegraphy.

"When this company was incorporated by the late Mr. John W. Mackay (whose name we shall ever revere), and Mr. James Gordon Bennett, and it first became public, the companies then operating in the Atlantic, were not very seriously alarmed, doubtless because they felt that their combined strength was sufficient to overcome any threatened competition.

"I am quite sure, that whatever views of that character may have been entertained then, have been entirely replaced by a more wholesome respect for our strength.

"I think this occasion is an appropriate one to review the company's history and development during the past twenty-five years, and in doing this I shall relate briefly the steps of progress from its inception.

"After Mr. Mackay's work of developing his great mining interests, he devoted himself largely to other business enterprises, chief among which was the establishment of an Atlantic cable system. This system was designed to oppose the monopoly existing at that time.

"On December 13, 1883, the Commercial Cable Company was legally born, and steps were immediately taken to launch the new enterprise on its active career. Landing places were selected, cables and apparatus were contracted for, arrangements for the establishment of stations were made and all other details necessary to the organization of a high class institution were thoroughly mapped out. There was some doubt at that time as to the Company's purpose and its strength to introduce and maintain competition, but this was dispelled by Mr. Mackay in a letter to the press, which read as follows: 'We have no intention of entering into any agreement or coalition whatever with the existing companies. We are in a position to take our stand and defy all attempts at coercion. In founding this new trans-Atlantic cable company, we were of the opinion that the time had come to give the public, on a permanent basis, a somewhat cheaper and at the same time a thoroughly reliable and prompt cable service.'

"You all know how well Mr. Mackay carried out these promises. Weaker men than he would have yielded to the pressure of the powerful forces united to crush out our existence. Although the matter is now cobwebbed with age, it must not be allowed to be forgotten, especially in an epoch so filled with 'trusts and combinations.'

"Recent events have brought forth inferences of a combination between our land line properties and the telephone interests, but our President, Mr. C. H. Mackay, has, I am sure, set all such thoughts at rest by his public statement the other day, in which he reiterated the policies of his father, namely, to maintain independence and competition.

"I am, however, turning out of my course. The

landing places selected as stations for the company's trans-Atlantic cables, as you are aware were Waterville, Ireland and Dover Bay, Nova Scotia.

"Our first trans-Atlantic cable was completed on July 20, 1884, the cable from Nova Scotia to Rockport, Cape Ann, Mass., having been completed shortly before that date.

"On October 9 the laying of a second trans-Atlantic cable was completed, and on October 18 the cable from Nova Scotia to New York City was successfully laid, thus forming the first all cable route between New York City and Europe.

"In the midst of our enthusiasm over the success thus far attained, first one and then the other of our main cables became interrupted on ground over which the cables should never have been laid. These cables were repaired in December, 1884.

"Our New York-Canso cable has the distinction of being the first submarine cable landed and operated in a large city, and has proved a great boon to the business people on many occasions, notably the blizzard in 1888, when all communication to places outside of New York City was entirely interrupted except by this cable.

"I distinctly remember the impression my words made upon a number of the representative business men in a few remarks I made to them at Coney Island, at the time this cable was landed, in which I ventured to say that a cablegram could be transmitted between New York and London inside of three minutes. That prophecy seemed too sanguine to some, but it is unnecessary for me to tell you that we have carried out this prognostication and, in fact, very materially reduced that time.

"On December 24, 1884, the cables were opened for public use, at a twenty per cent reduction, from fifty cents to forty cents per word and from the first were well patronized. The first paid message that passed over the line from America was sent by Mr. J. C. Reiff of Woerithoffer and Company and this gentleman I may say, has always been very proud of the fact. The other companies naturally met our reduced rates. Scenes of unusual activity and stern expressions were visible everywhere in the cable offices as the fight for prestige and supremacy began.

"To be prepared at all times to restore interrupted communication without undue delay, the cable ship 'Mackay-Bennett' was contracted for, and launched in 1883, and was put into commission in the winter of 1884.

"On February 1, 1885, our cable between Waterville and Havre was opened for business, thus establishing direct cable communication with France.

"On June 26, 1885, the first cable was laid between Waterville and Weston-Super-Mare, England, thus establishing direct cable communication with England, the manifest advantage of which was reliability of service.

"The company operated its lines in undisturbed tranquility until April 20, 1886, when placards and

circulars were issued by our pooled competitors, announcing a reduction in the rates from 40 cents per word to 12 cents per word. The object was perfectly clear. The popularity of the Commercial Cable Company's service and its firm establishment of independence, from which it could not be swerved, became a serious menace to the prosperity of the other combined forces, and in their desperation they determined to make a strong effort to free themselves of our opposition by commencing a ruinous war of rates. It was a war waged at a great financial loss to Mr. Mackay and others, not only for our own existence, but for the benefit of the public who now enjoy a competitive cable service unequalled in any part of the world.

"Our opponents, however, miscalculated the resources and character of their antagonist. We met the first attack by reducing our rate to twenty-five cents per word and secured a good deal of public support by giving a faster service.

"In September, 1887, we decided to meet the twelve cent rate. We were seriously handicapped by not having adequate and suitable land line facilities in the United States and Canada and our opponents made use of every message we handed over to them for further transmission, for canvassing purposes. We were also at a great disadvantage in Europe because the old companies had the exclusive right to all unrouted messages. The rate war lasted two years and five months, both sides suffering very heavy losses. It however, as you well know, ended in a decided victory for the "Commercial," which maintained its independence and gave the public a superior service through keen competition at a twenty-five cent rate, saving them hundreds of thousands of dollars annually.

"From that time onward, our progress has been steady and rapid. Under the able direction of our friend Colonel A. B. Chandler, whom we are all delighted to see here tonight, land lines were gradually acquired throughout the United States, rebuilt and organized into the great Postal Telegraph system, which with its connections now comprises over 330,000 miles of wire. A connection was also established at Canso, Nova Scotia, with the Canadian Pacific Railway Telegraphs; the largest telegraph system in Canada.

"In 1894 we laid our third cable between Canso and Waterville.

"In 1901 our Canso-Azores-Waterville cables were laid, thus completing our fourth trans-Atlantic route to Europe and establishing connection with the great systems of the Eastern and Western Telegraph Companies at the Azores. We also laid an additional cable between Canso and New York City the same year.

"For many years we were unjustly discriminated against in our efforts to secure traffic in Germany, but our prestige increased in proportion to our strength and when the two German cables were laid in 1900 and 1904 they were brought into our New York office and operated

by us through the successful business relations arranged with the German enterprise.

"In 1901 we laid a second cable from Waterville to Weston-Super-Mare, England. We now felt that we had an adequate, up-to-date cable and telegraph system in the Atlantic and United States and Canada respectively. We then shifted the scene for our activities to the Pacific. You all remember the governmental agitation for an American Pacific cable; how for years the matter was debated in Congress; that private interests offered to lay the cable conditional upon receiving a large annual subsidy, and when finally Mr. John W. Mackay agreed to lay the cable without subsidy or guarantee of any kind, we had to overcome strong and influential opposition. But we finally conquered, and in 1902-3 the Commercial Pacific cables between San Francisco, Honolulu, Midway Islands, Guam, and the Philippines were laid, and the long cherished desire of the government and public was realized.

"When we laid our fourth trans-Atlantic cable, there was a sufficient margin of facilities available, to make it doubtful in our minds whether we should require any further cable facilities for many years to come, but only four years elapsed before another cable was found necessary, and in 1905 the company's fifth trans-Atlantic cable was laid.

"In 1906 the Commercial Pacific extensions to China and Japan were made.

"For some years the company had been endeavoring to extend its system to Cuba, but was prevented from doing so by other interests which held an extensive monopoly of the telegraph privileges on that island. This monopoly expired in 1907, however, and a cable was at once laid from New York direct to Havana. The introduction of our competition again resulted in a much improved service and a large traffic.

"Our present systems in the Atlantic and Pacific comprise 28,379 miles, compared with 6,922 miles in 1885, a development of over four hundred per cent.

"During the past year we have diverted our two 1884 trans-Atlantic cables from a point in the Atlantic known as the Flemish Cap into St. Johns, Newfoundland, and have also laid a cable from St. Johns to New York, and a second cable from St. Johns to New York already partially laid will be completed in due course. The diversion of these two cables removes them from dangerous locations, shortens their length and gives us a practical transmitting speed between New York and Europe faster than the speed of any other trans-Atlantic cable route.

"This review would not be complete without a few words concerning the relations between the staff and the company. No organization can attain its highest success without harmony and confidence between the management and the employees, and I want to say that I am unaware of any institution where the harmony, zeal, fidelity and keen devotion to the company's interest exists in

a greater measure, than in the service of the Commercial Cable Company. Our gratifying success is the result of twenty-five years of arduous and unremitting activity, resolution and unity of purpose. The Commercial Cable Company will continue to expand and prosper.

"We have made it a power in the submarine telegraph world. It is looked up to by every other cable company as the company to follow.

"I heartily thank you, my friends and co-workers, for the unsurpassed co-operation you have always given the management; without your co-operation, loyalty, devotion and determination to make our institution the leading Atlantic cable company we could never have succeeded, and I am sure you will never relax your efforts to maintain this supremacy, of which we are all so proud.

"The requirements of the service are exacting, and those who would succeed in it must display loyalty and zeal. There is no duty, whether performed by office boy or by superintendent, that does not require intelligent execution. The efforts of its employees are reflected in the company's success. The company on its part has treated you generously, and notably in its establishment of a pension by virtue of which any of you shall be entitled to a pension upon attaining the age of sixty years after forty years service or before attaining such age any of you who may become physically incapacitated through no fault of your own shall after ten years continuous service be entitled to a pension based on the length of such service.

"The company will continue this policy towards you and I know that you on your part will continue to give the company a full measure of loyalty and co-operation.

"In conclusion, I desire to thank the President most cordially for this celebration which, through his liberality, I am happy to say, has extended throughout the service, and for the exceptional kindness and interest he has always shown to the whole staff, and to warmly congratulate him on the exemplary manner in which he has pursued his father's policies, honored his name, and enhanced the prosperity of the company by his active association in the administration of its affairs.

"Mr. President: Your kind remarks concerning me personally are indeed very gratifying. It has always been my great pleasure to serve the company, but whatever success may have resulted from my administration could not have been achieved without the confidence your late father and yourself have always placed in me and the able and loyal assistance at all times afforded me by my lieutenants, with whom I gladly share the honor which you do me. We have all worked together toward one objective point—success, and the realization that this has been attained, is my greatest reward.

"Gentlemen, I ask you to fill your glasses to the brim and drink to the continued prosperity of the Commercial Cable Company and I hope that you

will be able to drink to the toast of its golden jubilee. I couple the toast with the name of our President and friend, Mr. Clarence H. Mackay.

Mr. Mackay then responded to the toast proposed by Mr. Ward, saying:

"Gentlemen of the Commercial Cable Company and guests:—I will gladly respond to the toast, "Prosperity to the Commercial Cable Company," and, please God, I hope to continue to do so for many years to come.

"In my previous remarks I mentioned that I would leave to others the telling of the company's history, but in view of the times we are living in, it seems to me it would not be inopportune if I should dwell on certain matters as directly affecting your interests.

"The last quarter of a century has witnessed momentous events in the history of nations; the world seems to have been passing through a peculiar process of evolution—the whole tendency of the age has been directed towards a desire on the part of every civilized country to have closer intercourse, and which year by year seems to be accumulating momentum.

"Twenty-five years ago, important news was confined to the few great capitals. To-day we are not satisfied with that; we must be kept informed of all that is passing in every quarter of the globe; the statesman, banker, merchant, journalist and man of affairs all wish to know what is transpiring daily, and whether their interests are affected.

"To tell what the cable has done for the progress of the world would be to tax the imagination of the poet and the historian, but the fact remains that the cable has been the greatest human agency for bringing nearer to each other the civilized nations of the globe, and the part you have played in this development cannot be overestimated.

"I attribute the successful results which have brought about the present efficiency in the transmission of intelligence, to the aggressive competition of the Commercial Cable Company and its allied interests. When I look back and think of the time before the Commercial Cable Company entered the field, when rates were double what they are today, and when the whole cable and telegraph situation of the United States was in the hands of an iron-clad monopoly, I sometimes wonder how this company ever managed to live through it all. Wherever the arm of the Commercial Cable Company has stretched forth, whether in the Atlantic, Pacific or Cuban waters, invariably there has followed a reduction of rates, better facilities and better service. If ever there should exist any doubt in the mind of the public as to the benefits of competition, one has only to take what I have just stated as an example.

"If this company, through the untiring efforts and loyalty of its officials and staff, has been able to create a system extending two thirds of the way around the globe, it has been due in my opinion primarily to the fact that it has always endeavored to deal with the public fairly and squarely, and let it be said, gentlemen, to your

everlasting credit, that of the thirty million messages that have passed over the cables of our Atlantic system in the last twenty-five years, there is not a single instance on record of the contents of a message ever having been divulged. As your President, it is a source of great satisfaction to me to say this, and I always believe in giving credit to the 'man behind the gun.'

"And now, gentlemen, I trust I may be excused if in concluding my remarks, I should make a personal reference to our relations. Situated as we are, both engrossed with the affairs of the company, it is but natural that the time for intercourse should be limited, and that consequently we are unable to have as close a view of each other as we might wish, but I do wish to say this to you, and I am addressing particularly the rank and file, and that is I most earnestly desire your welfare—that at all times I will do all in my power to promote it, and further, if there should arise an occasion regarding which you would like to see the President of this company, the door of my office will always be open to you and I shall be glad to welcome you.

"Because we have prospered, gentlemen, this is no time to relax our efforts. Already a large opposition is looming up ahead of us, and while I have no fear of the result, nevertheless I say to you 'buckle on your armor and see that there are no loose joints.'

"There have been momentous changes of late in the telegraph world, and for all we know there may be more to follow; but there is one change that will never take place, gentlemen, and I can give you my positive assurance that as long as I live the Commercial Cable Company will never lose its identity. The Commercial Cable Company was created independent and so it shall remain, and as long as we will pull together, shoulder to shoulder, creating and building greater things, I have no fear of any competitive system that has been devised or will ever be devised.

"So with every hope of the future, with grateful appreciation of your loyalty and zeal, with every wish for your happiness, I say to you, gentlemen of the Commercial Cable Company, 'well done, good and faithful servants,'—may you all live long and prosper!"

Mr. Mackay then introduced Colonel Albert B. Chandler, Chairman of the Board of Directors of the Postal Telegraph-Cable Company. Colonel Chandler said:

"Mr. President, and my Comrades of the Commercial Cable and Postal Telegraph Companies: Having been somewhat closely related, almost from its inception, to the progress and development of the great enterprise projected and carried out by our rare and ever-to-be-remembered friend, Mr. John W. Mackay, which gave to the world one of its most important, extensive and valuable means of communication—the Commercial Cable Company, I am glad to join in this commemo-

ration, and hope it may interest you to learn something of a generally unknown feature of the initial work necessary to the bringing of the cable itself into this great commercial center of the new world.

"Early in the year 1884, at the instance of my friend your Vice-President and General Manager Mr. George G. Ward, whom I had well known as Superintendent of the Direct United States Cable Company for nine years previously, I undertook to obtain the right of way for laying an underground conduit from the sea shore at the eastern end of famous Coney Island, to receive the new cable, which was expected to be completed before the end of that year. I supposed it would only be necessary to make the proper officers of the three towns to be traversed, of the then City of Brooklyn, and of the wonderful Brooklyn Bridge, which had only been opened for traffic one year before, acquainted with the facts concerning our project to secure recognition of its importance to the public, and ready consent to our application, upon reasonable terms. I found, however, that it required many interviews and much explanation and persuasion to finally succeed, as we fortunately did just in time to complete the connection with the cable which, in the meantime, had been safely brought to its landing place, a short distance east of the Oriental Hotel. In securing this result I had the efficient aid of my friend Mr. Chas. C. Martin, then Chief Engineer of the Brooklyn Bridge; of the Honorable Seth Low, then Mayor of Brooklyn, and of a young lawyer of my acquaintance, who was familiar with the conditions in the towns of Flatbush, Flatlands and Gravesend, and who was only a few days ago duly installed as Mayor of the Greater City of New York—the Honorable William J. Gaynor.

"Within that same month of December, 1884, I was invited to examine into and report upon the conditions surrounding the many-sided competition with the Western Union Telegraph Company then existing, and this led to my undertaking, by Mr. Mackay's request, to "bring order out of chaos," as I think I may fairly express it, and this I have no doubt most of those here present know was accomplished during the following sixteen years, to a degree beyond the expectations of any one living at that time, and which I wish to testify here and now would have been quite impossible but for the full confidence, co-operation and friendship of the senior Mr. Mackay. The close alliance of the cable and land line service, from the beginning, and their practical oneness since 1896 have enabled these appropriately named "Mackay Companies" to perform a service to the public, and especially to the business public of the commercial centers, of such merit as had never before been deemed practicable, and which is not likely to be surpassed, except perhaps by themselves, in their own further development. And we are glad that the

mantle of their founder has fallen upon a worthy son as his successor, in administering their affairs.

"Singleness of purpose, uniform, yet moderate, rates; the determination on the part of officers and employes throughout the whole extent of our system to render a superior service, combined with personal courtesy towards and interest in our patrons, together with our unsurpassed equipment in every department, have placed us in the front rank of all telegraph enterprises; and I feel that we may justly felicitate each other at this time upon the completion of a full quarter of a century of useful endeavor, and that we may reasonably expect from our present ground of vantage to continue for a long time to come, to deserve, and hence to receive, an increasingly large share of public favor."

Colonel George W. Harvey, who was the next speaker of the evening, entertained those present by his ready wit and humor.

Mr. George Clapperton, vice-president and traffic manager of the company, was the next speaker introduced. In introducing Mr. Clapperton, Mr. Mackay characterized him as "Mr. George Clapperton, the Phil Sheridan of the old guard, midst the din of battle and the peace of victory, our little General who ever kept his seat in the saddle with that poise of temperament born of courage, determination and confidence that marks the able man." Mr. Clapperton said:

"The speed of the electric current remains the same as before, but cable transmissions have been improved, they have been made more certain, we do not have to make so many twice to get them done once, and we have eliminated delays at initial, intermediate and terminal points. As was to have been expected, there has been a steady natural growth of cable communications, and this growth has been stimulated as never before by multiplied instrumentalities, greater efficiency of operation and better business organization.

"Since 1884, not counting the original cables, the Commercial Cable Company has laid one half of the new cables in the Atlantic and Commercial Cable employes have contributed to the art of working cables two of the three really notable improvements since the siphon recorder and the application of the duplex. The principle discovered by Cuttriss, and it was pure discovery, is the principle that has survived, and the work of Wilmot remains a monument to his patience and his persistency. The results of the work of these Commercial Cable men have been of world-wide adoption. Their contributions, first, so helpful to the separate and individual advance of the Commercial Cable Company became in time their contributions to the common progress of cable telegraphy.

"The third improvement was contributed by one not previously identified with our branch of applied electricity and this makes the names of Cuttriss and Wilmot still more conspicuous in cable history.

"The company has always provided cables equal to the need and generally in advance of the time. The first cable ever brought from under seas into a great seaport was the cable brought by the Commercial Cable Company into New York City in 1884. Before that time it was settled practice to lay cables to some out-of-the-way place and to make the connection between the cable and the real objective point by land line. It was thought to be courting disaster to lay a cable in the track of commerce on the way to a great city. Bringing a cable into New York City is a commonplace nowadays, but it was an extraordinary step forward in 1884, a step that had to await the event for its justification. The event justified it so amply that what had been called foolishly adventurous became the evidence of foresight and courage.

"Now, gentlemen, cables do not do anything themselves. If the continents are not to remain as wide apart as ever the cables must be operated. It is only when animated by the informed touch of the operator that the dumb lifeless thing becomes the living, speaking thing expressing the current thought and telling the story of the current action of and to the peoples of the hemispheres. The operator is the living medium between the men of the one side of the world and the men of the other, and largely it rests with him whether by his skill and diligence the energy, the labor and the anxiety of negotiation that go to the making of world transactions shall be fruitful and their objects advanced or attained, or whether by his indifference they shall be marred and their objects delayed, if not defeated. Gentlemen, the cable operator as we know him is skillful, diligent and self-respecting, he approaches his task with feelings of responsibility and pride, responsibility because he knows the importance of his work, and pride because of his mastery of the craft that enables him to perform that work. Cable telegraphy is not a precise and definite art. It cannot be performed in a perfunctory, machine-like manner. At every step the operator has to deal with indefinite conditions that call for judgment and decision, and he cannot be successful unless he have in large measure in what he does a keen interest that amounts to inspiration, makes work worth while and distinguishes the man from the trained creature, wonderful in its way, but only because its trainer has made so much out of so little.

"Gentlemen, there is not much the matter with a man who is proud of his calling. We have good reason to be proud of ours. It is no humble place that has been assigned to us in the march of civilization, and we prove our right to it by keeping up with the procession. Temporary successes may be achieved by accident or expedient. Permanent successes must depend on real worth. The factors that have made the success of this enterprise are the only factors that can be relied on to continue it; a good plant and

a good staff that is what has given the company its eminence among cable companies; intelligent work under the direction of a leader who knows how, himself, that is what we have had for twenty-five years, and that is why we are here to-night celebrating and receiving congratulations from the ends of the earth.

"Gentlemen of the Commercial Cable Company, we have come to the end of a quarter of a century. We are engaged in a great competing enterprise. The best we can do to-day is only sufficient for the day and only marks the line below which we must not fall to-morrow. Our master, the customer, is exacting, often intolerant. If we do not suit him he goes, if we only suit him as well as somebody else, he divides. To hold him complete we must suit him best. We want to suit him best because we are jealous of the credit of our institution, but no Commercial Cable man ever abases himself. He has caught the spirit of his surroundings, and he is saturated with the sustaining conviction that he himself is as honorable as any adversary and that no adversary represents anything more honorable than the thing he himself represents.

"We have entered our twenty-sixth year. We cannot stand still, we must move, if not forward, then backward; if we do not expand we shall contract, and as it is with the aggregation so will it be with the individual. So long as he remains a part of it he cannot separate his fortunes from the whole, and it is of the utmost importance to him and his associates that this aggregation, a reliance for the present and a hope for the future, shall continue its onward march, and this it will surely do if everyone of us, living up to our traditions, continues to do his share resolutely and faithfully, each one aiming with real active loyalty to make his work the best work, his department the best department, his company the best company."

At the conclusion of Mr. Clapperton's remarks, Mr. Mackay took occasion to read cablegrams received from the staffs at Boston, Rockport, Mass.; Hazlehill, N. S.; St. Johns, N. F.; London, Liverpool, Manchester, Bradford, Newcastle, Waterville, Glasgow, Edinburgh, Hull, Dundee, Havre, Paris, the Azores, Havana, San Francisco, Honolulu, Midway Island, Guam, Manila and Shanghai; from Mrs. John W. Mackay, in Paris; from the staff of the steamer "Mackay-Bennett"; from the staff on duty in New York; from many of the European agents of the company, and from many of Mr. Mackay's personal friends, congratulating him upon the anniversary of the company and wishing it a long continuance of its present prosperity.

Mr. E. L. Cohn, of the operating staff, was then called upon. Mr. Cohn proved to be a first-class humorist, and told many stories and anecdotes which created much amusement.

Mr. F. A. Pirie, the head of the Commercial Cable Company Athletic Association, then spoke in the interest of that organization, and took oc-

casional to thank the President for the many benefits conferred by him upon the association.

Seated at the President's table were:

C. H. Mackay,	E. J. Nally,
G. G. Ward,	Geo. Clapperton,
Col. A. B. Chandler,	Capt. P. J. Lydig,
Morton Paton,	Albert Beck,
Col. Geo. Harvey,	F. L. Polk,
E. C. Platt,	S. S. Dickenson.

At the other tables were:

NEW YORK.

M. M. Davis,	H. W. Robinson,
E. Reynolds,	M. Till,
W. G. Taylor,	A. E. Francis,
E. Kinney,	J. J. Schneider,
F. H. Dennis,	A. R. Barry,
J. O. Stevens,	D. P. Wilson,
T. L. Cuyler, Jr.,	W. O'Donnell,
C. C. Adams,	R. W. Cuttriss,
W. K. Smith,	J. J. O'Donnell,
E. B. Pillsbury,	J. F. Kelly,
L. Lemon,	W. M. Virge,
C. P. Bruch,	F. J. Mills,
W. C. Wenman,	M. Axelrod,
C. Priest,	R. G. Milne,
S. F. Austin,	R. C. McCue,
T. E. Hurdus,	L. S. Fisher,
C. E. Merritt,	A. Aymong,
J. Beattie,	A. Williams,
J. Doran,	H. Sutton,
W. D. Francis,	E. Crickard,
F. E. d'Humy,	R. J. Jackson,
C. Shirley,	J. J. Coghlan,
H. F. Hawkins,	J. Johnston,
I. Smith,	A. S. Stevens,
J. F. Skirrow,	J. Quinn,
C. F. Leonard,	R. J. Wright,
E. S. Butterfield,	W. P. Hutchison,
W. Wilson,	F. Entwistle,
F. Yates,	J. Griffiths,
J. M. O'Shea,	J. S. Coghlan,
G. E. Johnson,	H. S. Booth,
S. K. Badcock,	C. F. C. Andrews,
W. O'Keefe,	C. E. Burgess,
J. J. Delchanty,	F. C. Coombs,
W. J. Geary,	J. C. Armstrong,
J. F. Conroy,	J. Carrington,
J. F. Power,	F. Mason,
H. F. Gearn,	T. W. Tovey,
T. Dickenson,	J. O. Lamond,
E. A. Comans,	W. Winterbottom,
W. J. McCarthy,	J. H. Glover,
A. S. Griffin,	G. Jones,
W. L. Robinson,	A. Smethurst,
J. B. Rostron,	H. Lee,
J. E. Shea,	F. Pirie,
W. D. A. Shea,	T. M. Drew,
D. J. Breslin,	P. Keating,
J. J. Foley,	F. B. N. Young,
F. J. Smith,	A. H. Roberts,
A. B. Fitzsimmons,	H. Vickers,
J. Leen,	C. J. Smith,
A. Lister,	A. A. Wilson,
P. Morel,	E. L. Cohn,

T. G. Barker,	R. K. Barnikel,
E. P. Amann,	H. E. Roland,
M. W. Blackmar,	C. R. Mignon,
A. Hoffman,	M. Morgan,
H. Vander Paaupert,	C. E. Lemken,
F. E. Fisher,	G. H. Kemp,
M. Williams,	W. Deegan,
J. H. Ruddick,	F. Rauh,
J. Goldhammer,	J. Austin,
H. Lamberton,	J. J. Loughlin,
R. Carswell,	C. J. Tomsey,
J. Williams,	J. J. Maguire,
A. B. McMillan,	J. Mitchitsch,
L. W. Gumaer,	O. Bryan,
J. Delaney,	J. Crennan,
H. Wood,	R. Chamberlain,
T. J. Lenahan,	A. S. Daly,
J. Dunlop,	P. Kast,
H. S. A. Ryan,	W. Bonke,
J. J. Finn,	W. T. Burke,
K. D. Webster,	J. Young,
H. D. Forsdick,	H. Brinkmeyer,
A. Rothwell,	C. Dedon,
W. G. Morgan,	J. R. Cavanagh,
J. McMaster,	L. C. Scheld,
G. E. Thomas,	J. McKiernan,
J. Spence,	W. F. Fitzpatrick,
C. H. Hood,	D. T. Sherlock,
W. H. C. Metcalf,	J. Weyrich,
H. C. Smart,	J. J. Leary,
	F. W. Powers.

BOSTON.

F. H. Putt,	G. B. Arnold,
	F. J. Luttrell,

ROCKPORT, MASS.

R. Herne,	C. F. Mills,
R. R. Colley,	T. G. Canlett,
	C. Tresnon.

Messenger Boys as Nurses.

The district messenger office in a western city is mourning the loss of one of their best messengers, Mr. "Reddy" Burns.

Mr. Burns, aged fifteen, answered a call recently to an apartment house. The young woman who had sent in the call had lately arrived from England. There were just three in the family—Mrs., Mr. and the baby. If there had been no baby Mr. "Reddy" Burns might still be a star messenger.

The young woman who sent in the call had received an urgent summons to the bank. Following a custom of London matrons, she sent for a messenger. The messenger was to care for the baby until she returned.

The messenger arrived and as usual stood with his book in his hand, wetting the point of his pencil in his mouth. The lady of the flat explained briefly Mr. Burns' duties-to-be. He didn't understand.

"Where'm I to take 'im?" he asked.

"Take him!" cried the lady, "You're not to take him anywhere. You're to tend him."

Mr. Burns nearly swallowed his pencil.

"Tend 'im?" he gasped.

"Yes. Tend him," replied the missus. "I'll get you his bottle."

When she returned to the room Mr. Burns was gone.

The office has not seen him since. A note was received from him the following day, but it gave little information. All that it said was:

"I quit. I am no nurce. I am a messingur."

No London messenger boy would consider such a duty as unusual. There messenger boys know how to tend babies. They have to.

If a mother wants her baby tended she goes to a telephone, calls up the messenger office and says:

"Will you please send me a nice, capable messenger boy?" Yes, I want him to take care of baby while I am gone. Please send me a real motherly sort of one. The last one was not at all careful about the temperature of the milk. Yes, that's all, thanks. Goodby."

Right afterward comes the messenger. He doesn't look like the American variety. He has an official air and an atmosphere of solidity that could never grow in the climate of the states.

"'Ere Ii am, lydy," he says. "Hany special instructions, and 'ow hoften do you feed hit?"

Instructions are given and madame sallies forth with an easy mind.

The messenger rocks the cradle, he even sings. If he has been told, he takes the baby out for a walk, pushing the perambulator with all the dignity of a father. He knows just what temperature the milk should be and he feeds the nursling at the right times.

What Our Friends Say Regarding This Publication.

Mr. L. Derrick, of Philadelphia, says: "I always consider a subscription to your paper one of my best Christmas presents and would as soon do without my Christmas turkey rather than miss a single issue."

Mr. B. F. Dillon, superintendent of the Western Union Telegraph Company at Jacksonville, Fla., writes: "I enjoy reading it too much to let my subscription expire."

Mr. James Wilson, superintendent of the Canadian Pacific Railway Company's telegraph, Vancouver, B. C., in renewing his subscription for two years, says: "I am always pleased to receive my copy. You are turning out a nice paper, well worthy of the support of all telegraphists."

Mr. Alfred Weller, now of Laporte, Ind., a forty-niner of the telegraph, for many years previous to ten years ago manager of the Western Union Telegraph Company at Milwaukee, in renewing his subscription states: "I value the Age very highly, as it keeps me in touch with the electric world."

Boston Should Honor Morse.

The Charlestown, Mass., Enterprise in a recent article strongly recommends that the City of Boston erect a statue to the memory of Professor Morse, the inventor of the telegraph. After commenting upon the many statues erected in that city to the memory of warriors and statesmen the writer speaks of the many literary men, artists and scientists who have received no permanent public recognition in the city which they honored. Professor Morse was one of the most prominent among the latter and of him the article says:

"Among the many inventions of the last century none had a greater effect upon civilization or did more to make the world what it is to-day than the telegraph, with its elimination of space and time. As the inventor of the modern telegraph, the man who first made possible the practical sending of messages between points far distant, stands Samuel Finley Breese Morse, born in Charlestown fifteen years after the battle of Bunker Hill. The story of his life is no less romantic than that of any general or sea captain. Like them he fought his battles and won his victories, victories the importance of which can even yet hardly be realized. He began his career, as did his brother inventor Robert Fulton, as an artist, and in his struggles with the hardships and obstacles of the profession learned the courage and energy that stood him in good stead when he left the path of art for that of science. Enemies could not down him nor disasters dismay. Step by step he went on until he attained his goal and gave to the world the fruit of his labors, the first working telegraph.

"Congratulate the Monmouth judge on the birth of a grandson. Next Sunday he is to be loaded with names, not quite so many as the Spanish ambassador who signed the treaty of peace of 1783, but only four! As to the child, I saw him asleep, so can say nothing of his eye or his genius peeping through it. He may have the sagacity of a Jewish rabbi or the profundity of a Calvin or the sublimity of a Homer for aught I know. But time will bring forth all things." So wrote Dr. Belknap of Boston to Postmaster General Hazard in New York. The 'Monmouth judge' was Samuel Breese, and his grandson Samuel Finley Breese Morse, who was born April 27, 1791, in a house still standing on Main Street, near Hathon Square, Charlestown, figuratively at the very foot of Breed's Hill.

"The boy was fortunate in his parents. The father, Rev. Dr. Jedediah Morse, was pastor of the First Congregational Church in Charlestown, a man renowned for his 'astonishing impetus.' Daniel Webster spoke of him as 'always thinking, always writing, always talking, always acting.' A former Yale tutor, his school books gave him the name of 'the father of American geography,' while besides his preaching he established a religious periodical, the Panoplist, and a religious newspaper, the Boston Recorder. The Andover

Theological Seminary, the American Board of Foreign Missions and the American Bible Society are only three of the many institutions in the founding of which he played a prominent part.

"Very different from the sanguine, impulsive spirit of this man was that of his wife, the future inventor's mother, Elizabeth Ann Breese Morse. Of Scotch descent, a granddaughter of Rev. Dr. Samuel Finley, the Presbyterian president of Princeton University, she possessed the judicial mind that is the attribute of her race. The best of housewives, the wise provider of the parson's sparse income, her influence was no less than that of her talented husband in shaping her son's career.

"Finley Morse, as the young boy was commonly known, was the eldest of eleven children, of whom only three, however, survived infancy. His birth year, 1791, was a propitious one for the future telegrapher, for it marked the birth also of the great Faraday, and saw the experiments of Galvani, which led nine years later to the invention of the voltaic pile. One year earlier, Benjamin Franklin had died, himself born in Boston, a bare mile distant from Morse's own birthplace, the first great American electrician.

"The boy's first years were as uneventful as could be expected. When four years old he was sent to a dame's school kept by 'Old Ma'am Rand' in a small building a few hundred yards from the parsonage. Here Finley manifested his first artistic impulse by scratching with a pin a supposed likeness of his teacher upon a chest of drawers, an effort which the model so little appreciated that she gave the artist a very thorough rattanning. Later he attended Mr. Foster's school at Andover and in 1801 entered Phillips Academy in the same town. His attainments in general scholarship were remarkable, and at the age of fourteen he stood ready to enter the freshman class of Yale.

"In his college course, which lasted from 1807 to 1810, the boy formed his first attachment for the two presiding deities of his later life, art and science. On the Yale faculty at the time were Jeremiah Day and Benjamin Silliman, the former teaching natural philosophy and the latter chemistry. Both of these men dealt to some extent with the little known subject of electricity. Professor Silliman dissected and explained the different types of battery then in use, while his colleague conducted experiments to demonstrate the proposition of Enfield that 'if the circuit be interrupted the fluid will become visible and when it passes it will leave an impression upon any intermediate body.'

"Writing in 1867, nearly fifty years later, Professor Morse said: 'The fact that the presence of electricity can be made visible in any desired part of the circuit was the crude seed which took root in my mind and ripened into the invention of the telegraph.'



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The Railroad.

Among recent New York visitors were, Mr. E. J. Little, superintendent of telegraph of the Great Northern Railroad, St. Paul, Minn.

Mr. W. W. Ryder, superintendent of telegraph of the Burlington system, has been appointed general superintendent of telegraph of New York Central lines west of Buffalo, with headquarters at Chicago, taking effect January 1.

Mr. J. Beaumont, superintendent of telegraph telephones, signals, and electric light and power of the Panama Railroad, is spending some time in this country visiting friends and inspecting telephone train-despatching systems.

The many friends of Mr. William Kline, of Toledo, who, for over forty years past, has been superintendent of telegraph of the Lake Shore and Michigan Southern Railroad, will regret to learn of his serious illness, he having suffered a stroke of apoplexy.

The Gulf, Texas and Western Railroad is installing a telephone train despatching circuit on its line between Jacksboro and Benjamin, Texas, a distance of 105 miles. This is a new road, located to the northwest of Fort Worth and joining the Chicago, Rock Island and Gulf and the Wichita Valley railroads at Jacksboro and Seymour.

The Pennsylvania state eight-hour law having been declared unconstitutional, telegraph operators in that state employed upon the Erie Railroad have resumed the nine-hour day provided by the Federal statutes. Similar state laws in Texas and other states have been declared unconstitutional because of conflict with Federal laws.

In the twenty-third annual report of the Interstate Commerce Commission to Congress mention is made that the operation of the hours-of-service law has been carefully watched. The railways are required to make monthly reports of all cases where men work beyond the statutory number of hours, but a few companies have refused to do this and the question is before the courts. During the year 336 complaints of violation of this law have been received, the large majority of which have been settled by correspondence; but ten cases are being prepared for submission to district attorneys. Several of these cases are of two telegraph offices near together at the same station, one office being operated during the day and the other during the night. The roads claim that such stations are not one office within the meaning of the law.

The minutes of the meeting of the Eastern Division of the Association of Railway Telegraph Superintendents, held at Washington November 18, 1909, have been printed and distributed among the members. The discussion at this meeting, which occupies twenty-four pages, was principally in regard to the standard railway contract of the American Telephone and Telegraph Company, several representatives of that company being present to explain the features of this contract.

The document is a very interesting one and well worth the careful study of all railway telegraph officials. The matter of the standard contract was placed in the hands of a sub-committee, mentioned in our December 16 issue, which will present a report to the Western Division which meets in Chicago at the office of Superintendent Bennett, of the Chicago and Northwestern Railway, January 19.

Annual Report of the Block Signal and Train Control Board to Interstate Commerce Commission.

The annual report of the Block Signal and Train Control Board presented recently to the Interstate Commerce Commission contains some very interesting information. It shows that this board which was appointed in July, 1907, to investigate and report to the Commission upon the use of and necessity for appliances and systems for the promotion of safety in railway operation, has not been idle but has obtained much valuable data upon this important subject.

Extended inquiry has been made into the conduct of the manual block signal stations and the telegraph offices on a considerable number of the principal railways of the country; this with a view to gaining information as to the efficiency and character of the men employed in these departments of the railway service. Incidentally to this inspection, information has been gathered concerning experience with telephones on those roads which have introduced telephones in the place of the Morse telegraph for the communication of train orders from the dispatcher's office to the stations along the line; and in the next statistical report of block-signal mileage on the railways of the country it is proposed to include a statement of the mileage of road on which telephones are used for sending train orders.

This inquiry has afforded a large amount of information, leading to the conclusion that, in the employment and discipline of telegraph operators and signal men, the practice on many roads is open to grave criticism. Men lacking in experience; others having considerable experience, but lacking in character, and boys too young to have had satisfactory experience, have been found in all parts of the country. Bad methods have been found to exist in the running of trains on a number of single-track railroads, and in a few such cases the faults of practice have been such as to warrant the use of the term dangerous.

The report says that the time of the board during the past year has been taken up in examining plans, drawings, and models of inventions calculated to insure greater safety in travel, nearly all of which were lacking either in merit or novelty. Of 328 inventions of various kinds which have been examined, only twelve have been held by the board to be of sufficient merit to warrant conducting tests of them at government expense if satisfactory installations for that purpose are offered by the proprietors.

The Military Telegrapher in the Civil War.

PART XXXIII—CONTINUED.

The story of Captain W. G. Fuller's war-time career was begun in our January 1 issue, and in that number was related his experiences in West Virginia until December, 1861, when he was ordered to Kentucky. His story of subsequent events reads in part as follows:

"I reported to Brigadier-General D. C. Buell at Louisville, Ky., December 20, 1861, and was provided with a pass for myself and my men through the Union lines to Lebanon and points beyond. On my arrival at Lebanon I found it very hard work to organize an efficient building party and was obliged to send to Ohio for reliable men. I could not obtain any good teams, so selected some wild mules and set my men to breaking them. My foreman, W. L. Tidd, forbade the use of the whip in breaking and after a week of hard work we had two first-class six-mule teams. We also hired a team, with negro driver, from a doctor living near Lebanon.

"Two or three days after all of my arrangements were completed General G. H. Thomas arrived and I received orders to construct a line to Danville, Ky. We reached there January 4, 1862, and then were ordered to proceed to Somerset, Ky., via Stanford. The weather was very wet and rainy, and in consequence of the heavy army transportation the roads were badly cut up, and after we passed Stanford the wagons sank so deep in the mud that we had to corduroy the road before we could proceed. This, together with the army trains which frequently blockaded the road for miles, delayed us greatly in getting our material to the scene of operations. We finally reached Somerset January 19, and one of the first messages I sent from there was one from General Thomas to General Buell at Louisville announcing the defeat of the Confederates at Logan's Cross Roads, in which engagement the Confederate General Zollicoffer and Bailey Peyton were killed.

"The same day I received orders to return immediately to Lebanon and push the line south from that point. I started for Lebanon the next morning, leaving the following operators upon the Somerset line: A. Ellison at Somerset, James Meagher at Stanford, D. E. Martyn at Danville, and William H. Drake at Lebanon.

"On reaching Lebanon we at once started the line toward Campbellsville, Ky. Everything went well until we reached Pleasant Hill church, thirteen miles south of Lebanon, where we camped on the night of January 29. The next morning I started the builders to work and, leaving my pistols, fur cape and gloves behind, started in light marching order for Lebanon to get some funds that had been forwarded from Louisville for our use. I left orders for the camp party to remain where they were until about eleven o'clock, and then start forward, giv-

ing the builders their dinner as they passed them, this being our usual routine.

"On my way back from Lebanon after transacting my business there I met a cavalryman who reported that my whole telegraph party had been captured. The camp of the First Ohio Cavalry, the colonel of which, Mr. T. C. H. Smith, was an old friend of mine, being near by, I applied to him for aid and he at once started a force in pursuit of the raiders. We found that the camping party had been captured by a Confederate force under General John Morgan. They also secured all of my personal effects, including a new pair of boots, my fur cape and gloves, a field glass, and my revolvers, all of which General Morgan appropriated for his personal use. The building party did not learn of the affair until, their dinner failing to arrive, they sent back to learn the cause. Colonel Smith pursued Morgan for two days, but without result; at Green River he arrived on the north bank of the river just as Morgan left the south bank.

"This disaster caused several days' delay in my work. As soon as we could replenish our camping and commissary outfit we completed the line to Campbellsville and thence to Columbia. On our arrival at Columbia we discovered that a box supposed to contain instruments had nothing but battery materials in it, and as Morgan had captured my field instruments, we had none to open the office with. When General Boyle, who was in command at this post, learned of this he became very angry and abused everyone and everything connected with the telegraph, saying that the superintendent ought to be shot, etc. While he was raging I tested the wire and sent word of my trouble to Lebanon. A messenger was at once started with the necessary instruments. I then notified General Boyle that I would be ready to send any despatches for him as soon as the messenger arrived. The General at once came to my office and wanted to know how I could operate the wire and send for the instruments without any key. I explained the matter to him and sent a despatch to Louisville, receiving the answer on my tongue. The General at once said to me, 'You are too useful to shoot yet,' and from that time forth showed me every consideration.

"After two days' delay waiting for material, we started for Jamestown, Kentucky. This section of the country was infested with guerillas and we were shot at several times, but none of the party was even wounded. We reached Horse Shoe Bend on the Cumberland River February 10. On February 12 I received orders from Captain Samuel Bruch to return to Lebanon and build a line toward Cumberland Gap. The operators upon the line which I had just built were John A. Cassell at Jamestown and W. R. Plum at Columbia. The fall of Fort Donelson and Nashville about this time, however, rendered the building of this line of little value.

"February 24 I reported to Captain Bruch that I had my building party organized to build the

line to Cumberland Gap and asked him to ascertain how far this line was to go and to keep us in material. Brigadier-General George W. Morgan was about this time appointed to the command of the Cumberland Gap wing of General Buell's army, and as he passed us on his way to the front urged me to complete the line with all possible speed. We reached Mount Vernon March 11 and Rock Castle River March 12. Between this point and New London the country was completely stripped, having been occupied by both armies. The weather was wet, we were for two weeks without dry clothing and twice we camped in buildings which we afterward found had been used as smallpox hospitals, but all of my party escaped contagion. We finally arrived at London March 20.

"I then received orders to extend the line to Cumberland Ford. We extended the line about four miles and were then compelled to wait for more wire. I went back to Lexington, secured the needed wire and other supplies, and on April 5 we again started the line forward, via Colliers' Ford, to Barbourville and thence to Flat Lick, which place we reached April 20. On April 27 we reached Cumberland Ford and extended the line to the advance posts.

"May 3 a Confederate sortie from the Gap drove in our pickets and destroyed seven miles of our line. This was immediately rebuilt, and May 15, by order of General Morgan, we extended the line ten miles to Clear Creek, at the foot of Pine Mountain, where I maintained my headquarters for ten days. May 25 General Morgan ordered me to build a second line connecting Collins' Ford and Flat Lick, a distance of thirty-five miles, this time running seven miles north of Barbourville, the object being to get the line upon a road which was better protected. We then took down the first line through Barbourville and connected that place with the new line by a seven-mile loop.

"June 3 I received orders to construct a line from Barbourville to Lambdin's, near Roger's Gap, and we completed this line June 5. Cumberland Gap being occupied by our forces, June 19, 1862, I was ordered to complete the telegraph line to that place as soon as possible and take up the line which I had built to Lambdin's.

"Soon after this I was taken suddenly ill, and after a week of severe sickness, was much reduced in strength. General Anson Stager advised me to go home to Ohio and recuperate. I placed Charles Lehr in charge of the operators and D. E. Newton in charge of the line builders in that part of Kentucky, and was about ready to start for Ohio when the Confederate General John A. Morgan made a raid through Kentucky. This delayed my departure somewhat, but as soon as he had left the State I started for Cincinnati."

The remaining part of Colonel Fuller's manuscript, with its interesting detail, from this point has been lost. Referring to Colonel Plum's history, however, we find him again in active service, in February, 1863, at Memphis, Tenn., where

he had charge of telegraph operations as assistant superintendent under Captain Samuel Bruch. On October 27, 1863, he was commissioned by President Lincoln as captain and assistant quartermaster. He was afterward transferred to New Orleans and placed in charge of the Department of the Gulf, where he remained after the close of hostilities, rebuilding the lines in that section. He retained this position until he finally left the service in July, 1865.

Progress of the Telephone.

In its review of developments in the telephone field during the past year the *Electrical World* says in part:

"On the technical side of the telephone industry there have been no developments this past year of an epoch-making character. The industry as a whole has shown a healthy growth, and the manufacturers have been busier than during the preceding two years. They have, however, on the whole, contented themselves with bringing out improvements in design rather than any radical devices or changes. Such improvements must not be underestimated as of value in the art, as they are continually necessary in order that the cost of giving service may be reduced to meet the popular demands for lower rates.

"With the growing importance of the long-distance service there is a natural interest in factors likely to affect its efficiency. In this category falls the telephone repeater, announcement of the commercial attainment of which was made a year or two ago. The repeater principle was discovered in the early years of the telephone, but in spite of the fact that inventors were made well aware of its value through the sensational offering of an enormous but doubtful prize for a successful repeater, and in spite of a vast amount of work, their efforts were in vain. It therefore seems all the more strange that the successful apparatus should be but a refinement of the repeater first suggested. Improvements in the commercial repeater have not been very rapidly introduced, and it seems almost as if its progress will be as slowly accomplished as was the reduction of the first suggestion to commercial requirements. The reason for this probably lies in the very minute limits of mechanical and electrical action and the consequent difficulty of studying the factors. Thus far the repeater is strictly an intermediate apparatus adapted for permanent connection in a through line, it being necessary to adjust each repeater to the electrical constants of the the sections of the line on either side of it. The chief improvement thus far seems to have been an increase in the allowable unbalance of the two line sections."

A gentleman entering the executive offices of one of the telegraph companies recently asked to be directed to the office of the chauffeur of the company. He was accordingly taken to the general manager's office.

Mercadier's System of Telegraphy.

The Mercadier system of telegraphy by the use of vibratory currents, says a foreign contemporary, has now entered upon a very successful stage of development, since the tests which were carried on by the French Government with a view of using it on the existing telegraph lines in France. Messages were sent between Paris and Havre, Paris and Marseilles, and between Paris and Lyons, and from twelve to eighteen messages, and even more, can be exchanged on the line at the same time.

M. Mercadier, who is one of the leading engineers of the French Telegraph Department and director at the Polytechnic Institute of Paris, designed his system so as to work the transmitters and receivers upon vibratory currents. Each transmitter gives a current of a different pitch, corresponding to a musical note, and each of the selective receivers will respond to this particular note and to no other, so that the current can be exchanged between one transmitter and receiver without affecting the other instruments. In this way it is possible to operate a multiple system and to send a number of messages over the line at the same time.

At the transmitting end of the line there is used an instrument which is designed to produce the vibratory currents. When in operation the instrument sends into the line a vibratory current which is produced continuously. In order to make the signals, dots and dashes, or the impulses for working a printing telegraph, a key is used to give the make and break of the vibratory current just as for continuous currents. The vibrating device is based on the action of a tuning-fork, which is kept in constant vibration by an electromagnet. An electromagnet is mounted in a fixed position between the prongs of the fork. Each of the prongs carries a steel wire contact piece of 1-28 inch diameter, which is designed to make contact with a platinum plate mounted on an adjusting screw. One pole of a battery is connected to the electromagnet, and the other pole to the metallic mass of the interrupter, while the other end of the magnet is connected to the mass of the tuning-fork. When the fork is in the normal position there is a contact between each of the steel points and the corresponding platinum plate, but this causes the current to flow into the electromagnet, attracting both prongs of the fork at the same time, thus causing the fork to vibrate at a definite rate, corresponding, for instance, to the note *sol* in the musical scale.

Owing to the effect of the battery current, there is produced a magnetic field in the electromagnet core and also in the ends of the prongs lying next it. When the fork vibrates this causes the distance between the prongs and the iron core to be greater or less, and the magnetic field is alternately increased and diminished thereby. Such a fluctuation of the field reacts upon the wire of

the coil and generates in it an undulatory current whose rate of vibration is naturally the same as that of the fork—that is, if the fork represents the note *la*, corresponding to 435 vibrations per second, the resulting current will also have 435 undulations or periods per second—and experience shows that this current has very regular waves, such as are found generally in alternating currents. Such waves exist along with the direct current which comes from the battery. Owing to the fact that there is always a spark between the point and the plate, the current dies down gradually and in this way it has a regular wave form.

From each of the terminals of the fork device a wire is connected to the primary of a small transformer, so that the vibratory current flows in the transformer, and is given out at the same rate of vibration by the secondary of the transformer. The secondary is connected to the line through a contact key of the usual kind, and, in consequence, the vibratory current corresponding to that of the fork is sent into the line and into the distant receiving station. There are a number of tuning-fork instruments connected to the same line, but the tuning-fork of each one is selected to give a different note of the scale. Morse signals can consequently be sent from any one of the keys, and the current will go to the distant station, where the signals will be taken by a suitable receiver designed to be affected only by currents of a certain frequency. As it is well known that a number of alternating currents of different frequencies can be sent at the same time over a line without interfering with each other, it is evident that each key can send independent signals at the same time, and each message will be read in the corresponding receiver and in no other. Thus a number of messages can be sent over the line at the same time and these will be quite independent.

One of the most difficult problems to be solved in the use of a vibratory system of this kind is to find a selective receiver which will work properly on such currents. M. Mercadier uses for the purpose a vibrating device known as a *mono-telephone*. An ordinary telephone can be employed to take the messages by ear, but it would not serve for the present system, as it would respond to the signals of any pitch of the scale, and would not, therefore, be selective for a certain pitch. On the other hand, it is desired to have the device work as a relay, so as not to be obliged to take the message by ear, but to use a sounder in the usual way, or else a Morse register or a printing telegraph apparatus.

The action of the *mono-telephone* depends on the principles of vibrating discs, which sometimes give quite complicated effects. In the present case, however, the effect is a simple one, and is analogous to the well-known effects of vibrating cords, which will vibrate with different harmonics according to the conditions. Round discs—as, for instance, a steel disc—will also give musical sounds, but as they can be struck differently their

modes of vibration are more varied. Taking a case where the disc is about one twenty-fifth of an inch thick, and is acted upon like a telephone disc by an electromagnet giving a regular vibrating current, if such a disc is allowed to rest upon three points lying on the circumference of a circle concentric with the disc, the diameter of the circle being .68 of the total diameter, this circle is the nodal line for the first harmonic of the disc. In this position the disc can be made to vibrate in an analogous way to a string clamped at its centre, and the disc will give out a sound corresponding to this harmonic and no other, so that it only vibrates at a certain fixed rate, in the same way as a tuning-fork can give only a certain fixed note. A disc of this kind will furnish a high or low note according to its diameter, so that by using discs of various diameters, each in a suitable apparatus, a series of mono-telephones or selective receivers can be formed. A receiver tuned for the note sol will thus respond to currents of this pitch, but not to any others. A second mono-telephone tuned for the note la will receive only this note, and so on.

The design of the mono-telephone relay such as is used by M. Mercadier is as follows: Mounted in a cylindrical case is an electromagnet, properly supported on a base, while above it is the circular metal disc, which is separated from the magnet by a small space, as in a telephone receiver. In this case the disc is much thicker than the usual telephone disc, being one millimeter in thickness, and instead of being held around the edge it is laid upon a support, so as to hold it at three points on the circumference of a circle. This is carried out by metal pins the supports of which are free to slide in and out in a groove and upon a radial line of the disc. As there are different diameters of disc used for each mono-telephone, we can thus have the right adjustment of any disc upon such a base. The circle containing the three supporting points lies so that the diameter of the nodal line is .68 of the disc diameter, as already mentioned, so as to use the first harmonic of the disc. A series of discs are chosen so that the mono-telephones give a series of musical notes, and each mono-telephone is tuned to exactly the same note as one of the tuning-forks of the transmitters.

Supposing that at the transmitting end the keys are operated so as to work the various tuning-fork circuits over the line one after the other, the mono-telephone tuned for the note sol will give a loud sound when the waves from the tuning-fork sol are sent, but the waves from tuning-fork la would have no effect upon it, and the disc is not vibrated. Such an action is a very positive one, as when the note received falls short of the required note by only one-sixth of a tone the mono-telephone will not respond, so that the selective effect of such a device is very good. It is now necessary to use the mono-telephone as a relay, and make it open and close the contact of

a local circuit and sounder, etc. On the center of the disc is a small silver plate, and bearing on the plate is the end of a curved lever. To the end of this lever a special form has been given. The lever is mounted on an upright, and it works on a pivot so as to rise and fall, the weight on the disc being lightened by a counterweight and the lever is designed so that its own rate of swing is less than the vibration rate of the disc. There is a very small pressure between the lever and the disc, and this contact is used for the local battery circuit. In order to work the device properly there is mounted above the lever a tongue carrying a special felt washer, and by applying a suitably mounted set screw a very slight pressure from the fibres of the washer can be given upon the end of the lever. By this means the lever falls more quickly after it has been raised. When the proper vibratory current is sent in the coil, the disc sets up a strong vibration, and, as the lever (having a slower rate) cannot follow it, the lever is repelled upwards, and there is a partial separation between the two which results in an imperfect contact, so that the local battery current is broken. Thus when one transmitter key is worked currents are sent from the tuning-fork transmitter connected to that key over the line, and this current is received in the corresponding mono-telephone relay, whose plate is the only one to vibrate. Contact is thus made and broken for the sounder belonging to this mono-telephone, and the operator takes the signals made by the corresponding key. Owing to the fact that the vibrations do not interfere with each other, several keys can be operated at the same time, and the messages will be selected out by the corresponding mono-telephones.

By a device consisting of a combination of transformers and condensers, the current sent from the transmitters can pass out to the line, but cannot pass into the mono-telephones of the same station. Owing to this arrangement the transmitters of one station may be operated at the same time that messages are being received from the distant station by means of the mono-telephones, so that by employing six different frequencies six messages may be sent over the line while six messages are being received, making thus twelve transmissions at the same time and over the same line.

The range of the Mercadier system is considerably increased by operating it along with one of the usual telegraph systems which use a direct battery current. For instance, a duplex, quadruplex or sextuple Baudot printing telegraph, such as is commonly employed on the French lines, can be used along with the different Mercadier instruments which work on the vibratory system.

In the official tests which M. Mercadier carried out under the direction of the State Postal and Telegraph Department during the year 1907 between Paris and Havre, on one occasion there were used six Hughes printing telegraphs at each

end of the line, working upon mono-telephone relays, and at the same time a Baudot sextuple printing telegraph system using the ordinary battery current, making eighteen messages on the same line and at the same time. The messages were all received on the printing telegraphs without any difficulty. About the same results were obtained over a longer distance, working from Paris to Marseilles, and there is no doubt that the number of messages can be still further increased as well as the distance.

Further tests were carried on recently between Paris and Lyons, a distance of 525 kilometers, over a line consisting of a single wire and the earth, whereas telephonic circuits with double wires had been used for the preceding experiments. The tests were supervised by the French Telegraph Department and the best results were obtained with the following telegraphs working on the line: Six Hughes printing telegraphs working with vibrating currents, and one Baudot quadruple printing telegraph working with ordinary direct current.

In the course of these tests, Wheatstone telegraphs were, moreover, substituted for the Hughes telegraphs and they were worked on the line with perfect success, at a speed corresponding to emissions of one-fortieth of a second.

The Robert W. Martin Fund.

Since our previous acknowledgement in our December 16 issue, of contributions to the fund for the assistance of the well-known old-time telegrapher, Robert W. Martin, only a few contributions have been received.

The committee in charge of the fund consists of J. B. Taltavall, of Telegraph and Telephone Age; Charles W. Price, of the Electrical Review; T. Comerford Martin, of the National Electric Light Association, and T. A. McCammon and Fred Catlin, of the Western Union Telegraph Company, New York. All contributions should be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Mr. J. Rosenbaum, telegraph operator in the Southern Pacific Railway's office in New York, in sending \$2.00 to be added to the R. W. Martin fund, says, "Just a little Christmas cheer for our old comrade." Mr. Rosenbaum won third prize in the Madison Square Garden tournament in 1898, in the receiving class. He made a very fine record and is justly proud of it.

The amount received to date is: Previously acknowledged, \$566.25; J. B. Austin, \$5.00; John Boyle, \$5.00; P. V. DeGraw, \$5.00; Richard V. Oulahan, \$3.00; Herbert S. Wright, \$1.00; H. J. Staley, \$5.00; Ernest W. Emery, \$5.00; Edward A. Conroy, \$5.00; G. P. Howe, \$1.00; R. H. Prender, \$2.00; W. H. Allen, \$5.00; L. A. Leech, \$1.00; all of Washington, D. C.; J. Rosenbaum, New York, \$2.00. Total, \$611.25.

Obituary.

Hamilton McKown Twombly, the well-known financier and banker and a son-in-law of the late William H. Vanderbilt, died January 11, aged sixty-two years. Mr. Twombly was in 1877-78 a vice-president and director of the Western Union Telegraph Company.

Thomas D. Carroll, a well-known telegrapher of Pittsburg, died December 28, aged fifty-four years. Mr. Carroll learned telegraphy in Canada, where he was born, and in 1883 moved to Pittsburg, where he remained in the service until a short time before his death.

William B. Shaw, the dean of the Washington newspaper correspondents, died December 31, aged eighty-one years. Mr. Shaw was the first newspaper man to induce his paper to establish a telegraphic news service from Washington, this service being inaugurated by the New York Herald in 1856, when Mr. Shaw represented that paper.

Henry L. Shippy, for about forty years identified with the John A. Roebling's Sons Company and for the past twenty-five years treasurer and New York manager, died at his home in New York, January 2, after an illness of a year, which caused his retirement from active business. Mr. Shippy was sixty-four years of age, and one of the best-known men in electrical circles throughout the world. He was a man of most amiable disposition and attracted all with whom he came in contact. He was a great lover of the sea and yachting, and in the pursuit of this inclination formed a warm friendship with Lord Charles Beresford and Sir Thomas Lipton. He was always a prominent figure at Magnetic Club dinners and other electrical functions.

J. P. McLoraine, chief operator of the Western Union Telegraph Company at Philadelphia, died of anaemia December 31, aged forty-six years. He had suffered from this disease for some time, and realizing his condition, predicted that he would not live the year out. Mr. McLoraine was always loyal to his employing interests. He entered the telegraph service in 1876 as a clerk for the Franklin Telegraph Company at Philadelphia and afterward served as messenger for the Atlantic and Pacific Company and operator for the American Union Telegraph Company. After the consolidation of this company with the Western Union he was operator at Atlantic City and Chester, Pa., and test operator at Conowingo, Md. In 1882 he became connected with the Philadelphia office and has been employed in that place continuously ever since, serving as operator, night wire chief, all night chief, night manager and finally day chief operator, which position he has held since May, 1903.

Telegraph and Telephone Age is headquarters for telephone, telegraph and wireless books and cable codes. All orders accompanied by price filled promptly upon receipt. Write for catalogue.

Legal.

In an opinion rendered December 10, the Supreme Court of Michigan denied the petition for a writ of mandamus in the case of the American Telephone and Telegraph Company of New York against Secretary of State Martindale.

When the company applied to the Secretary of State for a certificate to do both telegraph and telephone business in Michigan under a single head, the request was refused by Martindale, as he held that such a procedure would be a violation of the laws of the state governing the admission of foreign corporations. The company refused to abide by his decision and applied to the Supreme Court for a writ of mandamus to compel him to issue the certificate. In refusing the writ, the court said:

"For more than a quarter of a century the legislature has seen fit to keep separate these two lines of activity. This course has been followed, too, during a period in which the telephone business of the state has grown from an insignificant enterprise to one of great magnitude. Wherever the telegraph line is, there, too, is the telephone. In the hands of the independent agencies, it may well be that a healthy competition for the transmission of information by electricity will ensue. We are of the opinion that the legislative enactments touching the question indicate a policy on the part of the state to afford its people a choice of two agencies of independent ownership."

In the United States Circuit Court of Appeals at Chicago recently, Judges Grosscup, Baker and Seamon decided that the federal hours-of-labor law, fixing nine hours as the day's work for a telegrapher in a railway office kept open continuously, does not mean that the nine hours shall be consecutive. This reverses a decision of the lower court given by Judge Landis, in the case of the Atchison, Topeka and Santa Fe, which was tried last April. It has been the custom on the Atchison for day operators to work twelve hours with three hours out at noon, and night operators twelve hours with three hours out at midnight. Judge Landis held this to be a violation of the law. Judge Grosscup says that the statute was enacted in view of the customs of the land, and that our customs do not include such an intermission as a part of the working hours. The case was remanded to the lower courts and a new trial ordered.

LETTERS FROM OUR AGENTS.**NASHVILLE, TENN., POSTAL.**

Mr. C. V. Maslin, a former Nashville boy, now in the cotton business at Dallas, Texas, was a recent visitor.

The employees of the company in the Fourth District, Southern Division, on Christmas day

surprised Superintendent and Mrs. Chas. B. Arrington with a very handsome china cabinet and presented to Mr. Arrington a walrus skin travelling bag equipped with toilet case. The fact that every employe contributed towards these remembrances is evidence of the high esteem in which all hold Mr. Arrington. The superintendent took occasion while the managers were in Nashville to thank each of them for their token of esteem, with a heart to heart talk which all highly appreciated.

Superintendent Charles B. Arrington inaugurated a year ago a conference of all the managers of his district embracing the States of Tennessee and Kentucky to be held in his office in Nashville once a year and pursuant to call these managers were in Nashville on December 27. The meeting was held in the office of Mr. Arrington in the afternoon and evening of that day. Mr. Arrington having given the managers notice of this meeting in advance and having requested that they bring memoranda of subjects, thoughts and suggestions for discussion, all came prepared with new ideas for presentation. The following subjects were discussed in detail; cleanliness of office inside and out, courtesy, promptness, efficiency, business getting, opportunity, condition of property, arrangement and operation of circuits, efficiency of wire service, cost of handling traffic, requisitions, charged account, competing companies, telephone companies, operation and maintenance of call box system, new offices, error sheets and cards, signs, changes in forms, traffic inspection, care of circulars and general orders, surplus stock, office reports, service changes, proper vouchers, etc. In addition all were invited to submit anything they had for general discussion. Several excellent suggestions were offered by the managers and discussed by Mr. Arrington. All who were present agreed that the meeting was a most excellent one from the standpoint of experience and knowledge gained and expressed a determination to "Get it all" at their respective stations and make the year 1910 the banner one in this district. Those present were F. S. Meek, Owensboro, Ky.; L. W. Jones, Louisville, Ky.; S. D. Howard, Lexington, Ky.; J. J. Downing, Frankfort, Ky.; A. P. Martin, Nashville, Tenn.; J. S. Greever, Chattanooga, Tenn.; J. J. Barnett, Knoxville, Tenn.; J. F. Wilson, Memphis, Tenn., and W. L. Meeker, Paducah, Ky., all managers. Mr. Chas. B. Arrington, superintendent, J. F. Livingston, chief clerk to Mr. Arrington and M. J. Herbolzheimer, district foreman.

SPRINGFIELD, ILL., POSTAL.

The employees of this office all enjoyed their annual banquet which occurred on Christmas Day at noon. For two hours the messengers and other employees feasted on turkey and other delicacies of the season, and after the dinner the messengers responded to toasts, which were very

expressive and to the point and showed their appreciation of the efforts of Manager Shute in their behalf.

Those present were: George H. Shute, manager; Mrs. G. H. Shute, Master Clyde Shute, John P. Troy, wire chief; Edward O'Connor, Associated Press operator; William A. Kenney, night wire chief; F. J. Moyes, operator; Miss Addie Withrow, desk clerk; Miss A. Cherney, bookkeeper; Messengers John Harrison, Raymond Melton, Joseph Creighton, Hazel Armstrong, Leslie Robinson, Earl Meyers.

PHILADELPHIA, POSTAL.

The sympathy of all in this office is extended to O. C. Balmer of Manager McNichol's office on account of the sudden death of his wife.

Night wire chief Zecher has returned after a weeks absence on account of the death of his grandfather.

Joseph Eder, is among those on the hospital list.

James W. Dunn, of the force in this office, died January 3, after a brief illness having been on duty the morning of January 3.

Harry Bell of this office died January 9.

OTHER NEW YORK NEWS.

The proceedings of the forty-third annual meeting of the Telegraphers' Mutual Benefit Association, held November 17, 1909, have been printed for distribution among the members. The report gives an itemized account of the financial condition of the association and shows the securities in which the reserve fund is invested, all of which are first class bonds and mortgages paying from four to six per cent on the investment.

William P. Sheridan, a well-known New York policeman, who was a telegraph operator before he joined the police force in 1886, was retired recently because of defective eyesight.

Philadelphia Electrical Aid Society Annual Meeting.

The twenty-second annual meeting of the Electrical Aid Society of Philadelphia was held Tuesday evening January 11. The following officers were elected: president, A. S. Weir; vice-president, Wm. R. Harinstad; recording secretary, W. E. VanArsdall; financial secretary, R. C. Murray; treasurer, H. W. Hetzel; executive committee, Frank E. Maize, George G. Wells, Mary McFadden, Nellie F. Hayes; trustees, George J. Wells, chairman, R. H. Conway, H. C. Leahy. Reports showed a total of 851 members in good standing. Sick benefits paid during the year amounted to \$2,919.00; death benefits, \$800.00; reserve fund, \$6,148.56. About 250 members were present and after adjournment of the business meeting a banquet was enjoyed.

Trade Publications.

Bulletin No. 1105, recently issued by the Western Electric Company, describes in detail their intercommunicating telephone systems and contains wiring diagrams necessary for the installation of these systems. Bulletins Nos. 1001 and 1002 take up the operation and construction of the Western Electric Magnetic Non-Multiple Telephone Switchboards with self-restored and manually restored line signals. These two bulletins are the first of a series of the switchboard bulletins which they will issue describing their newest and latest designs of switchboard and telephone apparatus. Among other publications recently issued by this company are folders describing their various types of portable telephones for railway service, the Gill Selector for train despatching and the use of the telephone in railway terminals.

Over 1,000 miles of telegraph poles in full blossom are to be seen in Uganda, Africa. The wires are strung from a species of fig tree which has extraordinary powers of germination.

Every telegrapher can own a home.—The Serial Building Loan and Savings Institution, of 195 Broadway, New York, has assisted more than a thousand telegraphers to save money and buy homes and will assist others who have a similar ambition. Address them at their place of business, 195 Broadway, New York, and they will tell you how you can own a home of your own by saving a small amount monthly.

Advertising will be accepted to appear in this column at the rate of fifty cents a line, estimating eight words to the line.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Leg. Pattern \$2.50
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THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

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Telegraph and Telephone Age

No. 3. NEW YORK, FEBRUARY 1, 1910. Twenty-seventh Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Encouraging Facts for Students to Consider. A Few Secrets Revealed.

Possibly the greatest hindrance experienced in an endeavor to induce young men to take up a course of electricity, or in fact, any other scientific pursuit, is due to the self-belittlement on their part of their own capacity and an exaggerated estimate of the degree of general knowledge they magnanimously attribute to those who rise to distinction.

Now both of these conclusions are wrong. The fact is nearly every normal man possesses a potential energy and capacity far greater than he utilizes, while on the other hand comparatively few men of distinction are as gifted as the public at large believe them to be.

Emerson made no mistake when he said, "We have our Washington, our Napoleon, our Franklin, our Shakespeare, and other great men known to fame, but there never were such persons."

What he means is that their well-merited acts and achievements, viewed solely from a distance and disconnected from all other affairs of life, cause the public to associate large proportions to every other part or phase of their individuality and thus paint a picture with too glowing colors.

He then goes on to say that while he does not belittle their fame in the least, it is more than

likely that if we could meet them to-day and through daily association become thoroughly acquainted with their respective ways and habits of life, they would after all probably seem not much different from ordinary people, after full measurement was taken of every part. Hence the well-known saying, "No man is a hero to his own valet."

The student should therefore realize that in the pursuit of knowledge the gulf between him and his teacher is not nearly as great as he imagines and at once cease self-belittlement.

Don't forget that the world always takes us at our own estimate and one seldom rises above his own valuation.

In order to bring the merits and glory of honest achievements down to their proper level let us take, for example, the facts in the case of, say, a writer of high-class articles, or the authors of standard technical books of a scientific nature.

The student sees and reads the finished product and naturally jumps to the conclusion that the man whose head can contain so complete and accurate a knowledge of the multiplicity of subjects he treats must necessarily be blest with an abnormal craniological development.

By this magnanimous but erroneous measure he ascribes to such persons he belittles his own standing. The disparity between the two levels is not always as great as it at first appears. There are probably but few men whose ready knowledge is as voluminous as that indicated by the contents of their books.

It should be readily realized that while an author may temporarily possess accurate information and knowledge concerning each subject singly at such time as his mind is centered solely thereon, it does not by any means follow that he is as familiar with all the subjects all the time.

Neither should he be credited with being the originator of all the information the book contains. Much of it is merely compiled matter and as old as the hills, but being necessary links in the chain, is retold in different words.

What an author really deserves credit for, and that upon which his glory principally depends, is the incorporation in his work of an originality of some kind. It may consist of either or all of the following features:

Original ideas; new matter; a characteristic and comprehensive style of writing; the knack of building up to the objective point of a story or explanation by an easy step-by-step process; a unique arrangement of diagrams and style of drawings. At any rate, it must contain something which will immediately attract the eye and hold the reader's attention closely to the subject treated.

As to homage due the author as a master of

literature, measured by the graceful and fluent manner in which the words seem to flow from his pen, sometimes the less said the better. In fact, it would often be actually embarrassing to have the reader accidentally discover the waste-basket and see the mass of blue-pencilled, revised, and discarded "first copies" it contains. Nor would the author probably care to confess how much time he devoted to such revisions and corrections. Not for the world, would he deign to admit that possibly much of final lustre is due to the efforts of the editor or publisher himself, whose chief joy in life consists in discovering flaws in one's manuscript and after regilding the scar, flaunting his victory in one's humiliated face!

The same tendency to overmagnify the halo naturally due to the heads of all other exploits and achievements exists quite universally. The dazzling light itself is not necessarily too brilliant, taken as a measure of the value of such attainments, but it usually blinds the unaccustomed eye of the student to such a degree that he fails to see that it may possibly be made up of many parts representing the accumulative expended energies of many helpful lieutenants in the way of valuable assistance. The halo, however, invariably hangs over the head of the man whose name appears at the top of the list.

Hence, the lesson to be learned from these facts is that the world helps him only who helps himself, and that the actual distance intervening between Somebody and Nobody is not so great as to be unsurmountable by almost any one possessing ordinary intelligence and health.

The sole qualifications to attain success are persistence and a determination to do something. Then go right ahead and do it, but do it now. The hardest part of the proposition will be in making up one's mind to follow the advice given in the last three words of the previous sentence.

Recent Telegraph and Telephone Patents.

A patent, No. 945,023, for a telephone transmitter has been granted to S. A. Duvall, of South Bend, Ind.

A patent, No. 945,069, for a multiple telephone transmitter, has been secured by F. W. Wood, of Newport News, Va.

A patent, No. 945,293, for a lightning arrester, for telephone systems, has been awarded to William C. Shinn, of Lincoln, Neb.

A patent, No. 945,438, for an automatic telephone pay station, has been secured by Francis X. Bee, of Philadelphia, Pa.

A patent, No. 945,480, for a combination telephone instrument, has been taken out by A. L. Sohmn, of Whittier, Cal.

A patent, No. 946,287, for a lockout device for a telephone, has been issued to C. W. Throckmorton, of Pittsburg, Pa.

A patent, No. 946,372, for a keyboard telegraphic transmitter, has been granted to E. E. Kleinschmidt, of New York. A series of key bars, a series of selective bars with lugs in arrangements with telegraphic symbols, a series of wires moved by the lugs when a key bar is operated, one lug representing a dot and two dashes.

Patents, Nos. 946,380, 946,381 and 946,382, for a telephone meter system and apparatus, have been issued to R. H. Manson, of Elyria, Ohio.

A patent, No. 946,410, for a portable telephone transmitter and receiver or testing instrument, has been awarded to H. F. Thomas, Jr., and C. E. McGrew, of Chicago, Ill.

A patent, No. 946,418, for a combination switch and lightning arrester for telephone lines, has been taken out by S. W. Wood and E. T. Thomas, of Lookaba, Okla.

A patent, No. 946,528, for apparatus for telephone lines, has been secured by C. D. Enoch, of La Crosse, Wis.

The following patent has expired:—

A patent, No. 489,435, for telegraphy, held by Leroy P. Hotchkiss, of Oak Park, Ill.

Investigation of Telegraph and Telephone Companies in New York State.

The legislative committee of New York State, which is inquiring into the wisdom of placing the telephone and telegraph companies under State supervision has held several sessions in New York during the past two weeks.

Colonel Robert C. Clowry, president of the Western Union Telegraph Company, was one of the witnesses.

E. C. Page, counsel for the committee, who was doing the questioning, asked him: "Would the ability to transmit at a uniform rate of 1,000 words a minute have an effect on the rates?" Colonel Clowry replied that it would if the company was sure of having enough business to keep up that speed on a twenty-four hour basis. He said that while newspaper offices sent their matter by code abbreviation the company could not do that with regular messages. It was and had been for twenty-five years very common to deliver messages in some cities and villages by telephone. The company objected to having the filing time put on as that would mean a great increase of cost on the 80,000,000 messages annually, without any increase of revenue. He never had known why it was that the practice of sending addresses and signatures free had ever been instituted. The average cost per message was 28.5 cents, and the average return 34.1 cents.

"What have you to say," Mr. Page asked, "of Governmental or State control or regulation of corporations of public utility?"

"I have had no experience with it," Colonel Clowry replied; "I don't object to it if it is reasonable."

Mr. Page asked Vice-President Thomas F. Clark, of the Western Union Telegraph Company, why the company's accounts were not so kept as to show due credit to the States as to business within them and business between them, and particularly with reference to New York. Mr. Clark said that Mr. Page's proposal would not be fair, as in that event "New York would get all the sirloin and the other States the chuck steak." It was money from the other States that made it possible for New York to get as much as it does, he said.

Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Company, was also a witness before the Committee. As part of his testimony, Mr. Mackay made the following statement:

"I wish to say that the Postal Company has been free and independent from the time of its organization, in 1886, and purposes to remain so. It has not the slightest influence or control over the American Telephone and Telegraph Company or the Western Union Telegraph Company. It took no part in the recent purchase of the Western Union Telegraph Company by the American Telephone and Telegraph Company and was not consulted and knew nothing about it until after it had been accomplished. The Postal Company will now have to compete with both of them, instead of competing with the Western Union alone, as heretofore.

"The recent statements in the press that the change of name of the Postal Telegraph-Cable Company to Transcontinental Telegraph Company is a part of the combination is incorrect. Confusion has resulted from the fact that we have a company known as the New England Telegraph Company, while the Bell Telephone interests have a company known as the New England Telephone and Telegraph Company, with which company we have nothing whatsoever to do.

"We are proceeding now to change the name of our company, the New England Telegraph Company, to Postal Telegraph-Cable Company, so that the business may continue to be done in the Postal name. I would again say that there has never been a time in the history of the Postal company that it has not competed, and that competition will continue. We shall not take part in the combination, and we feel confident that we shall be able to retain our telegraph business, and even to increase it gradually by extensions and by good service.

"The Postal is the only company that has ever succeeded in competing with the old land line telegraph monopoly, and it has done so for twenty-five years. If the Postal Company were united with the telephone and Western Union there would never be another competing telegraph company, because no telegraph company can succeed unless it reaches every state and every important city and town, and not only would that require a vast sum of money, but it would be physically impossible.

"Between many of the important commercial centres, as, for instance, between New York and Philadelphia, it is impossible now to find another right of way on the highways for a through line. The Postal Telegraph Company will be the last competitor in telegraphy, and when that competition ceases there will be a choice only between monopoly and government ownership."

In reply to questions Mr. Mackay said that he considered eight per cent a fair net profit for a company after paying operating expenses, maintenance and all fixed charges. He also said that, though president of all the companies in the system, he drew no salary for his services, and that, allowing for cost of materials and work, for the fact that addresses and signatures are sent free and for the great distance covered, the service in this country was the cheapest in the world.

Personal.

Mr. Louis de Goll, president of the Rowland Telegraphic Company, Baltimore, was a recent New York visitor.

Mr. J. Frank Howell, formerly a well known telegrapher but for many years past in the brokerage business in New York, accompanied by his wife spent the holidays in Bermuda.

Mr. Bernard E. Sunny, president of the Chicago Telephone Company and vice-president of the American Telephone and Telegraph Company has been elected a director of the First National Bank of Chicago, the largest bank in that city.

Mr. Charles A. Tinker, formerly general superintendent of the Western Union Telegraph Company, New York, will leave February 3 for Empalme, Sonora, Mexico, where he will spend two months with his daughter, Mrs. W. T. Smith, whose husband is an official of the Southern Pacific Railway at that point.

Mr. J. H. Shearer, division operator on the Northern Central Railway at Elmira, N. Y., and a well-known old-time and military telegrapher, gave an address before the Young Men's Christian Association at Elmira recently upon "Reminiscences of a Telegraph Operator during the Civil War."

Colonel J. C. Reiff mentioned by George G. Ward in connection with the celebration of the Commercial Cable Company's twenty-fifth anniversary as sending the first paid message over the Atlantic cable system of that company being then connected with the firm of Woerishoffer and Company is still actively engaged in business being interested in the copper mining industry and having an office at 20 Broad St., New York. Mr. Reiff has been for the past thirty years engaged in a legal contest with the Gould estate over the patents for the Edison automatic system of telegraphy which he owned and sold to the Atlantic and Pacific Telegraph Company which was afterward absorbed by the Western Union.

Mr. Stephen D. Field, the well-known electrical engineer and inventor, of Stockbridge, Mass., was a recent New York visitor.

Dr. J. Emmett O'Brien of Scranton, Pa., is about to publish a book dealing with events in connection with the military telegraph service during the civil war. The book will be written largely from Dr. O'Brien's personal experiences and from the diary of his brother Richard O'Brien, who is assistant superintendent of the Western Union Telegraph Company at Scranton, and who was chief operator in the military telegraph service at Norfolk, Va. It will be well illustrated with pictures of many of those prominently connected with the military service during the war and with several maps showing the scene of operations.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. M. W. Hamblin, New York city superintendent, has returned to his office after a long illness.

Mr. William Finn, of the electrical engineer's office, sailed for England on January 22, to be absent for some time on business connected with the service.

RESIGNATIONS AND APPOINTMENTS.

Mr. A. F. Waitz, of the Houston office, has been appointed manager at Temple, Tex., vice Mr. W. B. Tyer, transferred to the position of chief clerk in the Houston office.

Mr. E. V. Easley, manager at Big Springs, Tex., has been appointed manager at Abilene, Tex., vice Mrs. J. M. Watson, resigned. Mr. F. R. Wallace has been appointed manager at Big Springs, to succeed Mr. Easley.

Mr. Fred G. Bromm has been appointed manager at Mount Clemens, Mich., vice Mr. J. Schanher, resigned. Mr. Schanher was well and favorably known to most of the telegraph officials who were occasional visitors at Mount Clemens.

Mr. O. L. Perry, manager of the Fort Wayne, Ind., office, has resigned after having served in that capacity at Fort Wayne for thirty-seven years. Mr. Perry expects to reside in the future in San Francisco.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

The funeral of Mrs. Isaac Smith, wife of the superintendent of tariffs, which occurred at her late home in Little Falls, N. J., January 16, was attended by many of the officials of the company.

A new and up-to-date office has recently been installed at Tacoma, Wash.

A new large and handsomely equipped branch office is being established by this company on West 30th Street, near Broadway, New York.

A patent, number 944,612, for an electro-magnetic punch, has been issued to F. E. d'Humy, assistant electrical engineer of the company.

Time signals from the Naval Observatory at

Washington, D. C., are transmitted at noon daily to all of the New York branches for the purpose of maintaining uniform time in all of the various offices of the company.

A circulating library is being established for the benefit of all employes of the company in Greater New York. The cost to members is ten cents per month. The library is located on the tenth floor, where books may be obtained at any time. A large number of instructive books are already on the shelves and others are being added daily. Vice President and General Manager E. J. Nally is encouraging the enterprise.

All of the superintendents of the eastern division, including Charles E. Bagley, of Philadelphia, Arthur L. Edgecomb, of Boston, Harvey D. Reynolds, of Buffalo, and Henry Scrivens, of Pittsburgh, together with the New York resident superintendents, met in the office of General Superintendent E. B. Pillsbury on January 29 to award the Mackay prizes to the managers and messengers for the past year.

Arrangements are being made to move into new quarters at Atlantic City, N. J. This, like all other new offices of the company, will be handsomely fitted up with a view to providing every possible facility for the prompt handling of business and the convenience and comfort of both patrons and employes.

The New York Telephone Company recently constructed and installed within ten days a new telephone switchboard for the executive offices. The board has a capacity of twelve trunk lines and seventy-six locals.

The company vigorously denies that there is any truth in the statement that the change of name of the Postal Telegraph-Cable Company to Transcontinental Telegraph Company has any connection with any plan for a merger with the Bell Telephone Company or the Western Union Telegraph Company. They state that the change of name is solely to enable their local company in New York State, known as the New England Telegraph Company, to transact its business in New York State in the name of the Postal Telegraph-Cable Company, and they ridicule the item which has been sent broadcast over the country that that simple change has anything whatsoever to do with the telephone interests or the Western Union interests. The Postal people say that they have been independent and will continue to be independent and that they have nothing to do with the telephone company or the Western Union and do not propose to have.

RESIGNATIONS AND APPOINTMENTS.

Mr. W. H. Stansell has been appointed manager at Wilmington, N. C., vice Mr. E. H. Bass. Mr. Stansell was for several years manager for the Western Union Telegraph Company at Johnson City, Tenn., but resigned that position to accept the managership of a steam laundry in that city. After nine months separation from the service, however, he decided to return to the work which was more to his liking.

The Cable.

According to its usual custom the Direct United States Cable Company distributed its desk calender pads at the beginning of the year. The familiar form is still adhered to and the new calender fills very acceptably the space reserved for its predecessors in so many business houses, offices, banks and other public places.

The negotiations between the British telegraph authorities and the Norwegian Department of Public Works resulted in an agreement that the cable line between the two countries should in the future be carried on by themselves, the British administrative authorities making the necessary agreement with the telegraph company for the sale of the cable at its actual value. It is the intention to reduce the rate from six cents to four cents per word.

Director Hefstye, of the Norwegian state telegraph system, has been in London for some time arranging the details of an agreement between the British and the Norwegian Governments for the establishment of a new British-Norwegian telegraph cable between Peterhead, in Scotland, and Egersund, Norway. On February 2, 1905, the two Governments agreed that the franchise of The Great Northern Telegraph Company should not be renewed after January 1, 1911, without negotiations between the two Governments for the establishment of a new line. The original franchise was given in 1869 and renewed January 1, 1881, for thirty years.

Lower Cable Rates for Canada.

The Hon. Mr. Lemieux, postmaster general of Canada, has had introduced in the House of Commons of the Dominion a bill having for its object the substantial reduction of cable rates charged by companies handling messages to and from Canada.

The bill proposes to place the control of rates for wireless and cable messages under the railway commission on the same principle as now obtains in the case of telephone and telegraph companies. It is expected that concurrent legislation will be passed in the British Parliament, enabling the Canadian law to apply to all messages received in Canada as well as those sent from Canada.

Pending the establishment of a state owned cable between Canada and the motherland, which is the ultimate object of the postmaster general, the present measure will go a long way toward securing the desideratum of cheaper cable rates. It is asserted the present rate of ten cents a word on press messages can be considerably cut down and still leave a fair margin of profit for the cable companies, which have now by agreement an arbitrary rate.

Mr. Lemieux believes that the rate for press messages can be cut down to six cents a word and the rate for deferred commercial or personal messages to twelve cents per word.

Municipal Electricians.

Mr. T. C. O'Hearn, city electrician of Cambridge, Mass., has asked for an appropriation of \$4,500 to repair the fire-alarm and police telegraph system of that city.

The police commissioner of Binghamton, N. Y., has recommended the installation of a police telegraph system in that city for the protection of outlying districts, which are not frequently patrolled by policemen.

Mr. Clarence R. George, city electrician of Houston, Texas, states that the new underground fire-alarm system which is being installed in that city will be adequate to care for the needs of a city of 300,000 population.

The fire-alarm and police telegraph system of Peoria, Ill., which has been in use for the past twenty-five years is in a badly dilapidated condition and City Electrician W. E. Wolgamott has recommended that a new system be installed at a cost of \$18,000.

Several important improvements have been added to the fire-alarm and police telegraph systems of Reading, Pa., during the past year under the direction of Superintendent W. C. Matthias. A red light system for calling patrolmen has been installed and the local battery police telephone system has been changed to a common battery system and a new switchboard placed in service.

At the annual meeting of the Gamewell Fire Alarm Telegraph Company, held January 18, the following officers were elected: W. H. Woolverton, president; William Gellatly, vice president and general manager; W. W. Bowes, treasurer, and Charles W. Cornell, secretary. The retirement of Mr. Joseph W. Stover from the presidency and active connection with the affairs of the company is viewed with great regret by his many friends. Mr. William Gellatly, who, in addition to his former duties as general manager, now assumes the vice-presidency of the company, is well known in telegraphic circles, having been prominently identified with the Western Union time service before becoming connected with the Gamewell Company seven years ago.

A conference of company agents was held at their executive offices, New York, on January 24 and 25, at which representatives were present from Seattle, San Francisco, Kansas City, Chicago, Cincinnati, Pittsburg, Boston and Montreal.

Mrs. Isabelle McMurray Freeland of Marion, Ohio, wife of Mr. J. W. Freeland, the well-known old time and military telegrapher, has recently issued a very attractive little booklet containing about sixty short poems of which she is the author. Among these are the two poems dedicated to Colonel Robert C. Clowry and Colonel William Bender Wilson, respectively, and read at the 1908 Niagara Falls reunion, and the 1909 Pittsburg reunion of the Old Time and Military Telegraphers.

The Telephone.

The Railroad Commission of Pennsylvania has directed its attorney to make an investigation of the telephone companies in that state in order that such recommendations as they may consider proper in regard to the control of these corporations may be made to the next session of the Legislature.

Some of the business men of Rochester, N. Y., are circulating a petition asking that the city government take steps to acquire the franchise of the Rochester Telephone Company and operate their system. This action has been taken as a result of a proposed increase in rates by the Telephone Company.

The British Post Office authorities have made arrangements, whereby letters posted in the provinces on Saturday, with a special superscription, may be telephoned to subscribers in the London district early on Sunday morning. A special fee of three pence per thirty words is charged for this service.

It is reported that Pittsburg will be the headquarters of the Continental Telephone and Telegraph Company, the recently incorporated \$50,000,000 concern whose object is to merge all of the independent telephone interests in the United States. This company, of which Mr. John A. Howard, of Wheeling, W. Va., is president, has already acquired the majority of the independent telephone plants in Pennsylvania and some other Eastern States.

The receivers and re-organization committee of the Illinois Tunnel Company of Chicago have authorized a plan to expend \$2,500,000 in establishing an independent telephone system in Chicago. The Illinois Tunnel Company holds a franchise to use the streets for the purpose of establishing a telephone system but the franchise becomes void if at least 20,000 telephones are not in service by June 1, 1911. As soon as the financial plan is approved by the courts work will be started. An automatic system will probably be installed.

Mr. Wilson S. Chapman, secretary and treasurer of the Central Union Telephone Company, Indianapolis, is one of the pioneers in the telephone business as well as being formerly in the telegraph service. Mr. Chapman was born at Tiltonville, Jefferson County, Ohio, August 20, 1842, and first entered the telegraph service at St. Louis in 1862 as clerk in the United States Military Telegraph Corps, later becoming cashier and serving with that organization until the close of the war. He then acted as supply agent for the Western Union and later chief clerk in the office of the general superintendent at Chicago where Colonel Robert C. Clowry occupied that office. In 1879 when the Bell Telephone Companies were being organized he became secretary and treasurer of the Western Telephone Company, afterwards the Central Midland and finally the present Central Union Telephone Company. This position he has occupied continuously to the present time.

The Western Telephone and Telegraph Company, a subsidiary of the American Telephone and Telegraph Company has sold \$10,000,000 of five per cent. two year notes the proceeds of which are to be used to refund the floating debt of the company which is held by the parent concern. The notes were offered at 99½ and found a ready sale. The Western Telephone and Telegraph Company is a holding concern owning eighty per cent. of the stocks of the Northwestern Telephone Exchange Company of Minneapolis, the Southwestern Telephone and Telegraph Company, the Wisconsin Telephone Company, and the Cleveland Telephone Company.

Among the recent New York visitors coming here in the interest of the telephone service were: Mr. E. C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company, San Francisco; Mr. B. E. Sunny, president of the Chicago Telephone Company, Chicago; Mr. W. T. Gentry, president of the Southern Bell Telephone Company, Atlanta, Ga.; Mr. H. J. Pettengill, president of the Southwestern Telephone and Telegraph Company, Dallas, Tex.; Mr. C. S. Gleed, president of the Missouri and Kansas Telephone Company, Kansas City, Mo.; Mr. L. G. Richardson, president of the Central Union Telephone Company, Indianapolis, Ind.; Mr. B. L. Kilgour, vice-president and general manager of the Cincinnati and Suburban Bell Telephone Company, Cincinnati; Mr. E. B. Field, president of the Colorado Telephone Company, Denver; Mr. J. F. Caldwell, president of the Cumberland Telephone and Telegraph Company, Nashville, Tenn.; Mr. C. E. Yost, president of the Nebraska Telephone Company, Omaha; Mr. G. E. McFarland, president of the Iowa Telephone Company, Des Moines; Mr. N. C. Kingsbury, president, and Mr. B. W. Trafford, vice-president and general manager of the Michigan State Telephone Company, Detroit; Mr. E. D. Nims, president of the Pioneer Telephone and Telegraph Company, Oklahoma; Mr. H. B. Lane, president of the Rocky Mountain Bell Telephone Company, Salt Lake City; Mr. A. Burt, president of the Wisconsin Telephone Company, Milwaukee; Mr. F. H. Bethell, vice-president of the Bell Telephone Company of Pennsylvania, Philadelphia; and Mr. J. N. Keller, vice-president of the New England Telephone and Telegraph Company, Boston.

All of those mentioned, together with Mr. Edward J. Hall, vice-president of the American Telephone and Telegraph Company; Mr. H. B. Thayer, vice-president of the American Telephone and Telegraph Company; Mr. U. N. Bethell, vice-president of the New York Telephone Company; and Mr. C. G. Du Bois, controller of the American Telephone and Telegraph Company, left New York Friday morning, January 28, to spend the week end as guests of Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, at his country home at Lyndonville, Vt.

Mr. E. G. Tillotson, president of the Cuyahoga Telephone Company, Cleveland, Ohio, has resigned and will be succeeded by Mr. Charles A. Otis, a well-known financier of Cleveland.

According to the terms whereby the Continental Telephone and Telegraph Company will obtain control of the Rochester Telephone Company, the Continental Company pays \$100 per share for 3,000 shares of stock in the treasury of the Rochester Company upon condition that they also be given the privilege of buying 1,000 shares of the outstanding stock at \$30 per share. This will give them 4,000 shares of stock out of a total issue of 7,894.

Press Association Changes.

Two new press associations, with headquarters at 200 William Street, have been organized recently. One of these, the International News Service, supplies reports for morning papers, and the other, the National News Association, supplies reports for the evening papers.

Simultaneously the Hearst News Service, the American News Service and the Hearst Syndicate have ceased to exist.

S. S. Carvalho is president of the International News Service and E. H. Clark of the National News Association, and the two new organizations have as their general manager Richard A. Farrelly, who had been general manager of the three old organizations since the retirement of Curtis J. Mar from that position.

General Mention.

The thirty-second annual ball of the Boston Telegraphers' Mutual Aid Association occurred in that city January 28. Like the preceding occasions of this nature it was a great success.

The International Bureau of the Telegraphic Union, Berne, Switzerland, has recently issued a new list of the telegraph offices of the world. They have also prepared a map showing the telegraph cables and lines of the world.

At the annual meeting of the Atlantic Telegraph Company, held January 12 at Portland, Me., the following officers were elected: Dr. Seth C. Gordon, Portland, Me., president; John J. Hogan, Lowell, Mass., vice-president; and Howard Winslow, Portland, Me., clerk.

The sixth annual meeting of the Wood Preservers' Association was held at the Auditorium Hotel, Chicago, January 18. A large number of papers bearing upon different phases of the subject of wood preservation were presented for the consideration of those present.

Trade Notes.

The total sales of the Western Electric Company for the fiscal year ending November 30, 1909, amounted to \$46,000,000, as compared with \$33,000,000 for the preceding year.

Among the recent publications issued by the Western Electric Company is a booklet describing their latest type of magneto telephone set.

Press Rates in Canada.

On November 15 the Canadian Railway Commission held a hearing at Winnipeg of a complaint of the Western Associated Press against the Great Northwestern Telegraph Company and the Canadian Pacific Railway Company's Telegraph regarding rates. The Western Associated Press is a combination of the Winnipeg daily papers, which does not take the report of the Associated Press, but gets specials from St. Paul and other points addressed to the "Western Associated Press." These they distribute to the different papers. On this incoming matter they claimed that they were entitled to the regular rate charged individual specials to single papers, instead of Press Association rate. The Board decided in favor of the telegraph companies on this point.

In order to offset to some extent the expenses incurred by the Winnipeg papers in getting specials from the United States, they arranged to forward these despatches to certain other papers at different points in Western Canada. At first the telegraph companies charged regular newspaper special rates on these despatches, but later on agreed to handle a daily service to certain papers for a specified number of words at flat rates. These rates were the same as those for which the Canadian Pacific Railway Company were supplying regular Associated Press despatches at different points in the same territory but with this exception that the Associated Press service was not limited to any number of words. The contention of the Canadian Pacific Railway Company was that it bought and owned the news of the Associated Press throughout Canada and sold it at different points to newspapers at certain rates, that these rates were not for carrying the despatches, and they could even give away the press news free if they so desired; but that for the Western Associated Press the charge was a carrying charge. The Board has decided that these weekly and monthly flat rates, which have been in use throughout Canada for thirty-five years or more, are in violation of the tariff clause of the Railway Act and has prohibited their further use and instructed that a tariff of tolls must be filed not later than February 1 covering this class of work.

The result of this decision will mean that the newspapers throughout the whole of Canada (which have been enjoying exceedingly low rates on their Associated Press despatches) will have their expenses very largely increased and they are expressing great dissatisfaction. The Winnipeg papers apparently never realized that their complaint might prove to be a boomerang.

Mr. A. H. Ginman, manager of the Marconi Wireless Telegraph Company's station at Siasconset, Mass., in renewing his subscription recently says, "We subscribe to numerous publications but I may add that Telegraph Age is the one paper that we feel we cannot do without."

Radio-Telegraphy.

A new wireless station equipped with the Bellini Tosi directive system has recently been constructed by the French Government at Boulogne.

A patent, No. 946,230, for a keyboard operating mechanism for type printing by wireless telegraphy has been secured by H. Knudsen and H. Barta of London, Eng.

At the Chicago Electrical Show, which began January 15 and lasted until January 29, the United States Signal Corps gave an interesting demonstration of the use of wireless, having two complete sending and receiving stations in use, one on the ground floor and the other on a Wright aeroplane which was suspended near the roof of the large Coliseum annex in which the show was held.

To prove his assertion, which was doubted by some that a high and widely extended aerial was not necessary for a wireless receiving station. Mr. E. N. Pickerill, manager of the wireless station on the roof of the Waldorf-Astoria Hotel, New York, recently received messages by connecting his receiving outfit to a typewriter in a large office building and using a nearby steam radiator as a ground.

Mr. Lee DeForest has been engaged for some time past in developing a telephone transmitter for use in connection with radio-telephony. The new transmitter is operated by direct current at 600 volts in series with a resistance. A water circulating system is combined with the apparatus which allows it to carry a current of two to four amperes without appreciable rise in temperature.

Rear Admiral Cowles, chief of the Bureau of Equipment of the United States Navy has recommended to Congress that wireless apparatus of the latest type be supplied to all of the new vessels of the Navy including torpedo boat destroyers and all auxiliaries. A shore station at Dutch Harbor, Alaska, is also recommended to connect with the station at Nome and thus enable vessels from Nome to California to keep in constant touch with the shore.

At the regular monthly meeting of the Wireless Institute of New York held January 5, Mr. L. R. Gleason presented an interesting paper upon "Measuring Instruments and Measurements in Wireless Telegraphy." Various forms of wave meters were described and discussed. Fleming's cymometer was described as representing a typical wave-length measurer, and the fact that its scales give direct readings of the three interdependent functions, wave-length, frequency and oscillation constant, was emphasized. It was also brought out that in this instrument the scale divisions are uniform, which characteristic allows equal accuracy in readings throughout the range of the apparatus, and renders calibration a simple matter.

A patent, No. 945,475, for an aerial for the transmission and reception of electromagnetic wave energy has been granted to Richard Pfund, of New York. A hollow structure poorly conducting with the energizing machinery located in and around its face and an aerial symmetrically supported from the top to earth connections symmetrically arranged around the base.

The New Zealand House of Representatives has authorized the adoption of regulations requiring passenger vessels to carry wireless telegraph apparatus. The New Zealand Government, however is standing out against the recent movement to connect up the Pacific Islands, Australia, and New Zealand by a system of wireless telegraphy, as they wish to await new developments in the art.

In a recent article in the "Physical Review" Mr. G. W. Pierce describes the action of various substances used as crystal rectifiers for electric oscillations. Anatase, an octahedral crystal of titanium oxide, was found to rectify very readily when subjected to a contact pressure of about two kilograms, giving much larger currents with a smaller applied voltage than carborundum. Extensive experiments with molybdenite showed that the rectification effect was more nearly perfect when one of the contacts between the molybdenite and the electrode had a high resistance. At a current of ten milliamperes the rectification was practically perfect, the current in the opposite direction being only about two hundredths of a milliampere. While it is generally believed that the rectification effect of this class of detectors is due to a thermo-electric effect the author brought out in his experiments with molybdenite evidence to show that in this case rectification could not be accounted for by thermo-electric action.

Patents Nos. 946,166, 946,167 and 946,168 for space telegraphy have been granted to J. S. Stone, of Cambridge, Mass. The first is for a power circuit, a sonorous circuit, a radiating system, and a circuit connected across the generator of the power circuit, including a condenser with a metal connection from one armature of the condenser to the frame of the generator. Protects electrical apparatus from excessive currents. The second is for developing waves by a plurality of oscillating circuits, each having a condenser and an inductance coil and in parallel with a spark gap, together with an elevated conductor having a plurality of parallel branches, each associated with a different oscillating circuit; also a circuit of large resistance and high unidirectional e. m. f. connected to the terminals at the spark gap. The third is for increasing the power factor of the primary power circuit. A space telegraph with a sonorous circuit, a discharger therefor, a power circuit and a transformer with primary connected to power circuit and secondary to sonorous circuit, together with means associated with the power circuit for increasing its power factor.

A Comparison of the Telegraph and Telephone.

BY D. B. GRANDY, ST. LOUIS.

As one who gives advice is always gratified when it is adopted, I am pleased to see the Age expand. The change of name is in line with the new policy, and better expresses the aims and ideals which the Age seeks to attain.

As an old telegrapher, I cannot but regret the passing of the telegraph. In the old days, before the advent of the typewriter and the various sending machines, it possessed a fascination such as no other occupation offered; a fascination which always lingered. And though the telegrapher might rise to great wealth and high position, as he frequently did, he never escaped that fascination, or forgot the associations of the days at the key.

I use the expression "passing of the telegraph" in its larger sense. Already it is far outclassed in mileage and importance as a means of communication by the telephone; and while I believe it will remain for an indefinite period an important factor in communication, its relative importance as compared with the telephone will steadily diminish.

For communications not requiring an answer, or to which a definite answer can be given in a few words, and for which the mail is too slow; for press telegrams over long distances; and for private leased wires, it could not, under present conditions, be dispensed with economically. But for communications for which a personal interview would be advantageous, or in which sentiment is a factor, and for press telegrams over short distances, where telephone transmission is distinct, the telephone is immeasurably superior, both practically and economically.

On a good telephone circuit of say not exceeding 250 miles, a reader at one end and stenographer at the other easily handle from 1000 to 1500 words in twenty to thirty minutes.

For railroad work, especially train orders, I was at first prejudiced in favor of the telegraph, but, with the safeguards used to insure correctness in the transmission of orders, the telephone is apparently answering every requirement of safety in this kind of work, and its use is rapidly extending.

With these facts in view, it would be a bold prophet who would, under present conditions, venture to predict the future. I believe the present distance limitations of telephone transmission will be steadily extended, with an accompanying improvement in all branches of the service. While the field of the telegraph is, and must necessarily continue, limited, that of the telephone is, apparently, absolutely unlimited, or if there are limitations, they are so vast that it is difficult to form a conception of them.

Report of the Chief Signal Officer of the United States Army.

The report of the chief signal officer of the United States Army, Brigadier General James Allen, for the year ending June 30, 1909, is an interesting document comprising twenty-eight pages and illustrated with a large-sized map

showing the cable and land lines of the United States Signal Corps in Alaska and the lines in Canada connecting therewith. The receipts of the lines for the year amounted to \$222,888, and government business to the volume of \$188,782 was handled. Because of the increasing business over the land lines between Valdez and Fairbanks it was found necessary to construct an additional line between these two points, a distance of 367 miles. Ten kilowatt wireless stations were established at Nome and Fort Gibbon, three kilowatt stations at Fairbanks, Fort Egbert and Circle, and one kilowatt stations at Wrangell and Petersburg. The wireless service has been so satisfactory that it is believed when a few contemplated improvements have been completed it will be possible to abandon a land line between Fort Egbert and Gulkana, a distance of 291 miles. This line is an especially expensive one to maintain. The amount appropriated for maintaining this branch of the army was \$285,000. \$236,368 was spent in improvements and extensions of the Alaska Military Telegraph and Cable System and \$145,578 in maintenance of fire control installations at seacoast defences. In extending these installations \$205,612 was expended. The report is very complete in its details of the work accomplished and shows the efficiency of this branch of the military service.

What Our Friends Say Regarding This Publication.

Mr. J. W. Atkins, manager of the Western Union Telegraph Company, Key West, Fla., in renewing his subscription for another year, says: "You are publishing a first class paper, full of both pleasure and profit to an appreciative mind."

Mr. S. B. Gifford, of Syracuse, N. Y., formerly and for many years superintendent of the Western Union Telegraph Company at that place, writes concerning this publication: "I am pleased to note the enlargement and steady improvement of the Age."

Mr. T. P. Masters, of Vancouver, B. C., in renewing his subscription, says: "I doubt if any publication is looked forward to with more interest than the coming of the 'Age,' and congratulate you on being the Editor of a publication of which this can be truthfully said."

Mr. Charles Shirley, assistant superintendent of traffic of the Postal Telegraph-Cable Company, New York, in renewing his subscription recently, says: "I have been saying a good word for the Age twenty-six years. I don't see how any telegraph man can get along without it."

Mr. Edward W. McKenna an old timer and military telegrapher, who has been prominent in railroad circles for many years and is now vice-president of the Chicago, Milwaukee and St. Paul Railway, in renewing his subscription recently, writes: "I find your paper very valuable in keeping me in touch with the associates of my early life."

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FEBRUARY 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

New Methods Will Benefit Operators.

The increase in the use of machine telegraphy and the probability that the telephone will in the future be used to a large extent in handling messages between points which are not far apart or between which the business handled is very small ought to be looked upon with satisfaction by the profession at large. The use of these methods cannot help but prolong the life of the operators and render the performance of their duties easier and pleasanter. At the present time a man working on a busy circuit in a large office has to remain at his desk for eight or ten hours at a time with, in many instances, a rest of only a half hour or even less. The position which he must assume when receiving is necessarily a cramped one, as he has to bend over to keep his ear close to his sounder in order to hear its sound above that of the many others which are in the same room. The necessity of assuming such an unnatural and unhealthy position for long periods every day for years cannot help but tend to shorten the life of the operator.

With machine telegraphy all of this is changed.

The attendant does not have to assume any fixed position in order to discharge his duties successfully. He can assume a natural position, and does not have to fear having to interrupt the sender every time he moves. In using the telephone, too, either in receiving or sending, the operator has his receiver held closely over his ear and can move about freely without any fear of interruption. In sending he can even stand if he desires, and thus change his position practically at will. He will thus be enabled to perform his duties with much less nervous, as well as bodily strain, than at present, and will live longer and enjoy better health in general.

Unfortunately, the younger operators, those who are now in their prime and are able to perform the strenuous duties required, do not realize this phase of the situation, but are rather inclined to view anything which tends to do away with the use of Morse as something which is going to take away their livelihood. That this view of the matter is not by any means the correct one has been shown in the case of the railroads who have adopted the telephone for train despatching. When this innovation was first suggested it met with much opposition on the part of the railroad telegraphers who believed that if the change was made they would lose their positions or be required to accept lower wages. As the new system has come into operation on many railroad systems, however, and the companies have shown no inclination to reduce the wages of their employees or to call in cheaper help to take the place of the telegraphers this feeling of hostility on the part of the operators has gradually disappeared and we find that some of those who were at first most opposed to the adoption of the telephone are now among its strongest supporters.

There is no reason why a similar state of affairs should not result in the commercial field. One of the principal requirements of the telegraph service is accuracy and this cannot be obtained except by employing in the service as good a class of labor as is now employed, even though machine telegraphy or the telephone come to replace the Morse operation of the wires.

Will Large Cities Always Exist?

A writer in a New Orleans daily comments editorially upon the claim put forth by some economists that there is no longer any need of people living in large cities; that because of the development of the telegraph, telephone and railway facilities and of long-distance power transmission our factories could be located much nearer the points where the raw material is produced and in this way a great saving effected in transportation charges. While admitting the truth of this part of the proposition, it is pointed out that on the other hand if this scheme were carried into effect we would have our entire population divided up into small communities each one engaged in one particular pursuit. In one town we would have nothing but cotton mill operatives, in another no-

one but shoemakers, and in another no one but steel and iron workers, etc. This would largely narrow the outlook and opportunities for everyone. It is by coming in contact with men who are engaged in other businesses than ours that we acquire a broader view of life and receive inspiration for our daily tasks. If we were constantly surrounded by those doing the same things that we were doing our tasks would soon seem to us mere commonplaces and the carrying on of one's labors would become merely a mechanical action and life would lose a large part of its interest. There are thousands of people living in New York who have to work long hours and under the most unfavorable conditions in order to make only the poorest kind of a living, yet these same people would absolutely refuse to go to the country or a small town if they knew that there they could have comfortable homes without working nearly as hard, but would not be able to see nearly as many people as they do now. In summing up the question it is evident that no matter to what extent telegraphic, telephonic or railway facilities may be developed the large city will always be a social necessity if not an economic necessity. Man's nature is essentially social and anything which tends to destroy this will be a step backward toward barbarism rather than an advance toward a higher degree of civilization.

Messenger Boys Do Not Become Tramps.

The statement regarding messenger boys being thrown out of employment by the telegraph and messenger companies and becoming tramps after they reach the age of eighteen, made by Mrs. Florence Kelly, Secretary of the National Consumers' League to the Legislative Committee Investigating Employers Liability and the Problem of the Unemployed, is arousing a storm of protest. Her statements are far from being correct. Mr. John C. L. O'Reilly, manager of the United District Messenger Company, New York, has written the following reply, which has been published in one of the daily papers:

"I am inclined to think that Mrs. Kelly has either been misinformed or did not investigate the matter thoroughly.

"I will admit that some messenger boys go astray, just the same as boys employed in other lines of business, but how many tramps are there to-day who never were messenger boys?

"Some of our most prominent men of to-day were messenger boys, and they are not ashamed to admit it. Andrew Carnegie, for instance, will tell you that he worked for \$3.50 per week as a messenger boy. If you want to see some ex-messenger boys who are holding good positions at present pay a visit to Wall Street. There are about twenty members of the New York Stock Exchange who started as messengers. There are cashiers of brokerage houses, also of banks and commercial houses. There are many men holding public offices at Washington, Albany, and Boyst, James F. Crate, W. M. Gove and Morris in our own City Hall who were messenger boys.

One-third of our brave firemen and patrolmen were messengers.

"Time will not permit me to mention the names of men in all walks of life who were messenger boys and are not ashamed to admit it. The statement that boys were thrown out when they reached the age of eighteen is far from being correct. It is ridiculous. I have in my employ one boy who is under eighteen, all the others are over nineteen. I have never heard of a manager throwing a boy out because he was getting older.

"All officials of the telegraph and messenger companies have been messengers, and they are all over eighteen years of age, and have not been thrown out. Many of our newspaper men were messenger boys, and they are not tramps either.

"If boys do go astray and become tramps, who is to blame? Certainly not their employers. Sometimes it is the fault of the parents, who do not know how to bring children up. They never think of sending them to church or Sunday school, but they always manage to find time to let them attend some moving picture show or a dance hall.

"I was a messenger, and am over eighteen and am not a tramp."

How to Make the Telegraph and Telephone Systems More Valuable.

With the consolidation of telegraph and telephone interests the problem which confronts many of those concerned with the operation of these two great industries is how the two can be operated in such a way as to confer the greatest possible benefit upon each other. While some of the higher executive officials of the two industries are already actively engaged in studying this question there is no reason why those occupying minor positions should not also devote some of their energies to the solution of this problem. The men who are in the operating end of the business and are constantly coming in contact with the public often see opportunities for improvements in the service which would never be discovered by one who was studying the situation from a theoretical standpoint. The columns of *Telegraph and Telephone Age* are open to anyone in either the telegraph or telephone service who has suggestions to offer upon this subject. Many good ideas emanate from those engaged in handling the business at the smaller points and we will be glad to publish any of these for the benefit of the service at large, giving the author due credit therefor.

Mr. Willis H. Jones, the well-known author of the articles entitled "Some Points on Electricity," appearing in this publication for the past fifteen years, is the possessor of several very interesting scrap books containing samples of handwriting of those who were connected with the telegraph service thirty-five years ago. Some of these specimens, all of which are written on telegraph blanks, are fine examples of penmanship. Among the most noteworthy are those of J. F. Shive, Thomas J. Bishop, Robert W. Martin, Jerry Borst, James F. Crate, W. M. Grove and Morris Brick.

Anniversary Dinner of Serial Building Loan and Savings Institution.

The twenty-fifth anniversary of the founding of the Serial Building Loan and Savings Institution was most fittingly celebrated by a dinner held at the Hotel Astor, January 20, which was attended by over one hundred and thirty-five members and guests. After those present had enjoyed a most appetizing repast and coffee had been served, President John C. Barclay gave the following brief outline of the history of the organization:

"We are gathered here to-night to celebrate the twenty-fifth anniversary of the Serial Building Loan and Savings Institution. The thought, out of which this Association grew, had its inception in the organizing of the Telegraphers' Mutual Benefit and Gold and Stock Associations for the insurance of telegraphers and of the Aid Society for their assistance in time of sickness. To afford him an opportunity to save and to stimulate him to the effort to put away in a safe place for the rainy day or old age, that percentage of his earnings which every man ought to save, as a duty to his family, this Loan and Savings Institution was organized. It took five years of agitation and education to put the organization on its feet, as co-operative saving was at that time unknown in New York.

"That success soon attracted widespread attention in the city and many successful associations now doing business in New York, testify to the timeliness of its organization. During its twenty years of existence the Serial Association has preferred to do business for, with, and by telegraphers, although sound financial judgment from the outset decreed that its clientele should not be exclusive.

"Upwards of 5,000 people have been members of the Serial during the past twenty-five years, and 1011 persons are on its roll at this time. Those people have contributed in small systematic savings in sums of one to fifty dollars a month, or a total of over \$4,500,000. No man who ever entrusted a dollar to its safekeeping has received back less than a dollar, and over \$4,000,000 have been returned to those who have withdrawn. The Institution has never lost or misused a single dollar placed in its hands by a member and has, in fund, \$110 for every \$100 that is due our members. It has encountered two great general financial panics and one building loan panic, due to the errors of management in other similar institutions whose names are now lost to history. It did not close its doors for a single day and, thanks to the great confidence of the members in the Institution itself, we have met promptly their necessary demands upon us.

"Our investments are made solely on the security of first mortgage loans. These loans are made almost entirely upon homes occupied by members of the Institution. Over eleven hundred of these loans have been made, of which a great

number have been repaid by our systematic saving plan and their homes cleared of all encumbrance.

"In the early years of the association it was the aim of the Institution to have the members clear their homes of the encumbrance in ten years. This was found to be too great a burden, and the system has been gradually changed so that a member practically has the option of clearing his home in from twelve to twenty years.

"The Institution is still young and vigorous. We enrolled during the past year 87 members, more than we lost by withdrawal and maturity. We made a gratifying gain in new business, which speaks volumes for the future, and are bound to keep the old Institution in the front rank.

"The management of the Serial Building, Loan and Savings Institution is performing a noble work and deserves the recognition and support of every one connected with the telegraph and telephone companies, including the presidents and other high officials, not only because it stimulates saving and has been the means of providing many homes for its members, but also for the reason that seventy-five per cent of its members are employed in the telegraph service.

"I am proud to report that during my term of office the membership has increased considerably. Of course this growth has not resulted from my individual efforts alone, but the credit is largely due to the perseverance of our Secretary, Mr. E. F. Howell, the directors and their associates, as well as to the hearty co-operation of every member of the Institution. Mr. Howell is recognized as one of the best informed men in the United States to-day on matters pertaining to building associations, and it is to his untiring efforts, to his conservative methods and great knowledge of its affairs that the Institution is largely indebted for its position at the head of all associations of its kind.

"We are honored by the presence of a number of gentlemen, some of whom have been prominently identified with the Institution in the past and instrumental in laying the foundation for a success that every member should be proud of, and it is my privilege and pleasure to extend to these gentlemen the thanks of the Institution, not only for what they have done for it in the past, but also for the kindly interest manifested in honoring us with their presence to-night. Among these gentlemen is one I desire to mention in particular, one you all know, love and respect, because of his sterling qualities, of his kind and righteous dealings with all mankind, including his associates and employes when he was filling a high position in the telegraph service, and his devotion to all with whom he comes in contact to-day. To this gentleman our Institution, which has been the means of providing over eleven hundred homes for the families of our members, is greatly indebted, for he was one of the founders and its

first President. I feel it an honor to have later served the Institution as President and to share with him the pride he must feel in realizing that to-night we are celebrating the twenty-fifth anniversary of the Serial, and that it is on the road to greater success than it has achieved in the past.

"I refer to James Merrihew, and ask you to join me in a toast to his good health."

Mr. Merrihew spoke briefly upon his part in the founding of the Institution and the objects of the founders. He was followed in the order named by Mr. W. J. Dealy superintendent of the commercial news department of the Western Union Telegraph Company; Mr. D. B. Hutton, formerly president of the New York State League of Co-operative Savings and Loan Associations; Mr. C. P. Bruch, vice-president of the Postal Telegraph-Cable Company; Mr. R. H. Davis, Hon. W. L. Durack, Mr. U. N. Bethell, vice-president of the New York Telephone Company; Mr. T. J. Skuse, president of the Metropolitan League of Co-operative Savings and Loan Associations and former State Senator Walter C. Burton. All spoke in most favorable terms of the work of the Institution, and expressed the belief that the next twenty-five years would show much greater advancement and greater usefulness for the Serial than the past twenty-five. Mr. W. J. Dealy took occasion to pay a tribute to the ladies, many of whom were present, and ascribed the large measure of success of the Serial to their co-operation. He said that the association had not only built homes, but had built character among its members as well. Mr. R. H. Davis stated that he was celebrating the twenty-fifth anniversary of his entrance into the telegraph service, having graduated from the rank of messenger to that of operator at Virginia City, Nev., twenty-five years ago. While in that office he was often in charge owing to the incapacity of the manager, and one day Mark Twain came into the office for the ostensible purpose of paying a sum of money which he owed the manager. The characteristic way in which the well-known humorist told of his business convinced the young operator that he must be crazy, and soon after he left the telegraph to enter the newspaper field. That he has always kept in close touch with the telegraph, however, was evidenced by the many stories he told of the late John W. Mackay, Thomas A. Edison and others prominently connected with the service.

Mr. U. N. Bethell, in a very entertaining manner, contrasted the means of communication of to-day with those existing before the telegraph and telephone were invented. He expressed the hope that the recent tie formed between the telephone and the telegraph would grow closer and stronger in the years to come. He said that those engaged in the transmission of intelligence were concerned in the most important factor in our commercial life.

Among those present were the following:—

Miss C. L. Ames, Mr. and Mrs. W. E. Athearn, J. Austin, J. C. Barclay, U. N. Bethell, Mr. and Mrs. James R. Beard and daughter, George W. Blanchard, E. E. Brannin, T. M. Brennan and daughter, C. P. Bruch, T. A. Brooks, Mrs. H. P. Brown, W. C. Burton, E. S. Butterfield, W. H. Butterfield, John Schuyler Casey, P. J. Casey, Col. A. B. Chandler, Miss M. G. Charlock, J. F. Cleverdon, Fred Cleverdon, Martin S. Cohen, Miss Sophie Cohen, Mrs. F. Cudmore, Miss E. Currie, R. H. Davis, W. J. Dealy, Frank J. Dealy, John Doran, L. F. Dowling, Hon. W. L. Durack, H. E. Dunham, Mark L. Dunn, W. Diegan, Mrs. J. E. Esray, James T. Farrelly, Miss Maude Finley, Miss Emily Finn, Miss Adelaide Finn, A. V. Finn, Mr. and Mrs. T. E. Fleming, W. E. Fleming, Mr. and Mrs. Fries, Mr. George Griswold, W. L. Gechr, F. D. Giles, Mrs. Kate Gillier, Maxwell Green, Stanley Gross, Miss Haberstroee, Samuel Hecht, George B. Hewlett, Miss Higgins, William Holmes, Miss E. Holmes, Mr. and Mrs. E. F. Howell and daughter, Mr. and Mrs. D. B. Hutton, Henry Hyde, Miss E. Hons, Mr. and Mrs. G. Irving, W. H. Jackson, Chas. Jacobson, F. J. Kernan, Mr. and Mrs. C. A. Kilfoyle, H. A. Konninger, G. H. Kemp, J. T. Laidlaw, F. Cyrus Leubuscher, T. A. McCammon, Mr. and Mrs. G. F. McCammon, Mrs. E. McCollum, Mr. and Mrs. A. W. McEwan, Arthur L. McEwan, J. T. Mulhall, Mrs. M. Marker, Mr. and Mrs. R. J. Marrin, R. Matherson, James Merrihew, Mr. and Mrs. W. A. Moore, W. J. Morrison, W. J. Morrison, Jr., R. J. Murphy, C. R. Mignon, Mr. and Mrs. J. F. Nathan, Charles Neuman, Jr., Joseph M. O'Connor, Mr. and Mrs. M. J. O'Leary, Miss Organ, W. J. Quinn, Miss Elsie Rankin, W. E. Rath, Mr. and Mrs. M. W. Rayens and daughters, Mr. and Mrs. J. J. Riley, C. Smearer, Mr. and Mrs. J. B. Sabine, F. J. Scherrer, T. J. Skuse, Miss M. H. Snieder, Miss J. F. Spicer, George F. Stainton, Mr. and Mrs. Stanton, Miss L. H. Thain, J. B. Taltavall and daughter, Charles A. Tinker, Miss E. Tighe, J. B. Van Every, Leonard Van Every, and Mrs. Gertrude Welty.

That a telegram from the King of England to his eldest daughter should go astray seems unlikely, yet this happened to a message sent to the Duchess of Fife, the Princess Royal, who with the Duke of Fife and Princesses Maud and Alexandra recently left London for Egypt. At Marseilles the Duchess asked if a telegram for her had arrived from King Edward. The reply was that no such telegram had been received. The Duchess insisted that it must have come and a diligent search was made at the central telegraph office. This resulted in the discovery of a message addressed "The Princess Royal," which had been indorsed with the official formula stating that although the docks of Marseilles had been thoroughly searched this ship was unknown.

The Military Telegrapher in the Civil War.

PART XXXIV.

Mr. W. H. Eckman, who was well known to the telegraphic profession and who died in 1901, was a prominent member of the United States Military Telegraph Corps during the Civil War, joining the same in 1861 at Cleveland, O., at the age of sixteen, and serving throughout the war and until the disbanding of the corps in 1865. Throughout his connection with the service, Mr. Eckman kept a diary, and in 1878, when Colonel William R. Plum was compiling his history of the United States Military Telegraph Corps, he wrote for him from his diary an outline of the important events which came to his notice in connection with the military telegraph service. His letter in part is as follows:

"What I remember of the dial telegraph, which was used for a time in the military telegraph service, is as follows: In the Army of the Potomac it was in charge of Lieutenant Beardsley of the Signal Corps and was operated principally by non-commissioned officers of that corps. Their officers usually connected corps with division headquarters while the military telegraph lines connected Washington with the base of supplies, the headquarters of the army and the several corps headquarters. They were entirely separate and independent of us until after the battle of Chancellorsville. At that time winter quarters near Falmouth was in connection with headquarters in the field on the south side of the Rappahannock near United States Ford, the Signal Corps people having put up the wire (rubber-covered wire on small poles or lances), and it being turned over to Morse men between these points. The Signal Corps people then extended the line further towards the front to near Chancellor's house, where General Hooker remained during the battle. All business from Falmouth, where part of the staff remained, and from General Sedgwick, who crossed at Fredericksburg, lower down, came to us (James Murray and myself). We handed the messages to the signal people for retransmission. For the two days of the battle business was very heavy, and Harper Caldwell and C. W. Jaques¹ at Falmouth sent it to us so rapidly that we handed the signal folks as much matter every five minutes as they could transmit in an hour. We were obliged to send most of the messages to General Hooker by orderlies, half a company of regular cavalry being detailed for that purpose. The consequence was that the commanding general and his subordinate commanders became totally disgusted at the inadequacy of the Beardslee telegraph, and it was immediately after turned over to our people, that is Dennis Doren, our chief of construction, took charge of all the material and the operators were directed to report to him. The Beardslee dial system was never used to any extent afterward, but their men, under Doren's direction, put up field lines for us to operate and proved in this way a valuable auxiliary to us, especially in the campaign of 1864.

"I arrived at Washington December 26, 1861, in company with operators E. P. Alexander, and Daniel V. Ferris² and reported to Thomas T. Eckert for duty. January 12 I was assigned to duty at McDowell's headquarters at the Arlington House, relieving W. J. Holmes. Charles Douglas was in the office there with me. Two months later I was transferred to Fort Corcoran, opposite Georgetown, some of the operators there being ordered to hold themselves in readiness to accompany McClellan to the Peninsula. On April 7 I was ordered to the Alexandria, Va., office, where I found operators O. H. Dorrance and John McMullin. Later I started by water to join the Army of the Potomac on the Peninsula in company with Operators James B. Norris, H. A. Bogardus and W. H. Shreffler. We arrived at Ship Point April 18, where we all came near losing our lives by being run down by a steamer while crossing Cheeseman Creek in a row boat. On April 20 I was assigned to duty with George Nail at the headquarters of Richardson's division on the left of Yorktown. Yorktown was evacuated early on the morning of May 4, after heavy cannonading by both sides. The operators nearest to the place of course entered as soon as possible with the troops. D. B. Lathrop, one of our operators, had a leg blown off by a torpedo, the enemy having planted large numbers inside the works, and died in a very short time. Two of the operators were selected to accompany his remains to his home in Mount Vernon, Ohio, and a subscription started to erect a monument to his memory.

"On May 7 I was ordered to Yorktown, where I remained awaiting orders. Among other operators here were Thomas Dolan, E. H. McGintey, George B. Cowlam, Joseph Schnell and Andrew Schnell.

"May 10 Dolan and myself walked to Williamsburg, a distance of about ten miles, to find a break in the wire. We had the choice between walking and accepting horses without saddles or bridles. The commanding officer at Williamsburg refused to give his permission to our returning without escort as the country was infested with guerillas and an officer had been ambushed and killed the day previous. We finally concluded to take our chances and returned without a pass and without adventure, not meeting a living soul between Williamsburg and Yorktown. We found and mended the broken wire. May 26 I was ordered to White House and from there to the depot of supplies of the Army of the Potomac at Despatch station, arriving at the latter place on May 27. I was alone at Despatch station until June 1, when Theodore E. Moreland³, from Pittsburg, arrived to assist me. Business was so heavy as to keep me busy night and day. We were in the midst of the Chickahominy swamps and several operators had

(2) Daniel V. Ferris is at present chief operator for the Western Union Telegraph Company at Syracuse, N. Y.

(3) Theodore E. Moreland is now in the Western Union Telegraph service at Pittsburg.

(1) C. W. Jaques is in business at Asthabula, O.

gone home sick, making us very short-handed. The enemy's cavalry under Jeb. Stewart raided our rear between us and our base of supplies at White House on June 13 and our station was in great danger of capture for a few hours. The climate and surroundings soon had their effect upon me and June 20 I was too sick to do duty. Between then and July 3 we passed through the seven days' fight and retreated to Harrison's Landing. I was too sick to care whether I fell into the enemy's hands or what became of me. I was with the headquarters of the army after we left Savage's Station and made my part of the retreat in the headquarters' ambulance. The boys were very kind to me, especially Frank A. Stumm⁽⁴⁾, who was constantly making raids in the country we passed through in search of such things as I might be able to eat. At Harrison's Landing we had no wires and our operators were scattered around considerably, but not at all demoralized. I started for Washington on sick leave on the first steamer from Harrison's Landing, only two or three other passengers being on the boat as it was strictly against orders to permit any one to leave the army. Through the kindness of Chief Quartermaster Ingalls and the strenuous exertions of Harper Caldwell, our beloved Chief Operator, however, I was smuggled through.

"On August 4 I was back on duty at Aquia Creek, Va. J. H. Glazier was there with me and on August 24 we were joined by Thomas Dolan. August 31 Fredericksburg was abandoned by General Burnside, who concentrated his troops at Aquia Creek preparatory to going to Alexandria.

"September 1 Theodore E. Moreland, F. H. Fonda, C. H. Lithgow, J. L. Cherry, W. H. Parsons, and W. D. Gentry⁽⁵⁾ started for Washington, leaving only Doyle and Brodnacht Burnside's operators at Aquia Creek. On September 2 Shreffler and myself were assigned to duty at Chain Bridge, one of the defences of Washington, General Pope having been defeated and the enemy supposed to be making their way into Maryland. We had no supplies except what we succeeded in foraging. My associate, Schreffler, however, was an expert in the latter branch of army life.

"On September 12 I went to join the headquarters of the Army of the Potomac at Rickville, Md., McClellan being again in command and following the enemy towards Frederick. I was accompanied by C. H. Lithgow. We found Caldwell, Parsons, Cherry and J. H. Bunnell at headquarters.

"September 13 we all arrived at Frederick City, where I was assigned at the headquarters of the Army of the Potomac, with Caldwell and Bunnell. We there witnessed the battle of South Mountain. The telegraph corps builders under L. D. McCandless extended the line from Frederick City and we moved with the army as fast as the wire could be put up.

"By September 15 the line had been extended to a point near Boonesboro and we had established an office at McClellan's headquarters. We were then in communication with Washington. September 17, with McCandless I viewed the battle of Antietam from a splendidly commanding and comparatively safe position. On September 21 I moved with the headquarters and established an office one-half mile west of Sharpsburg.

"On September 28 I moved to a new headquarters, camp three miles west of Sharpsburg. The whole army, including the telegraphers, was by this time pretty well tired out, the fighting being very heavy and the telegraphing correspondingly so.

"On October 13 I was transferred to a new camp in Pleasant Valley and sent to General Burnside's headquarters, where I opened an office. While there I received a message from the War Department for General Burnside, offering him the command of the Army of the Potomac, which he declined and expressed the hope that McClellan who, in his opinion, was the best fitted for the post, would be retained.

"On October 17 I was sent to Charlestown, Va., to open an office, but the order was countermanded before I arrived there and I was ordered to General Couch's headquarters on Bolivar Heights, Harpers Ferry, to relieve Charles H. Lounsbury. While there I did not have much to do and made frequent calls on the operators at the Harpers Ferry main office, where Edward Conway and Charles W. Moore⁽⁶⁾ were located. I was next ordered to Sharpsburg, Md., to assist Thomas Dolan, and remained there until December 31, when I was ordered to Washington for duty in the War Department office.

"January 18, 1863, I went to the headquarters of the Army of the Potomac at Falmouth, Va. January 20 I started on horseback with my pocket instrument, for Banks Ford, General Hooker expecting to attack Fredericksburg from that point. This campaign proved a failure. It rained hard continually, entirely defeating the movement of artillery and wagon trains. Until a tent arrived, I had my office on a caisson which was stuck in the mud and abandoned. Lineman Joseph Finnegan and myself had to rough it in the fullest sense of the word, wagon or artillery trains knocking down our wire as fast as we could repair it, and we had to live on hard tack, and sleep with only blankets between us and the mud. January 24 I returned to the headquarters of the Army of the Potomac at Falmouth and thence went to Aquia Creek, where I was assigned to duty with F. T. Bickford and James Murray, relieving Theodore Moreland, who went away on leave of absence.

"On March 1 Operator Charles W. Jaques having resigned and R. H. Ryan being on leave, I was on duty at Aquia with Thomas Dolan. Two days later J. D. Tinney at Stoneman's Siding was

(4) Frank A. Stumm is now a resident of New York city.

(5) W. D. Gentry is now a clergyman residing in Chicago.

(6) Charles W. Moore is at present in the employ of the Western Union Telegraph Company at Omaha, Neb.

relieved by John H. Dwight, who had been detailed from Berdan's Sharpshooters and assigned to the telegraph corps. Tinney went on leave because he was caught napping by General Burnside himself, which so exasperated the latter that he placed him in confinement on a prison ship at Aquia. He released him, however, after a short time. March 8 R. R. McCaine was assigned to duty at the Aquia office and W. H. Shreffler sent to Falmouth Depot to relieve Frank Drummond, who left the service to return to his home in Canada. On the same day the Confederates made a raid on Fairfax Court House and captured Operator Robert F. Weitbrec.

(To be continued.)

(7) Mr. Weitbrec was confined in Libby prison during the remainder of the war. He is at the present time a railroad contractor and resides at Denver, Col.

Early Telegraphy in Belfast, Me.

An interesting account of the early history of the telegraph in Belfast, Me., is related in a recent letter by Mr. E. B. Pillsbury, general superintendent of the Postal Telegraph-Cable Company, New York, to Miss R. T. Newell, manager for the Western Union Telegraph Company at that point at the present time. Mr. Pillsbury says, in part:

"I acted as messenger at Belfast during the latter part of the exciting war period and later I was advanced to the proud position of manager at the age of thirteen, turning the office over to my sister Adelaide when I went to college.

"The original line, carrying one wire through Belfast, was built by the Maine Telegraph Company, which was chartered in 1848, and completed from Portland to Calais, via Belfast, in March, 1849; and the service opened with the late Hiram O. Alden, of Belfast, as president. It was doubtless due to his interest in the undertaking that Belfast was included in the route. This line was a link in the extension of the telegraph from Portland to Newfoundland for the purpose of forming a connection with the first Atlantic cable, which was then in contemplation and which was unsuccessfully submerged in 1855. Up to the time of the successful laying of the second Atlantic cable in 1866 it was customary every two weeks, when European steamers arrived in Halifax, to telegraph the European news from Halifax to New York and, while this long newspaper message of some three thousand words was being transmitted over the wire, the offices where the news was then copied were closed, the doors locked and the public telegraph business through the whole State suspended. At that time the speed of transmission was very slow as the majority of operators could not read the signals by sound but were dependent on the embossed tape. In 1856 the Maine Telegraph Company leased its property to the American Telegraph Company, and in July, 1866, the Western Union Company (a Western corporation)

leased the entire property of the American Telegraph Company. The first office in Belfast was opened in 1849.

"The first operator was William Henry Simpson, afterwards the brilliant and versatile editor of *The Republican Journal*. He was followed by Erastus A. Austin. Mr. Austin taught the art to my brother, Fred A. H. Pillsbury, and turned the office over to him in 1859. He held it until 1863, when he resigned in favor of my sister, Arabella F. Pillsbury, who had been in training but six weeks, and the responsibilities devolving on her were strenuous on account of the establishment of the Provost Marshal's headquarters in Belfast. She resigned in 1869 in my favor, and in 1870 I turned the office over to my sister Adelaide, who held it until 1881.

"The entire telegraph business of Belfast, Rockland, Bath, and the smaller towns, with Portland, Boston and the West, was transacted over the one wire built by the Maine Telegraph Company until the merging of a competing line, known as the International Telegraph Company, with the Western Union Telegraph Company in 1872 or 1873.

Your Part.

John F. Skirrow, associate electrical engineer of the Postal Telegraph-Cable Company, New York, is the author of the following which appears in the January number of the *Postal Telegraph*.

"Are you satisfied to drift with the tide, to idly wait for things to come your way, wondering meanwhile, perhaps, why they delay their arrival so long?

"Are the tools you use good enough for you because they are the kind your forefathers used?

"Do you consider your methods of doing business all right because your predecessor managed to get along that way?

"Do you see no use in wasting your time experimenting?

"If that's the way you feel about things in general and your business in particular you are not on the road to progress, achievement or success.

"If Watt, Stevenson, Fulton, Morse, Bell and Edison, and the tens of thousands of other originators had felt that way—what conditions would you be living and working under to-day?

"It doesn't follow that you must be an inventor in the patent office sense of the word to be a factor in the march of progress; a little thought given to your local problems may enable you to devise new or improve upon old methods, or to eliminate useless expense or work.

"Don't you think it's up to you to do your part towards improving the conditions in your field of action, so that your life will be of some real use in the great scheme of things; and so that you may feel when the time comes for you to depart that your efforts have helped to leave the world better than you found it?"

The Dispatcher's Telephone Circuits.

The telephone has now been in service on the Delaware Division of the Erie Railroad since February 15, last, and on the Meadville-Corry subdivision of the Meadville Division since April 1, and has demonstrated its utility in the most satisfactory manner. Its success on the divisions mentioned, one a double track division and the other single track, is largely responsible for the recent order to equip the Genesee River Railroad with the same apparatus, with a view of still further benefiting by its time and labor saving qualities. These two points in telephone operation have received a remarkable demonstration in the Meadville-Corry installation, where, in telegraph operation with the Mosier Block, the life of the despatcher was indeed strenuous with but ten offices to handle; while under telephone operation the ten offices are handled with ease and at the same time all concerned are kept in closer touch with the constantly changing situation. The rapidity with which orders can be handled under the same safeguards which apply to the telegraph and the almost total absence of labor connected with the selective calling devices fully justify the claims of the telephone engineers as to the superiority of their equipment.

Paralleling each train circuit is a message circuit. The latter shows to the better advantage on the Delaware Division, where the message business of about forty-nine stations and towers is handled with the vim and dash so satisfactory to the telegrapher. The Meadville Division message circuit, serving but ten offices, has little opportunity to show its capacity, but when telephone despatching shall have been adopted for the Corry-Salamanca subdivision the message circuit will probably be extended to Salamanca and more thoroughly prove its value.

While the telegraph has been a splendid system for train despatching it goes without saying that had the telephone and the selector been inventions of priority to the telegraph the latter never would have been used for handling trains. Long ago the telephone engineers claimed for their instrument many of the functions of the telegraph. But telegraph engineers, realizing the futility of speedy calling under code ringing conditions on circuits serving as many offices as division train and message wires do, raised that potent objection. Time has brought forth the selective calling device in many forms whose advantages far outweigh all the objections legitimately to be raised and thus the telephone takes the place to which by right of conquest, it is entitled.

The circuits referred to are almost identical in equipment, the only difference being that the Meadville-Corry despatcher's circuit is arranged with a break contact in the primary circuit of each station transmitter, the contact being

broken when the block signal blade is thrown to a "proceed" position, thus preserving the safety feature of the Mosier Block System by rendering the operator's transmitter dead except when his signal blade is at the "stop" position. This feature is operative without rendering the receiver useless, the operator being able to listen and hear all business transacted on the line. Otherwise a description of one circuit applies to all. The wires are 210-pound hard drawn copper throughout, transposed against the telegraph circuits on the same poles and against each other to eliminate induction and cross-talk; each station is equipped with a 7-wire test panel containing the four wires of the telephone circuit and two iron telegraph wires available for short patches in case of trouble on either telephone circuit; test panels protected by lightning arresters, which also protect the selectors which are of the series type. The instruments are of the desk stand type with special hook to support the special receiver with leather head-band. These instruments are still further protected by arresters.

The test panels are made up of 35 jacks in 7 rows of 5 each, two rows for each telephone circuit, one row for each telegraph wire and the seventh row for the ground. The jacks are numbered serially from 1 to 35 and each test panel is equipped with a full set of cords and plugs. Throughout the entire installation the same wires are invariably brought to the same numbered jacks so that the manipulation of the circuits, the tests, the transfer of instruments or selectors or both from one circuit to the other and the patches are effected under unmistakable directions by numbers from the Wire Chief at headquarters.

In the Delaware Division installation the message circuit is carried to the private branch exchange telephone switchboard at Susquehanna and Port Jervis and is available for communication between all points at both division terminals when not otherwise occupied by message work. This makes practicable a modification of the staff meeting as it becomes possible during the light business of the evening hours for the Superintendent to get several of his yard masters together, or for the Division Engineer to communicate directly from his own desk with his corps of Supervisors and thoroughly cover situations impossible to handle as well by telegraph.

On both divisions the wrecking trains have been provided with portable sets and line poles by means of which the wires can be reached from the ground and the Delaware Division through passenger trains are similarly provided. Thus entry into the field of communication is afforded in emergencies to those outside of the Telegraph Department. The great benefit to be derived by personal communication between the office and the foreman of the wrecking outfit or the conductor of a crippled express train or a

supervisor or a yard master is a distinct gain for the general service.

Troubles which oftentimes hamper and occasionally prevent communication by telegraph such as heavy and extended fogs, general rain storms, etc., are not felt on the telephone.—*Eric Railroad Employee's Magazine.*

Report of High Tension Wire Crossings Committee.

The Committee on High Tension Wire Crossings of the Association of Railway Telegraph Superintendents has prepared a report supplementary to that given at the annual meeting in Detroit, June 23, 1909.

The report in part is as follows:

"Preceding the presentation of any license or agreement form requiring specified methods of construction to be followed in the building of wire lines across the railroad at streets, highways or other public service crossings where the rights of all concerned are equal, it is necessary to emphasize the fact that the execution of any such agreement must be accomplished by conciliation, by reasoning, and by persuasion, until the time arrives when our laws shall compel adequate safety in the construction of such lines.

"The committee's investigations have covered the country East, West, North and South. The committee has inspected crossing plans of many forms, including bridges (which are too costly for universal use); cradles or baskets placed underneath the transmission wires and designed to catch them in case of rupture; short spans; etc., but has unanimously agreed upon the construction plans recommended in the Detroit meeting as best calculated to cover the diversified wants of the situation in all parts of the country. It has, therefore, no hesitation in affirming that the plan it offers will be less objectionable to the crossing constructors than any other known scheme, and, from its flexible composition, more easy of adoption through the readiness with which it may be modified to meet local details than any other plan of sufficiently comprehensive scope to cover all types of crossings.

The plan of agreement, with construction specifications, recommended by the committee for wire crossings over railroads consists of:

"1. Agreement form." (To be executed by the superintendent of telegraph, general manager or other designated officer.)

"2. Specifications for crossing, of the particular type to be constructed, to be attached to and made part of the agreement upon written identification by the superintendent of telegraph or other designated officer of the railroad company, and a designated officer of the electric company.

"3. Location drawing, showing in detail the railroad property to be crossed, and the plan of crossing, together with such modifications in the specifications as local conditions or inadequacy of the laws require; this drawing to be identified

in the same manner as the specifications referred to in item 2.

"The crossings are divided into six types—three for low voltages and three for high voltages; two of them underground and four aerial.

"The rules and regulations adopted by the National Board of Fire Underwriters, for the installation of electric wiring and apparatus, separate electric lines into three systems, viz.: Low potential systems, 550 volts or less; high potential systems, 550 to 3500 volts; and extra high potential systems, over 3500 volts.

"Trolley wire voltages made difficulties in adapting the Standard Code specifications line of demarcation between low potential and high potential voltages to the plans advocated by the committee, and, in order to not become involved in difficulties, unavoidable, were we to include the trolley circuits in the high potential classification, it was decided to include all voltages under 700 in the low potential system, and currents of 700 volts in the high potential class. Thus, specifications have been prepared (a) for undergrade crossings of electric wires carrying less than 700 volts; (b) for undergrade crossing of electric wires carrying 700 volts or over; (c) for overhead crossing of electric wires carrying less than 700 volts; (d) for overhead crossing of electric wires carrying 700 volts or over; (e) for overhead crossing of electric cable line carrying less than 700 volts; (f) for overhead crossing of electric cable line carrying 700 volts or over.

"The plan provided will secure in the crossing span of overhead wires or cables the strength sufficient to insure that it shall not fail from natural causes, as the factor of safety employed is sufficient to guard against any breakdown from load received by accumulations of natural deposits, or from load occasioned by wind pressure. The poles are to be located at such distance from the track as to insure immunity from damage by train derailments. Modifications to fulfill local wants, or in details to comply with opposition, are, when necessary, readily made by notation on Exhibit "B."

"Altogether the scheme is so comprehensive and yet so mobile that the committee believes it adapted to the uses of each and every railroad in the country; therefore it entreats your co-operation in securing its adoption by all the railroads of the association, and the resultant united effort for execution that will insure the greatest measure of impression upon the wire constructing companies and eventually upon the powers regulating such construction, of the necessity for bettered conditions, until finally regulation by law shall provide the necessary safety in construction methods which are not now possessed and which are so necessary."

Mr. C. H. Cadwallader, manager of the Western Union Telegraph Company at Detroit, Mich., in renewing his subscription for 1910, said: "I cannot get along without the Telegraph Age."

The Telephone for Local Message Work.

BY W. W. RYDER, CHICAGO.

Late Superintendent of Telegraph of the Burlington System, Now General Superintendent of Telegraph of New York Central Lines.

One success with a piece of mechanism usually suggests hope of another, and our experience on the Burlington System with the telephone as a substitute for the telegraph in train despatching early suggested to me that possibly we could use it to advantage on message circuits. Therefore, as soon as possible after securing a train despatching circuit, we provided a second circuit and equipped it with similar selectors, using the single set of telephones in common with the train despatching circuit. The results were far beyond our expectations, it being found possible to handle as high as 350 ordinary messages in a nine-hour day on a circuit cut into thirty-two offices, and of these messages one-third were Western Union, which are always repeated but only count as one message.

One reason we were able to handle so large a number of messages was the greater promptness of the operator in answering calls, the ringing of his four-inch vibrating bell (plainly hearable in the freight house or even outside the building) compelling his attention far quicker than the oft repeated telegraph call generally does. Then, too, the operator on a busy telephone circuit while finishing with one office puts out a call for the next one desired, and keeps right on working with the first office. The result is the second man is waiting when the first finishes.

So far as the actual transmission is concerned, our experience has been that as soon as the way station operators and the operators in the relay offices become acquainted with the slightly different methods of handling the business, especially in regard to reading the message in phrases—one phrase at a time, so that the receiving operator has the advantage of not only hearing each word spoken, but getting the sense of the message in addition—that ordinary business can be handled at the rate of one message per minute, and on the shorter ones sometimes a speed of two per minute can be attained. The average message, except where it contains hard names or difficult combinations of figures and letters, is not spelled out, but is read in phrases, a pause being made at the end of each phrase for the receiving operator to finish putting it on paper whether by pen, pencil or typewriter. In handling Western Union messages where more frequently hard names and code words occur, these are spelled out carefully, and in addition all Western Union messages are repeated back.

The question of the operators using pen, pencil or typewriter and the speed which they make is entirely dependent upon their individual ability to use their tools. We insist that the operators in relay offices be first class typists and hence they have a speed in receiving of not less than

sixty words per minute, while some of them run up to eighty words a minute.

Another interesting point is the fact that as in train despatching the telephone circuits frequently work through bad weather or other troubles where the telegraph is absolutely inoperative,—for instance, broken wires, crosses or grounds which would completely kill the telegraph often have little effect on the telephone circuit.

In cases of emergency the telephone provides a means of direct personal conversation between officials and others who oftentimes are not telegraph operators, thus giving a clearer and quicker comprehension of existing conditions, and at the same time eliminating the intermediate parties necessary for telegraph communication.

So great has been our success in handling the message circuits, that we are now endeavoring in every instance to secure a message circuit wherever we install a telephone for despatching. Frequently this is easily accomplished by simply using the abandoned train wire and the message wire, the only limitation being that of distance over which he can get satisfactory transmission, as the old wires are almost invariably iron.

With greater speed, at least equal accuracy, and ability to work the circuits through more unfavorable conditions, I feel the telephone scores again heavily over the telegraph and I predict a rapid extension of its use for message work.

[It will be interesting to note that the Burlington system now has in operation twenty-six telephone despatching circuits of a total length of 2,387 miles out of a total mileage of 8,948 for the entire system. The total number of stations thus equipped is 457. They also have twenty-five message circuits with a total length of 2,333 miles and 429 offices on such circuits. 2,287 miles of block wire with 474 offices are also equipped with telephones.]

Telegraph and Telephone Service in the Future.

BY HENRY W. POPE OF NEW YORK.

Making the telephone a feature of Telegraph Age was the obvious thing to do. The personal element of the telephone business should, in my opinion, receive the more attention because of the greater opportunities and promotions, the more frequent conferences between officials, closer relationship to each other and the public than is the case in telegraph circles.

I believe, and I have frequently so stated, that the existing telegraph methods will not be recognized in a few years, so marked will be the improvements in the collection, transmission and delivery of telegrams, and the industry will take on new fields of usefulness and become more a factor in business than ever. The time will rapidly approach when the large telegraph user will transmit and receive very generally his own telegrams, from special terminals, the universal keyboard making possible the trans-

mission and the reception or translation either through the employment of printing or automatic devices—the company simply making the switch and “hauling” the telegram. The messenger boy should long ago have been largely eliminated through the use of the printer, telephone or telautograph rather than kept or utilized as a by-product—to the delay and detriment of rapid transmission.

The possibilities of the telegraph seem to be too numerous to treat of within the limits of this article.

So, too, it may be said of the telephone business—the present standard of transmission will appear crude enough in a few years and there is the possibility of unexpected results by reason of these improvements. It is now possible with existing conditions within limited distances to outstrip the telegraph both in speed and accuracy, as stated in your issue of November 16. With improved transmission the speed will be beyond the capacity of any method of recording other than shorthand, and distance will not cut much of a figure. Every man's telephone will be a telegraph office, open continuously, with availability to obtain information as to all matters concerning the transmission or reception of telegrams. Small telegraph offices and existing duplications will become obsolete, by reason of these increased facilities and advantages and gradually disappear.

The telephone possibilities are considered twenty years in advance, so, too, will the telegraph be considered. Each interest will find its own field of usefulness, and with greater improvement in each, will follow the increased use. The telephone will handle the business of a more important and more instantaneous character; the telegraph will, in addition to its present class of business, eventually develop into communications of greater scope, closer to the lines of postal service.

The public should appreciate the possibilities of greater convenience, more rapid and more accurate transmission; that the telephone and telegraph are in the hands of the most progressive and aggressive men not hidebound by impossible theories nor so ambitious for wealth as to sacrifice or ignore the interests, requirements and necessities of the public.

The Telegraph of the Future.

BY PATRICK B. DELANY, NANTUCKET, MASS.

I think the time has come for a more comprehensive name for Telegraph Age and am glad to note that you have added the Telephone to your title. Its scope of survey in the past certainly entitles it to a more inclusive designation.

Not only do I think the telegraph will always remain “a factor in the transmission of intelligence,” but I am firmly of the opinion that it will be the principal medium of correspondence, except for short distances. Even if the telephone was perfect, and all users blest with faultless enunciation, the speed per wire of thirty words per minute, absence of record, faults of memory, delays and difficulties of getting correspondents together, and lack of secrecy, will always confine it to the place it now occupies. It may be used to advan-

tage for collection and delivery of telegrams in suburban and rural districts, and by repetitions can be made as accurate as telegraphy. The telephone will undoubtedly maintain its present rate of growth numerically for a long time, but it cannot in the nature of things carry an appreciable amount of correspondence between cities. It is expensive, but almost indispensable in emergencies, requiring quick exchange of views. In fact the conference feature is the only warrant for long distance telephony.

Morse telegraphy will continue to carry exchange and private wire business, but when it comes to general mercantile and social traffic and newspaper correspondence the machine method will surely get it all—owing to its great capacity, adaptability to all conditions of wire, weather and distance, its simplicity and independence of trained labor it can telegraph profitably at a rate seventy five per cent lower than the living rate for Morse telegraphy or the telephone.

The telegraph has never been developed, but it will be when a ten-word postcard for ten cents or a fifty-word message for twenty-five cents can be dropped in a distant postoffice within half an hour by wire, and when every business concern will put its correspondence in perforations on a tape in its own office, wire it and have it delivered at the distant station on tape in plain inerrant dots and dashes for private transcription by typewriter—100 words for twenty-five cents.

This service will develop correspondence by wire to an extent never dreamed of by the old companies and will make the telephone simply an adjunct of the telegraph.

Writers' Cramp Affecting Operator's Ability to Use Typewriter.

Editor Telegraph and Telephone Age:

Will you please give me the benefit of your experience and knowledge through the columns of your paper.

I am an operator of twenty years' experience, working a private wire for a Wall Street house, using a typewriter and a sending machine. I am considered first-class on both. Lately, however, I have been losing my grip. Strangely enough, it only affects me when typewriting. I experience no trouble whatever in sending on a wire, even for hours at a time, but it is torture for me to strike the typewriter keys, and it would appear to be only a question of time when it will be impossible for me to work on the receiving side of a wire. I have tried writing with a ball of paper in my palm, massaging with hot water and Omega Oil, and various other expedients, none of which seem to afford relief. Anyone who has experienced this trouble can appreciate what I am going through, and I write in the hope that you or some of your readers may know of a cure or remedy other than a long rest for my arm, which, of course, it is impossible for me to take.

An Old Subscriber.

Rapid Cable Telegraphy.

Few people realize the great amount of matter which can be handled by an ocean cable in a short time. The system of the Anglo-American Telegraph Company for handling their Stock Exchange traffic is a good illustration.

This system has been rendered necessary, says the London Electrical Review, owing to the difference in time between New York and London. The American Exchange opens at 3 o'clock by London time, and the London Exchange closes at 4 o'clock. There is, therefore, but one hour during which business is in progress in both exchanges simultaneously, and it is of first importance that intercommunication between the two centers shall be as rapid, reliable and unfettered as it can possibly be made, in order that the transaction of business may be facilitated to the utmost.

Accommodation in the neighborhood of the Stock Exchange in London is necessarily scarce and costly, and for this reason, the Anglo Company formerly occupied a small office in a nearby building. Recently, however, the manager, Mr. J. H. Carson, succeeded in obtaining from the Stock Exchange authorities accommodation within the Exchange itself, and developed the system to the highest pitch attainable.

The space at the disposal of the company has been divided into a decoding room and an operating room. The former is occupied by the decoding clerks of the firms utilizing the special service—necessarily a small number, on account of the limited space available. From this room pneumatic tubes convey the messages direct to the floor of the Stock Exchange or to Shorter's Court.

In the operating room the receiving and transmitting apparatus is arranged for duplex working, with Morse recorders, and communicates through repeating stations with Valentia, Ireland, whence the cable runs to Newfoundland and on to New York. In the ordinary course one set of apparatus is in use, the other being held in reserve, with operators at all four instruments.

The procedure is very simple. The telegrams are short, being prices as they fluctuate on the New York Exchange; all free matter in the preamble is cut down to the lowest limit, and the address in most cases consists of a single letter. As each message is received and written down by ear (the recorder being in circuit only for the purpose of providing a permanent record) it is instantly handed to an attendant and passed rapidly through to the decoding room, whence it proceeds within a few seconds to its final destination. Two receiving operators are necessary at each instrument, as the loss of time in changing the carbon with which a duplicate is made would introduce delay—the instant that one message is through, the second operator commences taking down the next message, and this goes on continuously. A record of over 200 messages in

ten minutes has been attained in this way. At the same time, of course, messages were being transmitted to Valentia on the same wire and at the same speed.

To attain to this high-water mark of efficiency has naturally involved a great deal of organization and experiment that does not appear on the surface, and Mr. Carson is to be congratulated on this unique demonstration of the capabilities of the trans-Atlantic cable system.

Rapidity of communication is the watchword of the company, and to this end every possible means is utilized. High-speed automatic punchers, for example, are installed at certain points of the system, and though faulty at first, have now attained a degree of efficiency which enables Mr. Carson to speak highly of their performance. Manual punching, however, at the terminal stations is preferred to the keyboard instruments now on the market, though the company will not fail to take advantage of these when they have reached a satisfactory stage towards perfection. Every message is carefully checked to ensure accuracy.

Comparing the splendid work done by the cables with the fitful performances of the wireless trans-Atlantic system, one cannot but feel that the epoch when the latter will displace the former—if ever—must be far in the future. Wireless in its own sphere is unexcelled; but in long-distance working it is not yet a competitor with cables.

Bound Volumes of Telegraph Age.

For those of our readers who desire to have the past year's issue of Telegraph Age in a form in which they can readily preserve all of the copies for future reference we would recommend a bound volume. We are now able to supply these containing the twenty-four issues of 1909 for the nominal price of \$3.00. There are several features in one of these volumes which comprise nearly 900 pages of reading matter, which are alone worth much more than the amount asked. The series of articles by Willis H. Jones entitled "Some Points on Electricity" are in themselves worth the price of the book to any student. We have also published articles by the best informed authors upon the developments in wireless telegraphy, and, in fact, there will be found recorded in this book all of the important improvements in the wireless art during the past year. The use of the telephone for train despatching has largely increased since January, 1909, and we have kept pace with its development by presenting to our readers many articles upon this subject, written by some of the best posted men in the railway and telephone world. These are but a few of the many features presented in Telegraph Age, during 1909, and those interested in any branch of the telegraphic industry will find much valuable information in one of these bound volumes. A copy of this work will be sent to any address upon receipt of price, \$3.00, by J. B. Taftavall, Telegraph and Telephone Age, 253 Broadway, New York.

An Interesting Electrical Problem.

Editor Telegraph and Telephone Age:

Will you or some of your readers be good enough to offer some solution to an electrical problem, which exists on a block wire circuit between two offices situated six miles apart?

These two offices are twenty miles from any power plant, or high potential wires or gas or water mains.

The block wire is operated on the closed circuit system and was set up in regular gravity battery style, zinc to ground at one office and copper to ground at the other office, yet it would not work, the circuit would not close with a mile of copper wire submerged in a thirty-foot well as a ground at each end.

We discovered a positive current coming from the ground and by reversing the poles, putting coppers to ground at each office, the circuit closed and operated beautifully until recently, when a telephone office was opened within a hundred feet of one of the telegraph offices. Whenever the telephone generator is rung, it interrupts the telegraph instruments, the fifty ohm sounder on the telegraph line vibrating the same as the bell on the telephone instrument.

The telephone and telegraph ground wires are situated separately about one hundred feet apart, and the telephone line does not cross this telegraph line at any point, but runs in the opposite direction from the telegraph line.

I would thank you for any information you can give upon the peculiar results obtained.

R. L. Stultz.

Manager Western Union Telegraph Company,
Alexandria, Va.

Mr. Hearst Upon Journalism.

At a recent dinner Mr. William R. Hearst, publisher of the New York American and several other daily papers in different cities, was asked to speak upon the subject of journalism, and said in part:

"I regard a newspaper publisher as an attorney retained by the people to protect their rights and their interests.

"I believe it to be as much the duty of a newspaper publisher to place the interests of the people above all questions of personal advantage as it is the duty of an honorable attorney to place the interests of his clients above all such considerations.

"If journalism is sometimes found in active and critical opposition to certain business interests, it is merely because these business interests have come into direct conflict with the rights of the public, which it is the main duty of journalism to defend.

"If journalism maintains an attitude of greater approval toward other business interests, it is because of the disposition of the business men in control of these interests to entertain a broader and higher conception of their duties and responsibilities to the public.

"It is the difficult duty of journalism to distinguish between what is good and what is bad, not only in business methods, but in all other matters which vitally affect the interests of the people.

"In these complex and difficult situations I feel that the conscientious publisher should have the support of the people and also of that higher element in the business world which recognizes its own duties and obligations to the people."

Postal Club Formed at Atlanta.

The employes of the Postal Telegraph-Cable Company in Atlanta and surrounding towns met in the general offices of the company in Atlanta, January 21, and organized a social club, to be known as the Postal Telegraph Club of Atlanta, Ga.

A constitution and by-laws were adopted and the following officers elected: President, W. C. Daviet; vice-president, A. D. Holcomb; secretary, L. A. Minor; assistant secretary, F. F. Pursley, and treasurer, G. W. Oliver.

The following committees were appointed: Publicity Committee: A. M. Beatty, chairman; A. D. Holcomb, H. W. Pearce, F. F. Pursley, Lee Minor. Committee on Entertainment: C. G. Knapp, chairman; B. C. Delaney, J. P. Edwards, H. W. Pearce. Board of Governors: W. C. Daviet, chairman; A. D. Holcomb, L. A. Minor, F. F. Pursley, G. W. Oliver, J. P. Edwards, B. C. Delaney. Committee on Membership: A. M. Beatty, chairman; A. D. Holcomb, Robert Pope, Jr.

The object of the club is to promote social intercourse and friendship among the employes of the company. The club expects to give a banquet in February and to be addressed by prominent men both in and out of the profession.

The club was started with thirty-five charter members, and it is expected the membership will soon reach fifty.

The following is the complete list of members: G. H. Usher, H. W. Pearce, W. C. Daviet, C. G. Knapp, W. E. Sitton, F. F. Pursley, L. A. Minor, B. C. Delaney, A. M. Beatty, G. W. Oliver, E. S. Reeves, R. A. Paschal, H. A. McKinnon, G. W. McCaughy, A. D. Holcomb, J. T. Goodrum, R. S. Pope, Sr., H. P. Thornton, C. E. Harrison, R. S. Pope, Jr., J. E. Arnold, G. E. Paine, O. E. Hickman, J. P. Edwards, F. J. Poundstone, F. H. Robinson, P. A. McMullen, J. M. Manning, and B. B. Price, of Atlanta; S. E. Dorsey, of Gainesville; W. S. Scruggs, of Covington; J. H. Merrihew, of Marietta; W. H. Milam, of Cartersville; O. T. Moore, of Macon, and M. M. Morgan, of Greensboro.

The telegraph companies are now started upon what promises to be the most prosperous year in their history. The renewal in business prosperity which has become general throughout the country has affected the telegraph most favorably and now none of the various companies have a single wire which is not needed to properly handle their business.



KERITE



Insulated Wires and Cables

KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

Efficiency and safety in electrical installations depend chiefly on insulation. For fifty years KERITE insulation has been the standard of excellence.

Results count. KERITE wires and cables installed half a century ago are in service to-day. The wonderful durability of KERITE insures the highest safety and economy.

Initial tests determine the properties of an insulation only at the time they are made. They do not determine how well it will do its work years afterward.

The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

Experience of others should be useful to you. Insure your service by using KERITE.

KERITE INSULATED WIRE AND CABLE COMPANY



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WATSON INSULATED WIRE CO.

Railway Exchange, CHICAGO, ILL.



The Railroad.

Mr. G. A. Cellar, superintendent of telegraph of the Pennsylvania Lines west of Pittsburgh, was a recent New York visitor.

The Chicago, Burlington and Quincy Railroad has just completed the equipment of its Hannibal division from Hannibal, Mo., to St. Louis, with a telephone train despatching circuit.

The Georgia Railway will in the near future install telephone train despatching circuits upon three hundred miles of their road, practically the entire mileage.

Mr. V. T. Kissinger, assistant superintendent of telegraph of the Chicago, Burlington and Quincy Railroad at Lincoln, Neb., has been appointed superintendent of telegraph, with office at Chicago, to succeed Mr. W. W. Ryder.

Mr. J. B. Fisher, superintendent of telegraph of the Pennsylvania Railroad, has been appointed superintendent of the New York division. Mr. J. C. Johnson, chief clerk in the office of the superintendent of telegraph, has been appointed to fill the vacancy caused by Mr. Fisher's promotion.

The Cleveland, Cincinnati, Chicago and St. Louis Railway has recently placed in service a telephone despatching circuit between Cincinnati and Columbus, a distance of one hundred and twenty-five miles. They will soon add similar equipment to one hundred and ninety-eight miles more of road.

Encouraged by the success of their school of telegraphy at Bedford, Pa., the Pennsylvania Railroad Company has provided a library containing books upon all branches of electrical science. They have also installed an automatic sending machine with a transmitter that can be set at any speed desired. This is for use in teaching the students to receive messages.

The Delaware, Lackawanna and Western Railroad Company, Mr. L. B. Foley, superintendent of telegraph, is now despatching trains by telephone on the entire 957 miles of their system, and also has several additional telephone message circuits along their line. The dispatchers on this road are well pleased with the change, all agreeing that the work is much easier for them than under the telegraphic method. The Lackawanna is the first important railroad system to adopt the telephone exclusively for this purpose, though probably within the next year several other roads will complete the change.

A pension system for employes has been adopted upon the Rock Island lines. The plan is similar to that in force upon the Pennsylvania Railroad. All officers and employes who have attained the age of seventy years will be retired, and those in certain lines of work who have reached the age of sixty-five may be retired. Such as have been in continuous service twenty years at the time of their retirement will be pensioned and anyone who has been continuously in the service for twenty-five years or over and who has become permanently incapacitated may be retired on a pension regardless of age.

The telephone despatching system of the Santa Fe railroad will be largely extended during the present year. It is said that an appropriation of \$195,000 has been made to cover the cost of this work. Two new circuits will be installed from Albuquerque, New Mexico, to Los Angeles, Cal., and additions will be made to present circuits so that there will be two complete circuits from Bakersfield to Oakland, Cal.

Mr. Eugene H. Coapman, who has been appointed first vice-president of the Southern Railway, began railway work on the Chicago, Milwaukee and St. Paul when he was fifteen years old. From 1880 to 1883 he was operator and train dispatcher, and then went to the Iowa Central as train dispatcher. After serving as chief dispatcher and superintendent of telegraph he returned to the Chicago, Milwaukee and St. Paul in 1887 as train dispatcher. Since then he has been connected with the Illinois Central and Santa Fe systems and with the Southern Railway since 1902.

The Lehigh Valley Railroad, in addition to the Mahanoy and Hazleton Division, upon which a telephone train despatching circuit was placed in service December 6, is now equipping the Lehigh Division with telephones for train despatching. The new circuit will be fifty-four miles long, with fifteen stations. In the way stations special equipment, composed of a swinging arm with the transmitter and receiver mounted in a fixed position on a yoke, is utilized. When the operator pulls the arm forward a special switch closes the telephone circuit. When he wishes to talk he depresses a foot switch, which closes the primary circuit through the transmitter.

Mr. W. W. Ryder, whose appointment as general superintendent of telegraph of New York Central lines west of Buffalo was announced in our January 16 issue, is one of the best and most favorably known telegraph superintendents in this country. Mr. Ryder was born at Aurora, Ill., April 6, 1865, and in 1883 entered the employ of the Burlington system in the freight department. He remained here until 1887, when he took a position at Chicago as stenographer with Mr. Frank A. Vanderlip, now president of the National City Bank of New York. The same year he entered the offices of the superintendent of telegraph of the Burlington system as stenographer and soon became chief clerk. From 1890 until 1893 he acted as superintendent of telegraph and in the latter year received the permanent appointment to that position, which he has held until his present advancement. Under Mr. Ryder's supervision the telegraph system of the Burlington has been made one of the best in the country. He was one of the first to recognize the possibilities of the telephone for train despatching and some of the best results attained with this system have been secured under Mr. Ryder's supervision on the Burlington. His many friends predict that this advancement is but the forerunner of greater promotions.

At a meeting called in New York January 19 by W. E. Harkness of the Western Electric Company an organization was effected of the supply men who furnish goods used by the railway telegraph superintendents. The object of the association formed is to promote the social features of the annual meetings of the telegraph superintendents. Mr. A. P. Eckert was made chairman of the new organization. Others present at the meeting were: P. W. Miller, of the Kerite Insulated Wire and Cable Company; E. R. Gill, of the United States Electric Company; Mr. E. Chambers of the Duplex Metals Company, and A. T. Smith, of the American Telephone and Telegraph Company.

Great Northern Railway Despatches Trains By Telephone Over 2,100 Miles of Line.

The equipment of the Spokane Division of the Great Northern Railway with telephone train despatching apparatus will complete a total of 2,100 miles of line which this road is now operating in this manner.

The Spokane Division extends from Troy, Mont., to Leavenworth, Wash., a distance of 337 miles. On account of the length of this division, and the amount of traffic passing over it, two despatchers are required to handle the division. They will have on their despatching circuits 45 way stations.

The standardization of this apparatus for the railroads of the country has included a testing device which is installed throughout the Great Northern system. This is a panel somewhat similar to the well known telegraph peg board but containing telephone jacks and plugs. The circuits looping through an office, both telephone and telegraph, are wired through these jacks and by the operation of two keys and using the plugs at the despatcher's orders, it is possible to patch up temporarily a line in case of trouble, to interchange circuits, to locate a break or a cross to the nearest station—in fact, to make all the simple tests ordinarily required on a circuit of this character. These test panels have been found an important and useful portion of the despatching equipment of railroads. Their simplicity makes them especially valuable, as they may be operated by the most inexperienced employees.

Another interesting feature of the Great Northern installation is the use of siding telephones on the Spokane Division. Seventy of these are to be installed. As the use of the telephone for despatching has increased, the railroads, as in this case, have come to appreciate more and more the advantages of being able to allow the train crews to talk directly to the despatcher at all important sidings. A siding telephone is sure to be at hand in case of emergency, as a large number of them have been installed. The fact that these siding telephones enable the despatcher to reach train crews waiting at the sidings and give them orders to pro-

ceed permits him to take advantage of all changes in the schedule, prevent congestion and keep traffic moving, thus effecting economies in motive power and reducing overtime expense. Any of these uses warrants the installation of the telephone system, as the saving effected in one emergency will more than pay the cost of the installation.

When this equipment is put into service the Great Northern will have a telephone train despatching system the entire distance from Minneapolis to Seattle, with the exception of two short sections.

Gold and Stock Life Insurance Association Annual Meeting.

The thirty-second annual meeting of the Gold and Stock Life Insurance Association, at which there was a large attendance, was held in the Western Union Building, New York, January 17.

Mr. G. W. E. Atkins, president, in his report, stated that the Association strikingly illustrates the value of co-operation effectively and economically applied to protection of the home and family, and that undoubtedly a great privilege is afforded to all engaged in electrical pursuits to take membership in the Association, and that he is convinced that very many more would gladly avail themselves of the advantages if they were more widely known. The disbursements for death claims during the year were \$7,825, making a total of \$128,825 paid to the beneficiaries of deceased members.

Mr. Chas. P. Bruch, a former president, wrote that although unable to be present, he did not wish his absence to be understood as indicating any diminishing interest in the Association and its work. He urged all to find a way of getting the younger men interested, and of making the benefits of the Association more highly appreciated and valued, by those who are eligible for benefits.

Mr. Michael Breslin, the Association's first president, said that membership seemed to be conducive to long life, that he had been present at every one of the thirty-two annual meetings, and was sure that those who could say the same would be found engaged in active work for the association's welfare.

Mr. M. J. O'Leary, auditor, forcibly called attention to the good that is being done by beneficial societies generally, and said they should be constantly kept before the eligible young men and women, of all the telegraph and telephone companies, so that the result may be an ever increasing membership, and extension of usefulness.

The old board of officers were re-elected as follows: George W. E. Atkins, president; Gardner Irving, vice-president; W. J. Dealy, secretary; Lewis Dresdner, treasurer; executive committee, G. W. E. Atkins, Gardner Irving, Herbert Smith, Lewis Dresdner, W. J. Dealy, Michael Breslin, Charles Shirley, T. A. McCammon and Albert J. Driver; auditing committee, M. J. O'Leary, F. J. Nurnberg and J. J. Frederick.

OLD AND RECENT TOURNAMENTS.

General Information as to Early and Late Speed Trials, with Incidental Comments on the Persons Concerned in Them, and Unnecessarily Complete Reports, Perhaps, as to the Part I Myself Played in Them and in Other Related Events.

BY WALTER P. PHILLIPS.

(Continued from page 79, January 16, issue.)

In the forty years—1866-1906—embracing the widely separated achievements of William E. Kettles and David J. Ellington, and of all their nimble-fingered associates, many important records have been made, but there is one man who has been in but a single tournament, whose telegraphic work, both as sender and receiver, has ranked with that of Kettles, Burns, Shape, Wright, Catlin, Curtis, Waugh, Gibson, McClintic, Conkling, Bruckner, Ellington, and all the blazing lights from first to last. I refer to George M. Eitemiller. When he had been working around a switchboard for many years he came on from Pittsburg, without practicing up for the contest, and perfunctorily sat in, at the Hardman Hall tournament, in the Old Timers Class, in 1890. But it was plain to be seen that he made no effort to compete with Ayres and Catlin. It was evident that he regarded tournaments as in-artistic and that he was inclined to treat them as a joke. Personally, I was very much disappointed, for I had heard him send messages, in previous years, at the rate of from forty-five to fifty-five words per minute, on many occasions, on a duplex on which the men who received from him one night—DeGraw, Boileau and Moore—sent to me the next night and I was, therefore, in a position to know that, aside from Eitemiller's wonderful sending, his receiving was superb and his handwriting of the very best. I asked him once, when I was quite new on the Philadelphia wire, where DeGraw, Boileau and Moore were on the nights when one of the three was missing, and he replied: "The three take turns working a slow wire, to get rested up so they can come back at us, fresh and hearty, when it comes their turn to send. Any time, Walter, that you would rather receive than send, I'll swap jobs and round the Quakers up for you." Though we were supposed to work the sending and receiving sides on alternate nights, Eity did most of the sending and more beautiful Morse never went to Philadelphia from any direction. Once in a while I got ambitious to send—ambitious not to receive might be a more honest way to put it—and it was then, when George took the receiving side that some one of the famous trio sought to be revenged. But the extreme facility with which the sender was copied often attracted quite an audience to the vicinity of the Philadelphia duplex and the intended victim just smiled and

smiled and was a telegraphic villian still. From his first appearance in the business, out in Pennsylvania, where he worked a wire with Joseph W. Larish, through the days when he was a protégé of Patrick B. Delany's, in Savannah, to the time of the great fire in Boston, in 1872, when he was sent there and proceeded to teach a number of people in New York who had always underrated him, the particular kind of a telegrapher he was, and for many years afterward he went on springing more surprises on the profession than any of his contemporaries, and even now, in the evening of his life, although he no longer works as an operator, he sometimes takes the wire for a night in such a youthful and spirited manner as to remind those who observe him of the maiden of whom Longfellow said:

"To me ye never can grow old,

But live, forever young, in my remembrance."

Another operator, Charles H. Davis, who figured in but one tournament (that of 1885) was none the less a master of his profession and he would have been heard of afterward, but he took up photography and was almost immediately recognized as an artist of the first class. But Mr. Davis was more than an operator and, very early in his career, he and Frank B. Rae, published the first book of diagrams ever issued, showing how quadruplex and many other connections should be made. While in the service of the United Press (No. 1) he beat everybody in competition with him, by drawing a wire up the bluff at Fort Wadsworth, during the yacht races, and establishing an office on the top of a cannon, where he operated a telescope with one hand and a foxy eye and a telegraph instrument, which he held in his lap, with the other hand, furnishing graphic reports which were distributed to all parts of the world, far in advance of those supplied by others. Mr. Davis is a graceful writer, an expert with the telescope, a student of the stars and is talented in almost every direction. His photographic work commands the highest prices and is undoubtedly of the very best. He has made thousands of exquisite pictures and his name is known throughout this country and in many others, but the most interesting to telegraphers is the group picture, taken in 1907, in which General Eckert, Charles A. Tinker, Albert B. Chandler, and David Homer Bates appear. General Eckert, now approaching his ninetieth year, has but recently retired from his long term of service with the Western Union Telegraph Company; Mr. Tinker is leading the simple life in Brooklyn; Mr. Chandler divides his time between New York and his farm at Randolph, Vermont, and Mr. Bates is still actively engaged in business, being vice-president of the Gamewell Fire Alarm Telegraph Company and connected also with the long established house of Wilcox and Gibbs and besides that and his active service as secretary of the United States Military Telegraph Corps, he has written a charming book about the most

important man who has lived in the world since our Lord and Saviour came out of Nazareth and, after a brief sojourn here, returned to the Father by way of the cross. "Lincoln in the Telegraph office" is one of the great books of the time and while many volumes affecting the life and career of this wonderful man, many of them most excellent, have been written, no one who peruses Mr. Bates' work but will find that it is well that this particular book has been added to the others, for it settles many disputed points in a way that can offend no one and that will be helpful to many.

the use of copper wires, for telegraphic purposes, when he was the President of the Baltimore and Ohio Telegraph Company, but to my mind his book on Lincoln is his greatest triumph. He is fortunate in the possession of a strong masculine style of composition. Emerson said he liked the Flemish pictures because the figures in them stood on their feet and did not swing or float in the air. That is the way with Mr. Bates' assertions and situations. They are definite and would charm the old actor in "Trelawny of the Wells." He denounced the namby-pamby speeches the author had set down for him and



Photograph by Davis & Eckmeyer, New York

GENERAL T. T. ECKERT, C. A. TINKER, DAVID HOMER BATES
AND COLONEL A. B. CHANDLER

For example, there have been many theories as to when and where and under what circumstances Mr. Lincoln wrote the Emancipation Proclamation. It is conclusively shown in Mr. Bates' book that he wrote it in the War Department telegraph office, sitting at General Eckert's desk. This is only one of several matters that are elucidated and in treating of them the author brings the reader so close to the man of whom he is writing that his son, Robert T. Lincoln, wrote to Mr. Bates as follows, when he had perused his work: "I must thank you earnestly, for the pleasure I have had in your articles. They bring back very vividly, the most exciting and interesting days of my life, and the reminiscences of my father make him seem to me to be alive again."

Mr. Bates has done many things to endear him to his fellows and he has contributed his share to improve telegraphic conditions, one of his achievements being that he was one of the pioneers in

said to his wife: "Oh! for the good old speeches in Goldsmith's and Sheridan's times; speeches that you could stick your teeth into." A man who could write "Lincoln in the Telegraph Office" might have gone into fiction with success because it is plain that he possesses some of the qualifications for imaginative work—insight, sympathy, a sense of humor and the other charming qualities entering into the creation of literature. But to write history is much more important than to produce fiction. Even our "best sellers" are but ephemeral things, many of them reminding one of the unremembered songs of the forgotten poets. But all history from the inspired words of Moses, through all the written efforts of the Old Testament historians down to the limpid chronicles of Matthew, Mark, Luke and John and reaching forward so as to include the modern historians—Gibbon, Hume, Macaulay, Carlyle, Froude and our own Bancroft, Prescott, Irving and Motley—all his-

tory, if honestly and cleverly written, is of much greater value to the world than the fiction of even the greatest authors who have written it. I am therefore glad, as many of my readers must be, that a man so well fitted to write of the martyr President in the peculiar environment in which Mr. Bates knew him, has found the time and taken the pains to prepare such a carefully arranged and conscientiously written narrative affecting the greatest man of modern times as he seemed to those who looked and, as Hamlet says, saw that within which passeth show.

That the child is father of the man, as Wordsworth says, is being illustrated all the time, but it was never truer in any case than in that of William R. Plum. The spirit of determination that he showed when invited into the Burns-Kettles contest as a guest, as it were, and proceeded to beat both of the would-be champions, was just as notably in evidence in 1862, when he went to the Western Union office in Cleveland and applied to Captain Anson Stager for service in the United States Military Telegraph Corps. Captain Stager said: "Oh, no, I can't hire you to go down there; you are too little." An answer like that would have settled some boys, but not so the youthful Plum. Captain Stager had a superintendent, not far away, Captain Samuel Bruch, who had never seen Plum, knew nothing of his age or size, and who, furthermore, was ignorant of the fact that the youngster had already tendered his services to Captain Stager to have them rejected. So when he received a telegram decisive in tone and strictly business in its length and evident expectation of an answer equally to the point, Captain Bruch accepted Plum's services at once and told him to report for duty at Louisville. In the meantime the lad's father had telegraphed to him from Cuyahoga Falls, where William had attended high school and studied telegraph. On the side, to return home and go back to school but he was so imbued with an instinct for war that he proceeded to Kentucky, where he opened the first office that was established in Columbia, Kentucky, after a narrow escape from capture by Captain John Morgan. A little later, after various lively experiences with moving accidents by flood and field, he settled down, for nearly a year at Nashville, when both armies were moving up and down in Kentucky and Tennessee, and Nashville was almost constantly besieged. Finally he went with General Thomas and was with him at Chattanooga and upon the capture of Atlanta he was made manager of the office there. He was with General Thomas in the battle of Jonesboro, Ga., and also in the fight at Nashville, Tenn. Upon the evacuation of Atlanta he took charge of General Thomas's office and in that capacity continued until the end of the war, when he went to New Haven and studied law, as already related. The gait at which he piled in the dots and dashes on the morning of the

Burns-Kettles race was a surprise to all, though the style of his Morse was a little peculiar and it was of the old National style, which, as sent by the Duncan brothers, was not particularly unpopular. But Plum's style of sending in its higher attenuations was not impressive and he was ruled off the course by the judges. I believe that particular style of sending was said to have originated on the Cleveland and Pittsburgh Railroad, where Plum served a term as an operator. Edison's sending has the same swing, with a tendency to make the last dot in an *i* a little heavy until it resembles an *a* more or less intimately. When he first came to Boston I worked No. 4 East in Providence when he had the Boston end and we supposed, for a time, that he signed Slac, and wondered why he should. Later we learned that some one had dubbed him Victor Hugo and then it dawned on our groping mentality that Edison's sign was intended for Vic. Fred Seibert, with all the radicalism peculiar to new converts, acquired a style that was said to somewhat puzzle the Duncans, themselves, when they had to receive from him. He had followed in the footsteps in which Horace Greeley had been said to proceed when he abandoned regular operations at the Tribune office as philosopher and statesman and went in for scientific agriculture on his farm at Chappaqua. A flippant paragrapher once said that perhaps Mr. Greeley was carrying his advanced agricultural views too far afield when he seriously considered the feasibility of engrafting canned lobster on the tea plant. Seibert attempted to engraft on the pure National type of sending a canned lobster gait of his own and the resulting combination was not unlike the great architect, Richard Hunt's definition of the Queen Anne style of architecture, which he said was a bad imitation of a thing that was extremely undesirable in the original.

While Plum was studying law at New Haven he occasionally did newspaper work and on one occasion he came to Providence and reported the proceedings at the New England Agricultural Fair for the Journal. I have never forgotten how very excellent his work was and what an insight it gave me into the mystery of making even prosaic matters as interesting as fiction. It was the first real lesson I had ever had in the fine art of reporting. How much of a start his example gave me can be judged from the fact that in the early seventies I was tolerated on the reportorial staff of the New York Sun—an honor, indeed, for any man whether from the college or the farm. So many men ride for a fall in the Sun office that I hasten to add that I was not eliminated, but resigned, in 1874, to enter the service of the New York Associated Press.

(To be Continued.)

The annual Colonial Report for Jamaica for the year 1908-9 shows the receipts from telegraphs was £6,221, an increase of two per cent over the preceding year.

Serial Building Loan and Savings Institution Election and Statement.

At the annual election of officers and directors of the Serial Building Loan and Savings Institution, held in the office of the corporation, at 195 Broadway, New York, on January 18, the following were elected: J. C. Barclay, president; J. R. Beard, vice-president; E. S. Butterfield, treasurer; E. F. Howell, secretary; directors, G. W. Blanchard, E. E. Brannin, J. T. Laidlaw, M. S. Cohen, W. H. Jackson, J. F. Nathan, T. M. Brennan, J. B. Taltavall, C. A. Kilfoyle, M. J. O'Leary, F. J. Scherrer, W. J. Quinn, M. W. Rayens, P. J. Casey and Edward Reynolds.

The fiftieth semi-annual statement of the Serial Building Loan and Savings Institution for the six months ended December 31, 1909, was as follows:

ASSETS.	
Cash in bank.....	\$18,801 42
Mortgages	446,424 00
Stock Loans.....	7,985 00
Real Estate	12,718 07
Land contracts.....	8,730 17
Advances	2,495 48
	\$497,064 14
LIABILITIES.	
Shareholders, cumulative	\$312,468 81
Shareholders, prepaid.....	43,400 00
Shareholders, matured.....	42,600 00
Shareholders, Juvenile	440 87
Borrowed money.....	43,916 39
Due on loans.....	17,900 00
Surplus and undivided earnings.....	36,338.07
	\$497,064 14

The Robert W. Martin Fund.

Contributions to the fund for the support of the well-known old time telegrapher Robert W. Martin seem to have practically ceased. Unless more is received soon this brilliant member of the profession, who has been stricken helpless by paralysis for the past three years, and his family will be reduced to desperate straits, as the amount remaining of the sum which has been contributed for his support is rapidly diminishing.

The committee in charge of the fund consists of J. B. Taltavall, of Telegraph and Telephone Age; Charles W. Price, of the Electrical Review; T. Comerford Martin, secretary of the National Electric Light Association, and T. A. McCannion and Fred Catlin, of the Western Union Telegraph Company, New York. All contributions should be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Mr. F. W. Dillingham, a member of the firm of Hubbard Brothers Company, cotton merchants, New York, a former well-known telegrapher and a gentleman who has in his possession an excellent collection of autographs and autographic letters of the most prominent telegraph people in the country, in remitting \$5.00 to the R. W. Martin

fund, says: "73 to Bob Martin. I worked with him in 1882."

The amount received to date is: Previously acknowledged, \$611.25; F. W. Dillingham, New York, \$5.00. Total, \$616.25.

Of this amount the following sums have been paid to Mrs. Martin: July 10, cash, through Walter P. Phillips, \$15.00; by J. B. Taltavall, July 12, \$5.00; July 19, \$5.00; July 20, \$5.00; July 20, \$1.00; July 26, \$33.00; August 9, \$31.00; August 27, \$30.00; September 3, \$46.00; October 1, \$51.50; October 19, \$5.00; October 29, \$47.00; November 9, \$8.00; November 30, \$63.50; December 30, \$60.00; January 28, \$60.00; total, \$466.00.

Maver's Wireless Telegraphy and Telephony.

"Wireless Telegraphy and Telephony" by William Maver, Jr. (366 pages, 258 illustrations), is the most recent book published upon this subject and hence is probably the most up-to-date work to be obtained. The author outlines briefly the early forms of communication at a distance without the use of wires and the various systems of induction telegraphy devised by Phelps, Edison, Preece and others. He then takes up the propagation of waves through the ether, the production of oscillations in a circuit, the experiments of Hertz in detecting electric waves, the discovery of the coherer by Branly and Lodge's experiments with and improvements in the same, the various theories for electric wave propagation, syntonic wireless telegraphy, the various Marconi systems, Lodge and Lodge-Muirhead systems, Slaby Arco and Braun systems, the Telefunken systems, including the singing-spark system, the Von Lepel system, the Branly-Popp and Guarini systems, the DeForest, Fessenden, Stone, Shoemaker, Massie and Musso systems. After describing the principal features of all of these systems in considerable detail Mr. Marver discusses different forms of detectors, interruptors, transformers, spark gaps, condensers, antennae, tuning coils and other apparatus used in wireless communication. Another chapter tells of the attempts made in the line of directing the radiations to any desired point of the compass. Wireless stations for amateurs are also fully described and many useful hints given. The second part of the book devoted to wireless telephony describes the Ruhmer, Poulsen, DeForest, Telefunken, Fessenden, Collins and Majorana wireless telephone systems and gives a general outline of what has been accomplished in the way of transmitting articulate speech without wires. This book is undoubtedly the most complete and practical work upon this subject now on the market and is free from complicated mathematical formulae being written in a manner designed to be clear to the general reader. It is valuable to either the expert, the student, or the amateur. The price of this book is \$3.00 and copies may be obtained by addressing J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.

Legal.

In a recent decision of the Supreme Court of the United States rendered by Justice Harlan, the right of the State of Kansas to tax the entire capital stock of the Western Union Telegraph Company was denied. This decision is of far reaching importance, as circumscribing powers of a state to tax foreign corporations doing an interstate commerce business.

The court laid special stress upon the fact that the license fee of Kansas equalled eight per cent on the capital stock of the company not only in Kansas, but everywhere else, and was consequently confiscatory. It was not only that, but it took a stated annual sum from the company regardless of the business done.

The Court of Civil Appeals at Galveston, Texas, recently decided that the law passed by the Legislature of that State, limiting a day's work of a railroad telegrapher to eight hours is unconstitutional.

The construction of the higher court is that the statute is in conflict with existing Federal statutes on the same subject, which statute allows nine hours as a working day, and the State's eight-hour law is in conflict for the reason that railroads are practically inter-state methods of communication, and necessarily the Federal laws must take precedence. This is the first appellate court construction of this law, and consequently the decision is of great importance.

Effect of Magnetic Storm on Government's Alaska Cable.

During the magnetic storm which affected telegraph operation so seriously on September 25 last, the operators on the Government cable between Seattle and Sitka and Valdez had considerable difficulty in operating that cable. At 9 a. m. on the morning of that day the operator at Seattle found it impossible to keep the siphon on the paper, the suspension being nearly broken with all resistance possible in the circuit. A voltmeter across cable and ground showed a variable voltage of from 30 to 150, the voltage at no time being steady but averaging about 60. After a careful examination of terminals in Seattle to see if by any possibility they had picked up a leak on a high power city line, the operator at Fort Lawton, eight miles from Seattle, grounded the cable at that point and it was impossible to get a reading with a "1/1000" shunt on the reflecting galvanometer. Not until 12:30 p. m. were they able to get in working communication with Sitka and Valdez. Valdez reported then that the land lines from that point were working satisfactorily without any batteries.

Earth currents occur occasionally on the Sitka-Valdez cable to a greater or less extent causing short interruptions until proper adjustment overcomes the trouble. They are always noticeable on the Seattle-Sitka section when testing, but before this time they had never been severe enough to cause any great inconvenience.

Obituary.

The wife of Mr. J. L. Adam, cashier of the Western Union Telegraph Company at New Orleans, died on January 6.

The wife of Madison Buell, of Buffalo, N. Y., a well-known old time and military telegrapher, died on January 20.

Christian C. Frey, an old time telegrapher, died January 8 at Seymour, Ind., aged sixty-nine years.

Alvin T. Allen, aged fifty-eight years, died at Bunkie, La., on January 9. Mr. Allen had been identified with the telegraph in Louisiana for many years past.

Mr. M. E. Washburn, an old time and United States military telegrapher during the Civil War, died at Indianapolis January 15, aged seventy-four years. Mr. Washburn had been identified with the Big Four Railroad for the past forty-four years.

Hiram A. Woodring, aged fifty years, a well-known telegrapher, and for the past eight years chief operator of the telegraph department of Haydon, Stone and Company, brokers, of New York, died on January 12. Interment was at South Bethlehem, Pa. Mr. Woodring was a well-known old time telegrapher, and had worked at his profession in Washington, Chicago and at other points.

L. A. Angel, night chief operator of the Postal Telegraph-Cable Company at Birmingham, Ala., died January 17, aged sixty years. Mr. Angel served with distinction as a telegrapher in the Confederate Army during the Civil War, being an operator for General Fitzhugh Lee at the age of twelve. For many years he was a prominent figure in telegraph circles in Richmond, but for the past fifteen years had worked in cities farther South.

LETTERS FROM OUR AGENTS

CLEVELAND, O., WESTERN UNION.

Wire Chief W. H. McCormick and Miss Lillian Winters, of the operating force, in this office, were married at Grand Rapids, Mich., during the holiday season.

Operator J. S. Martin, of this office, was also married recently, to Miss May Hartory, who has been the telephone operator at the Hollenden Hotel, in this city, for several years.

EL PASO, TEX., WESTERN UNION.

The force in this city at the present time is made up as follows: Norman Ringer, manager; J. W. Brooks, chief operator; J. W. Dudley, night chief; C. Vollertsen, wire chief; H. B. Nelson and C. G. Hull, first Dallas, quadruplex; T. H. Esperson and C. B. Woods, second Dallas, quadruplex; W. L. Young and J. A. Young, first Denver, quadruplex; L. W. Broyles and J. H. Cronin, second Denver, quadruplex; C. M. Blum and R. F. Campbell, Los Angeles, quadruplex.

On the way wires are: E. Lomasney, Mrs. A. V. Lomasney, Mrs. J. H. Ray, Miss B. Porter, L. V. Wortham, F. Vandervoort, W. R. Fitzgerald, W. J. Shea and W. J. Pokorney, the latter being assigned to the late night trick.

P. Humphries is chief operating clerk; L. Garcia, day check, and O. Hale, night check.

The branch office managers are: Hosmer Hill, Union Depot; Isabel Martin, Sheldon Hotel, and L. A. Etie, El Paso Junction. E. Espinosa is chief operator at El Paso Junction.

In the clerical department are: H. L. Esch, cashier; M. Fontain, book-keeper; I. Wimber, assistant book-keeper; and A. Mawhinney, S. Bigelow, N. Briggs, A. B. Weatherby and H. H. Dansboe, clerks. In addition to this force there are thirty-four messengers regularly employed.

NEW YORK, WESTERN UNION.

Leon H. Jordan, of this department, has resigned to accept the position of manager at Charlottesville, Va.

F. E. Wellington has resigned to accept a position in his home city, Detroit, Mich.

William H. Mayer, of the eastern division, has for a third time been reappointed Borough Recorder at Wallington, N. J.

Charles Thoms, chief of the quadruplex department, who has been seriously ill for the past three months, is much improved, now having resumed his duties.

M. W. Jones, for several years past in charge of the complaint bureau in New York, has resigned to accept a position as secretary to Vice-President Stewart of the Guayaquil and Quito Railroad at Ambato, Ecuador, and sailed for that place January 16.

Henry N. Miller, for many years connected with this department and lately employed by the United Wireless Telegraph Company on the steamer Manhattan, died suddenly on January 14.

Thomas G. Tice, a well-known telegrapher and for many years employed in the brokerage business, died at his home in Brooklyn, N. Y. Mr. Tice had been in poor health and unable to attend to his duties for the past year.

OTHER NEW YORK NEWS.

The annual dinner of the American Institute of Electrical Engineers will be held at the Hotel Astor, New York, February 24. Prof. Elihu Thomson will be the guest of honor.

The annual dinner of the Morse Electric Club will take place at the Hotel Savoy, Fifth Avenue and Fifty-ninth Street, February 5, at 6:30. The entertainment committee is arranging an interesting program and a large attendance is expected.

A messenger of the American District Telegraph Company in New York earned \$80 in three days during the holidays delivering messages at two cents each. A brokerage firm had 4,000 messages to be delivered and this boy answered the call. He worked night and day until all of the messages were delivered.

Assessment No. 503 has been levied by the Telegraphers' Mutual Benefit Association to meet claims arising from the deaths of Annette E. Collins Smith at Los Angeles, Cal.; John F. Keregan at New York; George B. McCoy at West Point, Ky.; Frederick Fairchild at New Haven, Conn.; William T. Mobley at Los Angeles, Cal., and Lewis M. Owings at Columbus, O.

The Serial Building Loan and Savings Institution, of 195 Broadway, N. Y., has in the twenty-five years of its successful existence assisted over eleven hundred telegraphers to secure homes. It was established by telegraph men for the benefit of those in the profession and has always been conducted in their interest. You can buy a home and have from twelve to twenty years in which to pay for it. Write for particulars.

The Hulit Standard Telegraph Sending Machine

Will not split a dot, shorten a space, or transmit "choppy" Morse.

Is a ONE-HAND Transmitter with ONE SOLID CONTACT for making all dots and dashes. The contact is operated by an INTERMITTENT SPRING MOTOR.

THE MOTOR DOES THE WORK; you only control it. The Touch is EXTREMELY LIGHT.

Has MOST CONVENIENT ADJUSTMENTS. Is SHOCK-PROOF. The sending is EASY, and, if you wish, FAST. The Morse is PERFECT.

Send for

"\$5.00 for a Split Dot"

and for Booklet giving description, price, testimonials, and OUR SPECIAL 30-DAY TRIAL OFFER.

LOCAL AGENTS WANTED

The Hulit Transmitter Co.

529 Kansas Ave., Topeka, Kansas, U.S.A.

Leg Pattern \$3.50
Legless Pattern 4.00
F.G.B. Columbia, Pa.

THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,
Columbia, Pa. R. F. D. No. 1



Telegraph and Telephone Age

No. 4.

NEW YORK, FEBRUARY 16, 1910.

Twenty-seventh Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Locating and Determining Faults With and Without a Meter.

The attempt to locate and determine the nature of multiplex and other telegraphic faults today without the aid of a voltmeter or ammeter places one to about as great a disadvantage as an operator would experience trying to copy a code sender on a bonus wire without a typewriter. In each case the operation is obviously slow and liable to error through considerable guesswork.

Nevertheless there are many faults, and probably a majority of them at that, which can be determined with considerable accuracy without an ammeter if one goes about it in the right way; that is to say, first, does a little common sense thinking.

For instance suppose we suspected from the symptoms present that the failure of a quadruplex circuit to work is due to one of the poles of the distant battery being open, but having no ammeter at hand do not care to feel for the current with our fingers. The facts could be ascertained very quickly without leaving the set in the following manner.

Request the operator at the other end of the circuit to close the key on his polar side and make a series of dots on his transmitter. Then

if you hear the incoming signals on the number two relay, go to the "ground" on the home set. He will then be compelled to make his signals with his own battery. If the signals are silenced and your own neutral relay stands open, the indication is that the closed or negative pole of his battery is open, or at least the current is not getting through his pole changer. If the signals continue to arrive, however, while the distant polechanger is closed request him to open the key on the polar side. If the signals are then shut out you will know that it is the positive pole of his battery that requires attention.

If the fault cannot be remedied at once the quadruplex apparatus may still be worked as a duplex by using the number two or B side only. In this case all that is required is to instruct the distant operator to keep the key on his polar side closed or open, according to which position leaves the good pole to the line, and then operate the B side in the usual manner as a duplex.

Again, a meter is hardly necessary to determine the fact that a high resistance has developed in the points of a distant transmitter, or in the leak box coil or connection at that point. In other words, to know that the short end current of the distant battery is arriving in volume almost as great as that of the long end.

This fault should be detected the moment the home relay on the number two side of the quadruplex shows a marked decrease in its working margin. This very reliable sign is indicated by the inability to alter the tension of the retractile spring on the neutral relay to any great extent without interfering with the incoming signals. Of course, the reader should understand that we are not referring to wet weather margins but to abnormal margins which develop at times on apparently normal circuits.

In a case of this kind an ammeter would probably show that the short end value of the arriving current was in volume in the neighborhood of thirty or forty milliamperes instead of about fifteen or eighteen as it should be. Hence when the working margin on the neutral relay is small always suspect the distant transmitter adjustments as being the cause thereof.

An improperly adjusted transmitter very easily brings about this result and the majority of quadruplexes would give much better services if the importance of a finer transmitter point adjustment were more generally realized. An open or defective ground at the other end of a duplex circuit may be suspected when after a careful balance it is found necessary to give the armature lever of the polar relay a great bias in order to read the incoming signals. The necessity for altering the position of the lever indicates a false balance; that is to say, one that

is not true to the working conditions of the circuit when the distant battery is cut in. If there is no foreign current flowing through a conductor when both duplexes are on the "ground," the lever of the polar relay when centered should always lie at a distance exactly midway between the two magnets. If there is no defective ground or line disturbance its position should be normal at that midway point as long as the balance holds good. A biased armature lever therefore gives a strong hint that something is wrong, and the attendant should at once investigate the matter.

Again, if it becomes necessary, not only to balance to the distant battery on a quadruplex circuit instead of to the regular ground coil at that point in order to be able to read the incoming signals on the common side relay of the home apparatus, but also to give the home polar relay armature a bias to improve the incoming signals on the A side, the displacement of the latter lever indicates strongly that the two magnet windings of the polar relay are unevenly wound; or, as it is commonly expressed, the relay is lopsided.

Where a lopsided polarized relay is used on a quadruplex circuit, an ordinary line balance to the usual distant ground coil, although true magnetically so far as it applies to the polarized relay is concerned, is necessarily false to the evenly wound neutral relay because the former instrument requires more current through one of its coils than the other in order to even up the magnetic strength of the two divisions.

An ammeter would of course at once disclose the false balance by showing different volumes of current flowing through the main and the artificial line coils respectively and thus suggest the probability of a defective relay winding. In the absence of an available meter the mere necessity for lever displacement under the conditions stated should be considered good ground for suspecting the windings of the polar relay.

In like manner the presence of a foreign current in the line conductor may be ascertained by means of the armature of the polarized relay. If the volume of such a current flowing through the line conductor from the earth or other source while both the home and the distant duplex or quadruplex apparatus switch levers are on the ground, is great enough to interfere with the normal multiplex current to a harmful degree, it will be found that when the relay armature is finally centered, it is not midway between the magnet pole pieces by any means, but has a decided bias to one side.

From these simple examples it will be seen that while conditions often arise when the displacement of the polarized relay armature is temporarily unavoidable, the necessity for so shifting it is always a reliable sign that something is wrong.

A close observer of the mechanical arrangement of telegraph apparatus of all kinds while in active operation soon learns to detect with

great accuracy the principal troubles that arise, by the signs manifested in the disarrangement of the adjustable parts. The illustration cited is but one of many indicators of trouble which are available and in plain sight if one is but observing enough to detect them.

Recent Telegraph and Telephone Patents.

A patent, No. 946,664, for a vibrator for telephone transmitters, has been granted to J. P. Edwards, of Chico, Cal.

A patent, No. 947,148, for a telegraphophone, has been taken out by Ralph C. Browne, of Salem, Mass.

A patent, No. 947,244, for a telegraphic transmitter, has been secured by Patrick B. Delany, of South Orange, N. J. An auto-dot key for making dots automatically by current impulses of uniform strength and dashes by current impulses of uniform and less strength than used for dots.

A patent, No. 947,320, for auxiliary signaling apparatus for telephone lines, has been awarded to Charles S. Winston, of Chicago, Ill.

A patent, No. 947,335, for a connection-registering device for telephones, has been issued to David S. Hulfish, of Chicago, Ill.

A patent, No. 947,340, for a telephone switch apparatus, has been secured by Stanislaw A. Koltonski, of Boston, Mass.

A patent, No. 947,395, for a telephone transmitter, has been granted to William E. McCormick, of Chicago, Ill.

A patent, No. 947,772, for a selective ringing key, has been awarded to Burton W. Sweet, of Cleveland, Ohio.

Investigation of Telegraph and Telephone Companies in New York State.

The legislative committee of New York State which is inquiring into the wisdom of placing the telephone and telegraph companies under State supervision, has continued its investigations, holding several sessions recently. Among the witnesses examined was Mr. George Gray Ward, vice-president and general manager of the Commercial Cable Company, who submitted data showing how the Commercial Cable Company reduced the old Atlantic cable rate from fifty to twenty-five cents a word and how at that rate, which is the one now charged, is the lowest cable rate in the world except where deficits are paid by government taxation.

Moreover, he said, there is no combination between the Atlantic companies to maintain a uniform toll, and while in the last ten years the operating expenses of the cable companies have greatly increased, the use of code words and phrases, which are supplied gratis, has so increased within the same period as to minimize the cost of cable messages to a point far below a twenty-five cent rate.

"The disposition of cable companies to meet public requirements," said Mr. Ward, "is con-

spicuously shown in their attitude toward code language employed to reduce charges and so reduce the cost of cable transmission. Those who use the cables day by day are highly expert in devising cipher codes which enable them to express many words by one word. Originally these words had to be selected from dictionaries and were therefore genuine words, but owing to the complaint that restriction to genuine words did not give to merchants a sufficient range of words to make up efficient codes the rule has been gradually relaxed to admit artificial or manufactured words that are supposed to have some resemblance to real words. The extent to which this liberality has been taken advantage of may be judged from examples of artificial words which have been taken from actual cablegrams and are alleged to be pronounceable."

Mr. Ward gave to Senator Davis, chairman of the commission, the following list of code words composing a cablegram with the remark that where words of the kind were used a mistake in a letter of one of them had the effect of destroying the whole sense of the message:

"Nofebawuma phidvuztaf itacomelis kiuvwuv-gaw exsexaicgu eesawofyid zylemuzzop gabaga-bhaka pawyngicob wowiyihbow jorthpezut vrtfe-verd guasyabjcy, eqkeyefogi uqbijegotu ulhkyco-kklyz."

"Each of these so-called words," explained Mr. Ward, "really represents ten figures; the ten figures are two groups of five figures, and each group of five figures represents a separate code word and each code word easily represents, on the average, at least ten plain words. The net result is that each of the so-called code words, representing at least twenty words in plain language, is transmitted at a total cost of twenty-five cents."

"The cable companies are transmitting these notwithstanding that they are an imposition. The Postmaster General of Great Britain, in a letter to the London Chamber of Commerce, characterized them as an abuse. It will be noticed that the so-called words contain only ten letters each. This is only because the International Regulations fix that limit; were it not for this limit it is probable that the entire cablegram given would have been run together and presented for transmission as a single word of 160 letters, to be transmitted at a cost of twenty-five cents. It is almost impossible to transmit such words rapidly and correctly by cable, and yet any change or omission of even one letter would make an entirely different meaning. To transmit artificial code words by cable is most difficult."

"The point is made by agitators that codes are a luxury of the rich. That is not true. The cable companies have standard codes at their offices which the public are at liberty to use without charge, or, if the customer prefers, he may purchase an ordinary code at a small price. Travellers' codes are distributed free by bankers and merchants as advertisements. By the aid of these codes a message may be cabled from Europe

to America or America to Europe for seventy-five cents."

"When it is borne in mind that ninety-eight per cent of the cable messages are in cipher code and each code word, as explained, represents at least twenty plain words, it will be seen that cablegrams in code bring the rate down to less than two cents a word for the translated message."

"There is another very important thing to consider. Because of the difference in time between Europe and America the business hours common to both countries are only three or four. It is imperative that the cable companies shall have ample facilities to transmit with reasonable despatch all the business offered on both sides of the Atlantic during those hours."

"We are not in favor of either of the working of cables by the State at a loss or of the subsidizing of private cables on commercial grounds, both of which courses appear to us to burden the general taxpayer."

"The amount expended by all cable companies for maintenance and repairs," continued Mr. Ward, "is enormous; the total sum is little realized by the public. For instance, it is costing the Commercial Cable Company over \$70,000 a year to maintain a special seagoing repairing steamer at the wharf on the American side in readiness to put to sea at short notice, and in addition thereto a large amount is expended when the steamer puts to sea to repair a cable. Then, there is the expense of repairing the cables themselves. Sometimes a single break costs over \$50,000 for repairs. On one occasion it cost the Commercial Cable Company \$92,000 for a single repair."

"The twenty-five cent rate is a fair rate, it is no more than necessary to pay operating expenses and to keep the plant in thorough repair and readiness to furnish the best possible service in point of regularity, accuracy and speed and to pay a very reasonable return on the money invested. The service cannot be rendered for less."

Mr. James A. Scrymser, president of the Mexican and the Central and South American Telegraph Companies, testified that these two companies used one cable and charged a fifty cent rate, although in many cases messages sent through their cable did not travel half the distance of messages over the Atlantic cables of the Commercial Cable Company.

Mr. Union N. Bethell, vice-president of the New York Telephone Company, and Howard F. Thurber, its general manager, also testified as to telephone rates in the metropolitan district. Mr. Thurber said that the rates were as low as it was possible to make them and continue to earn a profit and that they were largely based on the density of population. He said that it was necessary to establish zones in which fixed charges were made, and for that reason local calls were made five cents in Manhattan and ten cents from Manhattan to the Bronx and Brooklyn. He said that a reduction of these ten-cent rates would

seriously affect the company's dividends. He explained the recent reduction in certain suburban rates by saying that the increase in business from these points made the reductions permissible. Mr. Bethell said that it cost more to carry a man's voice over a certain distance than to carry his person, because when a man telephoned he had the exclusive use of the apparatus. He also said that many protests had been received from business men against the installation of two telephone systems in the same city.

Several other telephone and telegraph officials have been before the committee, which hopes to be able to finish its work and make a report by March 1.

Personal.

Mr. Thomas A. Edison, accompanied by his wife and youngest son, left February 1 for his winter home at Fort Myers, Florida, where he will remain until April, as is his usual custom.

Colonel William Bender Wilson of Holmsburg, Philadelphia, president of the Society of the United States Military Telegraph Corps, was a recent New York visitor.

Mr. W. H. Hurst, president of the Stock Quotation Telegraph Company, James Rascovar, president of the New York News Bureau, Henry Myers, president of the Hamilton Press, and J. J. Walsh, director of the Stock Quotation Telegraph Company, sailed for England on the *Maurelania*, February 9, to inspect the system of the Central News Company, Limited, of London, in which they have a large interest.

Mr. Bernard E. Sunny, president of the Chicago Telephone Company, at the annual meeting and dinner of the Western Society of Engineers on January 12 read an interesting and instructive paper upon "The Engineering of Chicago," in which he outlined plans of proposed permanent city improvements relating to sewers, steam railroad terminals, pavements, subways, etc. Mr. Sunny is one of the most wide-awake and progressive citizens of Chicago, and is probably doing more than any other individual for the improvement of the city.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Among recent executive office visitors were Superintendents C. F. Ames, of Boston; W. A. Sawyer, of Philadelphia, and F. E. Clary, of New Haven, and Managers W. J. Higgins, of Buffalo; J. P. Doyle, of Oswego; E. A. Baird, of Binghamton; I. W. Copeland, of Troy; A. E. Reynolds, of Schenectady; J. E. Bierhardt, of Syracuse; T. J. Meade, of Albany; F. E. Howell, of Utica; H. F. Taff, of Washington; J. M. Creamer, of Baltimore; J. W. Reed, of Philadelphia; H. H. White, of Portland, Me.; E. Ryder, of Hartford, Conn., and F. H. Lamb, chief clerk to Superintendent Sawyer, of Philadelphia.

Mr. I. N. Miller, Jr., assistant general superintendent at San Francisco is expected to arrive in New York from Europe, February 16, on his

way home from a trip around the world which he has been taking, accompanied by his wife, during the past year for the benefit of his health.

The managers of the first district, Eastern division, Mr. E. M. Mulford, superintendent, held a conference in the office of that official in New York, February 5. Managers from Buffalo, Syracuse, Oswego, Utica, Schenectady, Albany, Troy, New York, Brooklyn, Newark, Jersey City, and Binghamton were present.

At the annual meeting of the American District Telegraph Company of New York, held January 27, Mr. Union N. Bethell was elected a director to succeed Phillip V. R. Van Wyck. All of the other officers and directors were re-elected.

At the annual meeting of the stockholders of the American District Telegraph Company of New Jersey, held at Jersey City, N. J., on February 8, Mr. Union N. Bethell was elected a director to succeed George J. Gould, resigned. All of the officers were re-elected.

RESIGNATIONS AND APPOINTMENTS.

Mr. W. E. Black, of the Cleveland, O., office, has been appointed manager at Fort Wayne, Ind., vice Mr. O. L. Perry, resigned. Mr. Black was born at Youngstown, Ohio, June 28, 1886, and entered the telegraph service in that city in 1900, as messenger boy. He afterward became clerk and then operator, and was later employed by the Erie Railroad, and also at Jacksonville, Fla. Previous to his present promotion he had served as relief manager at various places.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

President Clarence H. Mackay, accompanied by Charles C. Adams, second vice-president of the company, has been making a trip of inspection in the southern division that took them as far south as New Orleans.

Mr. W. I. Capen, general superintendent of plant, has returned from a business trip in the South.

The first banquet of the recently organized Postal Telegraph Club of Atlanta will be held in that city February 26.

Several changes have been made recently in the executive offices, giving Mr. E. J. Nally, vice-president and general manager and Mr. C. P. Bruch, third vice-president more room for their offices, and to provide space for a file-room and an employees library.

RESIGNATIONS AND APPOINTMENTS.

Mr. Howard Mayhall has been appointed manager at Lexington, Ky., vice Mr. Samuel Howard, resigned.

Mr. F. W. Jacobs has been appointed day chief operator and H. M. Barlow night chief operator of the Peoria, Ills. office; the former filling the vacancy caused by the advancement of Mr. F. H. Jacobs to the managership.

The Cable.

It is reported that the Western Telegraph Company has commenced legal action against the Brazilian Government and Mr. Richard Reidy, in connection with a concession granted to Mr. Reidy for laying and working submarine telegraph cables on the coast of Brazil. The cancellation of the concession is demanded on the ground that the company's rights are infringed thereby.

In the semi-annual report of the Direct United States Cable Company for the six months ending December 31, 1909, it was stated that the company had under consideration the plan of landing the end of their main cable at a point in Newfoundland. The cable for transmitting the Atlantic messages would then be shorter, and so capable of working at a greater speed. Another advantage would be that there would be less likelihood of interruption, and such interruptions as might occur would be of less importance with regard to the earnings.

A committee of the Australian Senate has reported that present conditions give an imperfect cable service and insufficient news of various parts of the Empire and has recommended the completion of the all-British cable, in order to bring about a reduction in the charges for press cablegrams. The restriction prohibiting newspapers supplied with cable news by the Cable Association from publishing news received through any other source is condemned as being exceedingly injurious, and it is recommended that steps be taken to make such restrictions impossible.

Mr. James A. Scrymser, president of the Central and South American Telegraph Company and Mexican Telegraph Company, together with Mrs. Scrymser, Mr. J. Montgomery Hare and Mr. Loyall Farragut will sail on the steamer "Vasari" for Buenos Aires February 19, where they will remain about two weeks visiting places of interest in Argentina and Uruguay. From Buenos Aires they will go to Valparaiso, across the Andes, thence to the Isthmus of Panama, visiting the stations of the Central and South American Telegraph Company. They expect to remain on the Isthmus of Panama for some time, arriving in New York about May 20.

Municipal Electricians.

The contract for installing a fire alarm system at Palo Alto, Cal. has been awarded to the Gamewell Fire Alarm Telegraph Company.

A new fire system alarm has recently been completed at South Bethlehem, Pa. The new system has four circuits and twenty-four stations.

A large increase was noted in the number of fire and police calls by telephone in Chicago during the past year. There were 8,825 fire calls, an increase of 986 over the preceding year and 62,005 police calls, an increase of 12,602 over 1908. Free service is given by the telephone company for all calls to fire or police headquarters.

The municipal authorities of Rochester, N. Y., having found that the telephone is used more in that city for reporting fire alarms than the fire alarm boxes are taking steps to mount the boxes in more conspicuous places, have them painted red, and have red lights placed above them.

Legal.

According to a recent decision of the Supreme Court of Oklahoma cities and towns in that state have no right to fix telephone or telegraph rates, such power being confined solely to the State Corporation Commission.

A suit has been brought against one of the telegraph companies in the State of Mississippi to recover damages alleged to have resulted from a runaway.

The declaration in the suit states that the rays of the sun caused the wire to "shine, flash and sparkle brightly" and the "shining and sparkling wire" frightened an "ordinarily gentle horse" when he came "suddenly and unexpectedly in view of and in close proximity with the said shining and flashing wire."

After this, the construction gangs will either have to blindfold all the horses in the vicinity or put a screen around the wires.

An interesting legal question now confronts the State officials of Michigan. Under the laws of that State telephone and telegraph companies have to be incorporated under a special act of the legislature, while all other companies doing business in the State are incorporated under a general act. The United Wireless Telegraph Company has applied for permission to do business in that State, and the authorities are in a quandary to determine under which classification the company should be incorporated. As they do not use wires for the transmission of messages, some are of the opinion that the wireless company should be incorporated under the general act.

According to an opinion recently rendered by the Fourth Court of Civil Appeals of Texas, telegraph companies which accept a message by telephone cannot claim that the conditions of their contracts as printed on the back of the telegram forms are applicable. In reversing the action of a lower court, the judge took as his ground the fact that the agent of the company cannot also be the agent of the sender and that the employee of the telegraph company becomes both in cases where messages for transmission over the wire are accepted by him orally or over the telephone.

As a result of the decision of the Supreme Court of the United States in the case of the Western Union Telegraph Company against the State of Kansas, in which it was held that the State could not collect a tax based upon the entire capitalization of the company, similar attempts on the part of Wyoming and other States to collect large amounts from the Western Union for doing business will be abandoned.

Radio-Telegraphy.

The United Wireless Telegraph Company is preparing to build a large addition to their manufacturing plant at Jersey City.

The vessels of the Chilean navy will soon be equipped with wireless telegraph apparatus of the Marconi system.

At the regular monthly meeting of the Wireless Institute of New York, held at the Engineering Societies Building February 2, Mr. A. R. Sharples presented a paper on "Resistance in Oscillatory Circuits."

Experiments have been made recently in conveying music by wireless telephone from the Metropolitan Opera House to the stations around New York within communicating distance by this method.

The New England Wireless Society at a meeting held in Boston February 4, passed resolutions protesting against the proposed appointment of a National Wireless Commission unless the interests of the manufacturer and experimenter are properly represented.

Mr. E. B. Moore, a student in the Massachusetts Institute of Technology and president of the wireless society recently formed in that institution, is endeavoring to develop a wireless telephone outfit small enough to be carried in the pocket. He believes that such apparatus can be produced with a range of fifty miles.

The Marconi Wireless Telegraph Company, it is said, expects to establish a chain of twenty or more stations at principal points throughout Canada, the object being to establish a cheap service between all parts of England and the Dominion. Messages to the less important points in Canada will be transmitted to those places by telephone.

Dodge's Institute of Telegraphy, Valparaiso, Ind., has established a wireless station to teach his branch of the art to its pupils, and each student being provided with a receiving outfit in his room, is required at certain times during the day to copy messages sent out by the central station. Mr. P. F. Godley, who has charge of the instruction in wireless was before connecting himself with this institution, one of the best operators of the United Wireless Telegraph Company, and is also an expert wire operator.

A novel arrangement for producing practically undamped oscillations has been developed by Professor W. Peukert, of Brunswick, Germany. For a park gap two iron discs are used slightly separated from each other and so arranged that when one of them is revolved a thin film of oil is formed between them. When the discs are at rest and a sufficient difference of potential is applied a discharge in the form of small sparks takes place. If the voltage is increased the discharge takes the form of a continuous arc. When the movable disc is rotated the arc is resolved into spark discharges between the two discs. The use of the oil between the discs gives a more regular effect than would otherwise be obtained.

The Spanish war department has ordered two new wireless telegraph stations. One of these, a high power station, will be installed at Madrid, and the other, a smaller power station, at Ceuta, thus establishing wireless communication between this island and the Spanish capital.

A wireless station has recently been installed on the Island of Angaur, belonging to the South Caroline group in the Southern Pacific. By this means the few hundred people living on this island have connection with the outside world through a station on the island of Yap, 310 miles distant, which is in direct communication by cable with San Francisco, Shanghai and Menado.

The Balsillie system of radio-telegraphy, the apparatus for which has been developed by the British Radio-telegraph and Telephone Company, has several novel and interesting features. A rotary spark gap is used which is so constructed that when rotated a large air pressure is produced at the points when they are in closest proximity. This gap is capable of interrupting the discharge from the condenser from 300 to 1500 times per second. The detector used is a very sensitive form of magnetic hysteresis transformer which is fully as sensitive as an electrolytic detector and is entirely automatic in its action and not subject to deterioration due to heavy static charges on the aerial.

Another Rescue by Wireless.

The value of wireless telegraphy as a lifesaver at sea was again demonstrated February 4. The steamship Kentucky left Newport News, Va., February 2, on her way to the Pacific Coast. Soon after getting to sea she encountered heavy weather and began to leak so badly that by the morning of February 4 the captain gave up all hope of reaching Charleston, the nearest port, and had W. D. Maginnis, the operator of the United Wireless Telegraph Company on board the vessel send out the distress signal "S. O. S." together with their location as near as they could determine it. The steamship Alamo, bound for Key West, the nearest vessel to the scene, was sixty-five miles away and she made all haste to reach the sinking vessel. Before the Alamo came in sight the water had risen so as to put the dynamo on the Kentucky out of commission and thus render the wireless apparatus useless, but the location given by operator Maginnis in the first messages had been accurate enough so that the Alamo had no difficulty in finding the sinking ship and taking off the crew, consisting of forty-seven men.

Mr. Maginnis has been a wireless operator for about five years and is considered one of the best operators in the United Wireless service. Before being assigned to the Kentucky at Newport News, after the operator who accompanied the ship to that point from New York had resigned, he was informed of the fact that the ship was not considered seaworthy, but this did not deter him from accepting the post.

The Telephone.

Mr. H. R. Swartz, of Trenton, N. J., has resigned from the presidency of the Interstate Telephone and Telegraph Company of New Jersey, which was recently acquired by the Continental Telephone and Telegraph Company, and Mr. John A. Howard, president of the latter company, has been elected as his successor.

The Cumberland Telephone and Telegraph Company having made extensive improvements and additions recently to their toll and long-distance facilities at Evansville, Ind., and vicinity, gave a reception to the business public in that city January 25, affording them an opportunity to see how promptly connections could be made over the new routes to distant points.

At a recent meeting of the board of directors of the Hudson and Middlesex Telephone and Telegraph Company at the headquarters of the company at Perth Amboy, N. J., it was decided to increase the capitalization from \$250,000 to \$1,000,000. The additional capital is for the purpose of extending the plant of the company and completing a line to Washington, D. C.

At the convention of the Wisconsin Electrical Association held in Milwaukee January 19 and 20, Mr. W. R. McGovern, chief engineer of the Wisconsin Telephone Company, presented a paper on "Inventories," in which he explained the methods followed in taking inventories of telephone exchange plants in Wisconsin to determine the estimated cost of replacing the existing plants as well as the estimated present value.

A bill has been introduced in the Ohio legislature requiring competing telephone and telegraph companies to interchange business in order that all points served by any company may be reached by a customer. The proposed statute places the regulation of these interests under the jurisdiction of a commission which also has supervision over electric light and power companies, railroads and other public utilities, with power to fix rates.

In a recent lecture before the Berlin Electrical Society Mr. A. Ebeling described experiments made by German engineers in the use of the Pupin system of loading telephone lines. As a result of the investigations with the use of Pupin induction coils on aerial lines they found that an economy of line conductor of fifty per cent could be obtained; in other words, that a loaded line could be constructed for about half the expense of an unloaded line having the same efficiency.

The regular monthly meeting of the American Institute of Electrical Engineers held February 11 at the Engineering Societies' building, New York, was under the auspices of the Telegraphy and Telephony Committee, of which Mr. William Maver, Jr., is chairman. Mr. W. L. Campbell presented for discussion an interesting paper upon "Modern Automatic Telephone Apparatus," in which he described at considerable length the operation of the principal automatic system in use at the present time.

At a meeting of the New York Telephone Society held February 15 Mr. G. Swopa, general sales manager; Mr. O. D. Street, general telephone sales manager; and Mr. W. E. Harkness, sales engineer of the Western Electric Company, gave short talks upon the relation of the telephone to railway service.

An interesting application of the intercommunicating telephone system has recently been made in the public schools of Haddonfield, N. J. From a master station in the principal's office any one of thirty-two stations scattered throughout five buildings may be called instantly by merely pressing a button, and the principal is thus enabled to get into communication with any of the teachers without delay.

In pursuance of the policy of consolidation of the smaller subsidiary companies of the American Telephone and Telegraph Company, papers have been filed with the Secretary of State of New Jersey, completing the consolidation of the Delaware and Atlantic Telegraph and Telephone Company of New York with the company bearing the same name in New Jersey. The Northeastern Telephone and Telegraph Company, the Hudson River Telephone Company and the Seashore Telephone Company have all been consolidated with the New York Telephone Company.

Mr. Gansey R. Johnston, formerly secretary and auditor of the American District Telegraph Company of New Jersey, but who has been since 1905 general manager of the Columbus, Ohio, Citizens' Telephone Company, has been made general manager of all of the telephone companies in Ohio, recently acquired by J. P. Morgan and Company, with the exception of those at Dayton and Toledo. The system over which Mr. Johnston now has supervision comprises fifty-eight exchanges, with about 42,000 telephones and a toll line system extending throughout the state with 3,000 miles of pole lines and 15,000 miles of toll circuits.

Evidence was taken recently in New York in the suit which has been brought by the minority stockholders of the United States Telephone Company and the Cuyahoga Telephone Company, to enjoin the sale of the controlling interest in those companies to J. P. Morgan and Company. Mr. E. J. Hall, vice-president of the American Telephone and Telegraph Company, was the principal witness examined. He testified that overtures had been made to him by James S. Brailly, Jr., and F. H. Goff, president of the Cleveland Trust Company to purchase the properties involved. Mr. Hall endeavored to bring this about but when he attempted to get a banking concern to finance a holding company for the stocks of the various companies, all of those whom he approached on the subject, including J. P. Morgan and Company, refused to have anything to do with the deal. Mr. Hall accordingly gave up his attempt to bring about the purchase and notified the holding interests that he would not buy the stocks. Shortly after this J. P. Morgan and Company bought the stocks on their own account.

Some Old Time Reminiscence.

Mr. J. J. Fowler, secretary of the Board of Civil Service Commissioners, at New Orleans, La., and an old time telegrapher sends us an historical document worthy of production. In forwarding the same Mr. Fowler says: "Time's flight has left few of the old clippers of space. I presume to send you the enclosed mile stone that you may measure your data of the kids whose foot prints have been lost in the shifting sands."

The document enclosed reads as follows:

Boston, January 23, 1865.

Mr. J. J. Fowler,

Norwich.

My Dear Sir:

By reference to the last number of the "Telegrapher" it will be seen that complaint is made that the Boston District of the "National Telegraphic Union" admitted to membership an operator under the age of eighteen, which is in violation of the constitution. This of course has reference to yourself, as I learn upon inquiry that you lack ten months of the necessary age.

I am instructed by the district to inform you that you were admitted under misapprehension as to your age and that we cannot consider you a member as we have pledged ourselves to support and sustain the provisions of the constitution. We very much regret this and have not the slightest fault to find with your qualifications as an operator.

Trusting that when you reach the required age you will present your name, which will be promptly acted upon without a dissenting voice, and with kindest regards to you, I am,

Yours,

T. A. Davin.

Secretary, pro tem.

P. S.—If you have sent the directors any funds on account of initiation fee or dues, they will be returned.

The writer of the letter, Mr. T. A. Davin, is still a resident of the "Hub," where he is employed by Richardson Hill and Company, brokers. When Mr. Davin wrote the letter he had just left the service of the Government having been a military telegrapher during the Civil War.

On receipt of Mr. Fowler's letter we mailed it to Mr. Davin for his information, and to recall the painful duty which he once had to perform and that gentleman replied, in part, as follows: "Mr. Fowler's letter was an agreeable surprise. Please present my sincere regards to our old friend, and say I always regretted that the trifle of a few months kept him out of the National Telegraphic Union, because if the institution had been run by men of his calibre it would be in existence today, and a source of comfort to many worthy operators. In these days we hear much of the younger generation, but very little of those of fifty years ago."

"I have read the published accounts of the trials of telegraphic skill that have been going on for a long time and have wondered why the early years of the quadruplex have not figured in these interesting historical writeups

"In the early days of the quadruplex a trial of speed was ordered by the officials between New York and Boston, in which it was my privilege to take part. The system was by no means perfected at the time and the result was so gratifying that mention should be made of it. Mr. E. B. Pillsbury, now general superintendent of the Postal Telegraph-Cable Company, New York, who was one of the night chiefs of the Boston office at the time, furnished me with the figures, accompanied by a note reading as follows: 'I enclose memorandum in regard to speed trials in which you were interested. I think you have every reason to be proud of the record, which is as follows:

Boston, Sept. 1876.

(Extract from Chief Operator's Register.)

Western Union Telegraph Company.

Quadruplex test of speed between Boston and New York.

Started 10:42 a. m. Boston time; closed 11:42 a. m.

	Mes.	Words.
No. 1 side—W. E. Kettles sent.....	61	1,936
No. 2 side—C. D. Stanford sent.....	69	2,264
No. 1 side—Chas. Finch received....	57	1,643
No. 2 side—T. A. Davin received....	65	2,151
	252	7,994

These figures may look small to the present generation of operators, but when we take into consideration that the quadruplex system was new and not perfected, and the operators were more or less subjected to interruptions, the trial was a good one and was so considered by all concerned at the time it took place.

Mr. Davin was born in 1837, and became an operator in 1852 in the Astor House office, New York. He has been in active telegraph service in Boston since the close of the War.

Mr. Fowler was born in Buffalo, April 4, 1848, and entered the telegraph service upon the Buffalo and Lake Huron Railroad in 1860, later being employed by the New York Central Railroad at Albany. In 1863 he became an operator for the American Telegraph Company, serving that company at Albany, Troy and Norwich, Conn. At the latter place he worked on the famous No. 4 East press circuit. At that time the sending operators at New York were Fred Seibert, now dead, and David W. McAneney, now one of the chief operators in the New York office, where he has been continuously employed since the early sixties. The receiving operators on the line besides Mr. Fowler, were Fairchild, at New Haven, Shean at Hartford, Pope at Providence, Delany at Worcester and Duxbury at Boston. Most of these operators have been immortalized in the telegraph world by Walter P. Phillips in his series of articles which have been appearing in our columns during the past few months. Mr. Fowler next occupied a position at Buffalo for a brief period, when he entered the United States Military Telegraph Corps, in which he remained until the close of the war, when he went to Memphis, Tenn., where

he remained until 1880, when he left the telegraph to enter the telephone field. In 1883 he became general manager and director of the company operating in Mississippi and Louisiana, which position he held until his retirement in 1897. In 1899 he was called upon to organize a municipal civil service department in New Orleans and he has, since that time, been secretary of that body.

General Mention.

Representative Cary, of Milwaukee, has introduced in Congress a bill to prevent telegraph companies from forwarding, except by telegraph or telephone, telegrams or messages which are accepted for telegraphic transmission by wire.

The rehearing of the United Press petition for a permanent injunction against the Associated Press to prevent it from compelling members to remove wires and operators of other news services from its offices, it is said, will be called soon in Chicago.

The Venezuelan Government is preparing to construct a telegraph line to a point near the borders of Colombia and Brazil and if possible extend this to connect with the Brazilian system. Telegraphic connection between Venezuela and Ecuador has recently been established via Bogota.

The telegraph and telephone service in Paris was badly demoralized as a result of the recent flood in that city and has not yet been restored to its normal condition. At one time all communication with London was cut off and the news from London and other European cities was received in Paris via New York.

A committee of the National Electric Light Association, with Mr. W. K. Vanderpoel as chairman, is now engaged in an investigation of the subject of preservative treatment of poles and cross-arms. In order to gather desirable data, a circular of inquiry has been sent out to those interested in this matter, containing sixty questions bearing upon the subject.

We are in receipt of a finely illustrated catalogue of the Port Arthur Business College, Port Arthur, Texas. This outlines in detail the various courses given in this college, including the one in telegraphy and telegraph engineering. The equipment includes a complete line of wireless apparatus, so that the students graduating from this department will be prepared to engage in the wireless field as well as in commercial or railway telegraphy.

Herr Ruhmer, the German inventor who has been studying the problem of television, has evolved a scheme whereby he believes that the image of a person or object or any picture can be instantly reproduced at a distant point. To produce only the head and shoulders of a person, however, would require four thousand selenium cells and a corresponding number of wires between the two points, and Herr Ruhmer estimates that the apparatus alone would cost \$300,000.

Telegraph Happenings Here and There.

A man entered a southern telegraph office one evening recently and asked the night chief operator if he was in charge of the wireless service. In spite of his reply that he was not, the intruder began to deliver a wireless message to the chief with his fists and it required the combined efforts of several of the operators to persuade him that his services in the office were not desired.

A man who claimed to be a telegraph operator from Newburg, N. Y., was taken in hand by the police of Wilkes-Barre, Pa., recently after telling them that he had had \$6,000,000 stolen from him. As he claimed to have \$14,000,000 left, however, he did not mind the loss very much. Later when questioned by the mayor he admitted that he had lost a large amount, but as he thought he had \$10,000 left he did not complain.

A telegraph lineman, who recently sued a telegraph company for damages as a result of a fall which he sustained, brought into court a six-foot section of the pole which he claimed broke and caused him to fall twenty-five feet to the ground. It is unfortunate in the celebrated controversy about a pole which has been before the court of public opinion for some time past, the contestants could not produce as conclusive evidence as this.

An Arkansas woman has entered suit against a telegraph company for damages caused by mental anguish which she suffered as a result of an error in a telegram which she received. A relative sent a message saying "Father died this morning" and when delivered it read "Mother died this morning." The mother referred to was a favorite aunt and the sorrow which she felt for her death was not alleviated even when she learned that it was her uncle instead of her aunt who had died. She thinks that a few thousand dollars now would heal her lacerated feelings.

Among the peculiar suits brought against the telegraph companies under the so-called "mental anguish" laws enacted in the various states was one in North Carolina where the plaintiff asked for \$2,000 because the telegraph company failed to deliver to him promptly a message notifying him of the birth of a daughter. Another suit brought in Kentucky by the wife of an actor is based on the failure of the telegraph company to deliver a message to her husband who was with his company playing in Chicago, notifying him of the illness of their daughter. Her damages were caused, she alleges, by failure to have her husband's companionship at such a time. An Iowa man, being delayed in getting home, owing to a telegraph company's not delivering a message promptly and as a result of the delay failing to arrive in time to be present at his wife's death-bed, was considered in that state sufficient cause for a judgment of \$600 against the company.

It is said that there are telegraph wires in Heaven but no operators to work them.

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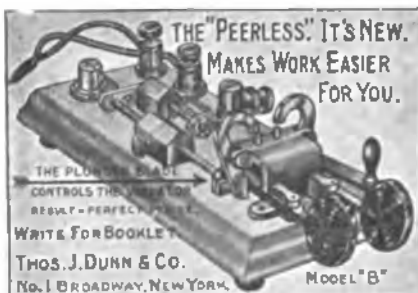
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The diagrams appearing in "Official Diagrams of the Postal Telegraph-Cable Company's Apparatus and Rules Governing the Construction and Repair of Lines" were made from the company's blueprints and are absolutely correct. This volume, which is published by TELEGRAPH AND TELEPHONE AGE, under official sanction and supervision, is of especial value to operators and linemen. It will be sent to anyone, postpaid, on receipt of fifty cents. Address J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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FEBRUARY 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Iron Wire Versus Copper.

As a result of the many severe sleet storms which have visited different sections of the country during the past two years, and the resulting damage to telegraph lines, there are many who advocate the general return to the use of iron wire for telegraphic purposes. It is doubtful, however, whether the results obtained by carefully comparing the behavior of copper and iron wire under storm conditions, would actually show any good reason for reverting to the former general practice of using iron wire of a size large enough to get the required conductivity on long circuits. With the introduction of copper wire for telegraphic purposes one of the factors which made its adoption desirable was the greater conductivity which could be obtained with a smaller cross section of wire. The smaller weight of the metal which it was possible to use and still secure better conductivity for long circuits, together with the longer life of copper than iron when exposed to atmospheric conditions offset the increased cost of copper per pound over iron

wire enough so as not to make its use a financial burden upon the companies. As a result, the common practice in line construction has, in recent years, been to use a copper wire of No. 9 gauge, or even smaller, whereas, when iron wire was generally used No. 6 gauge wire or larger was commonly employed. Comparing the two lines constructed of No. 9 copper and No. 6 iron wire, respectively, we find that when first built the line of iron wire has a breaking strength of about three times that of the copper wire. Even when iron wire is well galvanized the zinc coating is soon broken off in places and the iron, being exposed to the corroding influences of the atmosphere, rapidly loses a large part of its original strength, so that in a few years the copper line is as strong as the one built of iron wire. That this is true is shown, in a measure, in nearly every case where there has been a chance to compare the behavior of the two types of line construction under abnormal weather conditions. It has been found at such times that No. 6 iron wire has suffered as severely as the smaller copper wire. Hence, from the standpoint of increased ability to withstand severe weather conditions, it is hard to see where iron wire has any advantage, in the long run, over the copper.

Another factor which has not heretofore received the serious consideration of telegraph engineers now enters into the problem of line construction. That is to build the lines so that they may be used for telephoning as well as telegraphing. It is a well known fact that the iron wire is not at all suitable for telephonic purposes, its low conductivity alone making it useless for long lines. Hence, in order to realize the greatest possibilities out of a pair of wires, that is to have them serve a dual purpose, it is necessary that they should be of copper. Taking into consideration all of the conditions which have to be met in line construction, there does not seem to be any probability that iron wire will ever supersede copper for use on either telegraph or telephone lines.

Regulation of Telegraphs in New York State.

The careful investigation which has been made recently by a legislative committee of the conduct of the business of the telegraph companies in New York State has failed to reveal any of the startling facts expected by some would be reformers who believe that telegraph rates in this country are altogether too high and that the companies are making exorbitant profits upon the business. In fact, if, as a result of the investigations of this committee, the telegraph companies are placed under the supervision of the Public Service Commission, it is very doubtful if that body will require any reductions in rates, or will suggest any changes in the methods of handling the business. According to the testimony of Colonel Robert C. Clowry, president of the Western Union Telegraph Company, the average cost to his com-

pany of handling a message is twenty-eight and one-half cents and the average return is thirty-four and one-tenth cents. Upon a business of 80,000,000 messages per year this shows a profit of \$4,480,000 or less than five per cent. interest on the invested capital of the company. This surely is not an exorbitant return for an investor to expect on his money. The system which is in use to handle the telegraphic business to-day is the result of over sixty years of experience, and of the labor of many men of high executive ability, combined with the best electrical engineering talent to reduce the cost of handling the traffic to a minimum. As President Clarence H. Mackay, of the Postal Telegraph-Cable Company, said in his testimony, allowing for cost of materials and work, for the fact that addresses and signatures are sent free and for the great distance covered, the service in this country is undoubtedly the cheapest in the world. The rates in this country are often compared with those in European countries, where the telegraphs are owned and operated by the Government, but it must be remembered that the distances covered in those countries are small compared with those in the United States, and in England, where cheap rates obtain and a charge is made for addresses and signatures, there is a large deficit each year, which has to be met by the Government.

Advocates of cheaper rates usually advance the theory that if the rates were reduced the business would increase enough so that the companies could still make a profit. Unfortunately, however, these would be reformers fail to show just how this could be done. To handle more business, the companies would have to provide additional wire facilities, more operators and more messengers, and it is hard to see how any of the items which go to make up the cost of a message, could be reduced enough to permit of any considerable reduction in the rates.

We have always contended that inasmuch as the greater part of the business of the telegraph companies is inter-state, that if any regulation of the conduct of their business is necessary for the public good, such control should be in the hands of a Federal Commission. The Public Service Commission of New York State, however, has not shown any inclination to change existing methods and rates in force among public utility corporations until they could show a way in which such change could be made without doing an injustice to the interests involved. Hence, the stand taken by both President Clowry and President Mackay that they were not opposed to state supervision if the people of the State desire such regulation of their business, is a good indication of the sincerity of these gentlemen in their belief that they are giving the public the best and cheapest telegraph service possible at the present time.

Taxation of Telegraph Companies.

It seems to be the general opinion of those outside the service who have anything to do with fixing the valuation of telegraph property that it is worth much more than is admitted by

those who are in the business and know the actual cost of everything that goes to make up a telegraph system. As a result the assessors in most small towns who have to fix a value on the property of the telegraph within the limits of their domain usually estimate it at much above its true valuation, in some instances multiplying the actual cost several times. If they really know the true worth of the telegraph system they will still make the assessment high, as they think the telegraph company is a foreign corporation and ought to pay a larger proportional share of taxes than the other property owners in their town, most of whom are friends of or at least are known individually to the assessors. When it comes to valuing office equipment some of the most extravagant ideas are entertained. In some instances bills have to be produced in order to convince the assessors that ordinary telegraph instruments do not cost \$150 a set or even more. In fact, so high a valuation has been placed on the instruments in some cases that the companies have found it cheaper to allow the equipment to be sold for the taxes and replace it by new apparatus rather than pay the exorbitant amount demanded.

The Field of the Telegraph and Telephone.

BY B. E. SUNNY, CHICAGO.

President Chicago Telephone Company.

I was very much pleased at the change in the name of the Telegraph Age, so as to include the telephone. This is a pleasant recognition of a large number of telegraph men who have been for years in the telephone service. It also recognizes what has been apparent for some time—that there is need for a closer alliance between the telegraph and telephone, if we are to get the best out of both for our commercial and domestic needs.

It has been clearly demonstrated that there is a field which the telephone alone will care for, and likewise there is a field for the telegraph, in which the telegraph alone can give the best service: but then again, there is another and a growing field, where the combination of the two will give the best results.

That the telegraph will always remain a factor in the transmission of intelligence is, of course, undisputed, for the reason that a very considerable portion of the traffic is made up of important communications which must be in writing; but, a more controlling reason is, that except for short distances, the telephone can scarcely ever hope to compete with the telegraph in the matter of rates, because of the necessarily higher cost of handling the telephone message. The development of the whole country is at such a tremendous rate that it will tax the ingenuity and enterprise of every one engaged in the task, to make the telephone and telegraph do their share. Every bit of usefulness that there is in both must be brought out and put to work.

I hope that the change in the name of Telegraph Age will add many new friends and subscribers to its list.

A New Keyboard Telegraphic Transmitter.

A patent, No. 946,372, has been granted recently to Mr. E. E. Kleinschmidt, of New York, for a keyboard telegraphic transmitter, as mentioned briefly in a previous issue.

The object of the new invention is to construct a transmitting machine which will continuously and automatically transmit telegraphic symbols at a uniform rate of speed independently of the speed at which the keyboard is operated, and which will enable the operator to accumulate or store up successive groups of telegraphic symbols in advance of their transmission, and which furthermore will allow of the transmission of the first symbol immediately after it has been set up, and the continuous transmission of the successive symbols so long as the keyboard is operated, thereby avoiding all loss of time in transmission.

The invention comprises a key board selective mechanism and a transmitting mechanism, the relation between the two being such that the selective mechanism acts to simultaneously set up all the parts of a telegraphic symbol, the regular transmission of successive groups of symbols by the transmitting mechanism not being affected by the speed at which the selective mechanism is operated.

The key board selective mechanism comprises a series of selective bars under the control of the key bars, said selective bars being constructed with projecting lugs arranged to correspond with the telegraphic symbol of the character of the corresponding key bar which controls it.

The transmitting mechanism by which electrical impulses of variable length are sent over the line, comprises a "storage wheel" which wheel is provided with a series of pins adjustably supported thereon and at equal distances apart. These pins which may be arranged to be moved longitudinally either vertically or horizontally, or pivotally mounted, are adapted to be moved by the operation of the selective bars in groups and so arranged that the pins of each group shall correspond with the telegraphic symbol of the character struck on the key board. The storage wheel is adapted to be rotated by a continuously driven source of power and is automatically controlled in its movement by the key bars, the construction being such that the wheel is held in a position of rest when a telegraphic symbol is being set up and released so as to be rotated when the operator releases a key bar. The pins which are acted upon by the selective mechanism are all moved a like distance and when adjusted in position are adapted to operate a make and break lever by which an electric impulse to transmit a dot or a dash is sent over the line. The normal positions of these pins with relation to the lever is such that should the storage wheel be rotated when the pins are in their normal positions the lever will not be actuated and no impulse will be transmitted.

The transmitter make and break lever referred to is so arranged relatively to the storage wheel

as to be rotated in the same direction as the direction of rotation of the storage wheel when the latter is intermittently advanced after the setting up of a symbol but at a less rate of speed than the wheel is advanced. The normal position of the lever when it and the storage wheel are both at rest is immediately in advance of the first pin of the first symbol about to be set up, and when the storage wheel is brought to rest after having been rotated to advance a symbol, the lever immediately begins an independent return movement toward its normal position. If the interval between striking successive keys on the key board is less than that of the period of transmission then the return movement of the lever will be arrested and it will again be given an advance movement with the storage wheel, only to begin a return movement when the storage wheel is again brought to rest. Under normal conditions of operation the make and break lever is kept oscillating upon its axis through variable arcs, returning to its normal position only at the end of a message or when the interval between the striking of successive keys is sufficient to allow it to travel the full distance to reach its normal position. By reason of the relative arrangement of the several parts and the speeds at which they are operated, the operator is enabled to accumulate symbols on the storage wheel so that the transmission of symbols is effected both when the storage wheel is being rotated to advance a symbol and when it is at rest while a symbol is being set up. The mechanism by which the storage wheel is alternately locked and unlocked is operatively connected with all of the key bars in such manner that the length of the symbols themselves determines the distance the storage wheel is rotated after it has been released.

Mr. James Kent, manager of the Canadian Pacific Railway Company's Telegraph, Montreal, Que., in renewing his subscription for another year, has these complimentary remarks to make concerning our publication: "It is most gratifying to note the high standard of excellence maintained in the articles published in the Age, which I always read with utmost pleasure and profit."

Experiments made on the Valtellina three-phase railway, described in *l'Industrie Electrique*, says the *London Electrical Review*, showed the general result that the effect of stray currents from the railway on the adjoining telegraph lines was quite negligible; electrostatic induction was also of small moment, but the electromagnetic disturbances were very serious. It was found necessary, when the line commenced electrical working, to provide metallic circuits for the telegraphs in the neighborhood of the railway, with translators at the terminal points, but this was both inconvenient and expensive, and required skilled attendance to keep the translators in good working order. Nevertheless, there seemed to be no better way out of the difficulty, short of compelling the railways to use continuous current.

The Military Telegrapher in the Civil War.

PART XXXIV.—CONTINUED.

In our previous issue we published the first instalment of this article giving credit for the same to W. H. Eckman. Upon comparing the details however with those given in Colonel Plum's history we find that the manuscript was written by John H. Emerick of New York, instead of Mr. Eckman. Through an evident oversight of Colonel Plum in indexing the story we were led to believe that it was that of Mr. Eckman. The continuation of Mr. Emerick's graphic account of his war experiences is as follows:

"On March 28, 1863, I was ordered to Alexandria and assigned to duty in place of John McMullin who was leaving the service.

"On April 21 H. W. Cowan and myself were sent with a construction train which started out to reopen the Orange and Alexandria Railroad. It went as far as Catlett's Station, where, the bridge being gone, we returned to Bull Run and spent the night. Cowan remained at Manassas Junction where he opened an office. General Stoneman who had been on an extensive raid was expected at Warrenton and the road was opened to supply him. After a few days spent at the war department awaiting orders, I went to Aquia Creek and thence to United States Ford on the Rappahannock above Fredericksburg. I crossed the river there and opened an office in a house. The army of the Potomac were also crossing the river at that point. John B. Pierce opened an office at Banks Ford below United States Ford, the wire having been put up by the Signal Corps. The wire between there and the headquarters at Falmouth was guarded by an entire regiment of infantry distributed along the line and having orders to shoot any one tampering with it.

"May 1, I was joined by James Murray, most of the army had crossed the river and the Provost Marshal General having made his headquarters in our house the telegraph business was very heavy. The next day the Battle of Chancellorsville was fought. The house we occupied was also used as a hospital and the yard and out buildings were filled with wounded, in fact there were some in the office itself. We did what we could to help them though the business was very heavy. Our ground wire giving out during the night I groped around in the dark for it under the window and found a dead man lying across it.

"Our forces being defeated a retreat was ordered and all of our troops moved back across the river to the old camps. Murray and myself had a narrow escape from being captured as we crossed, all but the very last of the troops having left the south bank. Nearly all of the army crossed on one pontoon bridge which on account of the swollen condition of the river threatened to give way at any moment. The office at Banks Ford was also closed and John Pierce and Samuel Ed-

wards returned to headquarters at Falmouth.

"On May 9 Generals Kilpatrick and Stoneman returned from a raid toward Richmond having been within one and one-half miles of that city. Operator J. L. Cherry accompanied them on this expedition. I was soon after ordered to the war department office to relieve Frank Stewart temporarily on cipher work. On the night of May 27 President Lincoln and Secretary of War Stanton kept me company a greater part of the night waiting for news from Grant at Vicksburg but none came.

"I was next sent to Warrenton Junction to await the arrival of General Stoneman who was out on a raid. Operator J. D. Tinney was with me. On June 7 about midnight, I was ordered to Bealton Station, a few miles south of Warrenton. I was accompanied by a cavalry escort and the night was very dark but I arrived without adventure and opened an office. The next day I was ordered back to Warrenton Junction, General Pleasanton having sent a saddle horse and escort after me but I returned again to Bealton in the afternoon with operator J. D. Flynn as an assistant. The cavalry was advancing to a ford of the Rappahannock near Bealton, just below the railroad bridge. Two days later there was heavy cavalry fighting across the river all day, the wounded being brought to Bealton.

"On June 11, 1863, I returned to Warrenton Junction. The army of the Potomac was arriving there and Dennis Doren was building a line from Falmouth to Bealton. The enemy was abandoning Fredericksburg and apparently moving toward Maryland. The next day I built a loop from Warrenton Junction to General Pleasanton's headquarters one-half mile distant and moved my office to that point. J. Kirby, an operator who had been detailed from a cavalry regiment, assisting me. We had a large quantity of cipher work to do. A few days later I moved to Union Mills near Bull Run with Pleasanton's headquarters the General having furnished me with a good horse and in fact with everything that could be expected in a cavalry camp.

"I proceeded with General Pleasanton to Addie, a hard days ride; about sixty miles by the route we took and the weather was very hot. We were there far distant from any telegraph line so I had a rest from the severe work of the past few days.

"Three days later I was given an ambulance to take me back to Fairfax Station and from there I went to Alexandria where I found many of the Army of the Potomac operators who were accompanying the army from Falmouth to wherever the enemy might lead them toward or into Maryland.

"On June 21 I returned to the War Department office where I was complimented by Major Thomas T. Eckert for the manner in which I had carried out my work during the recent tedious service. I was sick in Washington after my return from Pleasanton's raid until July 13

In the meantime some of the boys had been with the army at Gettysburg and were on their way back following the retreating enemy into Virginia.

"I joined the headquarters of the Army of the Potomac at Berlin, Md., below Harpers Ferry relieving John Pierce in assisting Harper Caldwell and L. A. Rose. I remained at Berlin until a new office was opened at Lovettsville on the Virginia side of the river and then joined headquarters at that point.

"On July 20 our headquarters having again moved, I started to overtake them but our wagons were blocked by moving trains and we finally went into camp at Philamont, this country not having been very thoroughly raided over, Dennis Doren's men succeeded in capturing a calf and a sheep which added materially to our somewhat limited bill of fare.

"The next morning we started at 5 A. M. and overtook headquarters at Union but we had no telegraphic communication. On July 25 we arrived at Warrenton and halted there for supplies. Our train consisted of an ambulance, a saddle horse for each operator and the chief of construction and a train of about a dozen army wagons carrying telegraphic material, forage, etc. Having no lines after leaving the Potomac we had a very comfortable march and lived on the fat of the land passing through the most productive portion of Virginia, an elegant rolling country abounding in beautiful springs of excellent water. On August 1 we moved into camp at Germantown on the Orange and Alexandria Railroad and re-established communication with Washington. We remained in camp at Germantown for some time, the weather being very warm and both armies appeared to be perfectly willing to rest. The Army of the Potomac was sending troops to suppress the draft riots in New York. The operators at Germantown and at the railroad stations had a very easy but uncomfortably warm time. The headquarters force at that time consisted of A. H. Caldwell, chief operator, John Pierce, James Caldwell and myself. Other members of the corps were scattered along the railroad at various stations.

"On September 16, our headquarters were moved to Culpepper and we established our office in Wallach's house a half mile from the village. A few days later orders were received by telegraph to General Meade to send the Eleventh and Twelfth Corps to join Rosecrans in the west. These troops were accordingly sent though General Meade strongly protested against it.

"On October 14, the enemy having attempted the same tactics which succeeded when Pope was beaten at Second Bull Run, the Army of the Potomac retreated to Centreville. The retreat was made in the most masterly manner and without losing a wagon, a position taken up on the heights of Centreville and a plan of defense completed, when the enemy came through Thoroughfare Gap expecting to get in our rear and be-

tween us and Washington. Generals Meade and Halleck who did not agree on the plans carried on a brisk cipher correspondence, Meade using very plain language in expressing his opinions and defending himself in such an able way as to cause Halleck to give way or rather to give up the argument.

"On October 19 we advanced from Centreville and two days later arrived at Warrenton and established communication with Washington. On October 24 I started on horseback at 8 P. M. with a cavalry escort to open an office at Catlett's Station for the use of General French, who was in camp at that point. I opened the office at 10:30 p. m. and during the night suffered considerably from cold as I had no blankets and had no provision for fire. After two days at this point I was relieved by operators Shreffler and Glazier and rode back to the headquarters of the Army of the Potomac at Warrenton.

"The next day the headquarters were moved to Auburn but I remained to keep the office open at Warrenton for the use of the Sixth Corps until I was relieved by operators Ryan and Samuel Edwards from Washington.

(To be Continued.)

Wireless Transmission of Photographs.

According to "Electricity" of London, G. J. de Guillen-Garcia, a Spanish engineer, has devised a new system for transmitting photographs or sketches by wireless. For the usual transmitter and receiver he substitutes two equal cylinders, rotated uniformly by clockwork or otherwise, and each carrying a tracing stylus, describing a helical path on the surface of its cylinder. The sketch placed on the metal cylinder at the transmitting end, is drawn in insulating ink. The current passing between the stylus and the cylinder is broken as the stylus crosses the ink, and this causes a relay to close the circuit sending out Hertzian waves. At the receiving end the cylinder is covered with paper moistened with potassium ferro-cyanide, or other solution. As the Hertzian waves arrive, a current passes through the stylus, giving a black line on the paper, and, as the two cylinders are turning in the same time, this line corresponds to the path of the sending stylus across the ink. When each cylinder has been completely traversed by its stylus, the lines received will have the form of the original drawing. For sending photographs, the positive or negative is produced in relief in bi-chromated gelatine, and the transmitting apparatus is somewhat modified. As the stylus traverses the relief, which varies in height for light and shade, a sensitive lever causes four different contacts to be made. One contact leads the current to the relay through a smooth-edged disc, and the other contacts lead through toothed discs having different spacings, so that the waves sent out are in a continuous series, or broken into different intervals. The long lines, and graded dotted lines received, reproduce the picture in its varied shading.

The Telegraph in the South During the Civil War—Two Telegraphers' Unions.

BY E. H. HOGSHEAD, MERIDIAN, MISS.

At the beginning of the Civil War two telegraph companies controlled nearly all of the lines in the Southern States. The American Telegraph Company covered Virginia, the Carolinas, Georgia, Florida, Alabama, and East Tennessee, while the South-Western Telegraph Company provided wire facilities for Western Kentucky, West Tennessee, Mississippi, Louisiana, Texas and Arkansas. A state of war necessitated a readjustment of the directorate of the companies. Doctor W. S. Morris, of Richmond, Va., a director of the American company, was made President of the new Southern Telegraph Company, taking over the lines of the American company within the Confederate States; and John Van Horne, general superintendent of the South-Western, became President of that portion of that company's lines in the Confederacy. Doctor Norvin Green, president of the South-Western, continuing as President within the Federal lines. This status was maintained until the close of the war.

Within a year or two the operators of the Southern Telegraph Company became very much dissatisfied with their condition, claiming that they were overworked, underpaid, and oppressed generally, and proceeded to organize for mutual protection. A convention, called by a circular letter addressed to all operators in the Confederate States, met at Augusta, Ga., on October 26, 1863, and organized the Southern Telegraphic Association, electing Charles A. Gaston, of Mobile, Ala., president; J. Sisson Clarke, of Charleston, S. C., vice-president; Charles F. Barnes, of Augusta, secretary; E. J. Saville, of Mobile, treasurer. Others present and participating in the meeting, whose names appear in the minutes, are: Wm. Sandford, of Mobile, W. H. Clarke, of Savannah, J. W. Kates, of Charleston, and W. A. McMurchy, location not stated. Resolutions were adopted providing for the issuance of an address by the President to the operators of the country explaining the purposes of the Association and inviting all to become members. When fifty or more operators should be enrolled, the constitution, by-laws and regulations adopted by the convention should become operative, and the President was to proclaim the Association duly organized thereunder.

The next move was devising plans for a strike, the only means that seemed to the members of the Association to give promise of relief. I do not know what demands, if any, were submitted to the Southern Telegraph Company, whose operators were the only ones concerned; in fact, I was never fully advised of their movements. But on the eve of the proposed strike the Confederate military authorities at Richmond became cognizant of the situation and proceeded to arrest all those known to be connected with the scheme. A brief statement of the facts is given in the issue

of the Telegraph Age of July 1, 1909, by Mr. James P. Cassidy, who mentions Charles A. Gaston and W. D. S. ("Billy") Anderson as being among the number of those sought for. This decisive action served as an effectual deterrent upon the other members.

But not all of the adherents of the Association were content to make a final surrender of their organization, and on the date previously fixed for the first annual meeting, at Augusta, in April, 1864, an effort was made to hold a meeting; but there were not enough delegates present to make a quorum, and nothing was accomplished. The writer was sent by the operators of the South-Western Telegraph Company as a fraternal delegate to this meeting, and on the way was joined by James C. Hueston, then employed at Selma, Ala., who was a member of the Association, but not a delegate. It was decided that there was nothing to be hoped for in the way of securing the results for which the Association was formed, and the meeting adjourned without day.

I will digress here for a moment to remark that, in the office of the Globe Hotel, in Augusta, where Hueston and I stopped, was conspicuously displayed a huge placard bearing in large letters this legend: "Rates Thirty Dollars a Day. No Deduction for Meals Missed." A month's pay of an operator would not have housed him three days in that hospitable inn. But such prices were not exceptional; everything else was proportionately high. Of course, the inflation of the currency was the cause.

On my return to Mobile, a brief report was sent by wire to the South-Western operators, my "constituents," who thereupon proceeded to get together and form an Association of their own; not for aggressive purposes, however, but for benevolent and social ends,—the officers and employees of the South-Western Telegraph Company being on the most amicable terms, and the operators having no grievances to redress. So, the South-Western Telegraphic Association was organized at Meridian, Miss., on May 1, 1864, with the following officers: John B. Morris, president; George W. Trabue, vice-president; E. H. Hogshead, secretary; G. W. McMurchy, treasurer. E. J. Marshall, E. L. Marchant, J. H. Henderson, directors. The archives of this association are still in my keeping, including a bound copy of the constitution and by-laws. But the close of the war brought so many changes that no effort was ever made to perpetuate the organization. The applications for membership, with the signatures of applicants, are interesting only as souvenirs. Only a small number of the signers now survive.

I also have a bound copy of the constitution and by-laws of the Southern Telegraphic Association, printed in Mobile, in 1863, and a printed copy of an address by President C. A. Gaston to the operators.

"Billy" Anderson, mentioned previously, was, in 1883, chief clerk to the Country Treasurer of

Cook County, in Chicago, where I met him.

Of the members of the South-Western Telegraphic Association I give the names of some who attained to prominent positions in the telegraph service, or other employment: George W. Trabue became general superintendent of the southern division of the Western Union Telegraph Company; M. W. Barr became southern reporter of the New York Associated Press at Washington, and at present holds a Government position in that city; George M. Dugan became superintendent of the Illinois Central Railroad telegraph system; James C. Hueston became general manager of the New York Associated Press. The following held Western Union positions: James T. Allyn, manager at New Orleans; Wm. A. L'Honniedieu, chief operator at New Orleans; Emmett Howard, manager at Memphis; E. J. Saville, manager at Montgomery, Ala.; John B. Morris, chief operator at Nashville; Matt Flippen, manager at Baton Rouge; George W. McMurchy, manager at Baton Rouge; Wm. E. Flippen, manager at Vicksburg; John A. Galbreath, manager at Jackson, Miss. But this list is not complete.

Joseph W. Kates, a member of the convention that organized the Southern Telegraphic Association, was afterwards a district superintendent of the Western Union, and, later, general superintendent of the Postal Telegraph-Cable Company. William Sandford, another member of that convention, was for many years manager of the Western Union at Mobile.

In this connection, I may state that Mr. O. C. Hatton, who succeeded J. C. Hueston in the Western Union managership at Meridian, afterward became agent of the Associated Press in New Orleans, and later assistant night manager in New York of the New York Associated Press, then Southern reporter of the Associated Press at Washington, then agent at Washington, of the Southern Associated Press. He is now with the Western Union Telegraph Company in New York.

Of the old Southwestern operators, Joshua R. Hull was appointed assistant superintendent of the New Orleans, Jackson and Great Northern railroad, and James Compton was promoted to district superintendent of the Western Union, with headquarters at Jackson and later at Nashville. Hull is long since dead. Mr. Compton, after long service, is now living in retirement at Nashville.

Of the members of these two telegraphers' associations but few are yet alive; while of the officers, I think the writer is the sole survivor.

The following extract from the address of C. A. Gaston, president of the Southern Telegraphic Association, which Mr. Hogshead mentions, is well worth reprinting, showing as it does the high aims and purposes of the founders of that Association:

"The practicability of organizing an association of telegraphers which should have for its objects the maintenance of a fair remuneration

for services rendered; the encouragement of the telegraphic fraternity; the relief and protection of members; and to use every means which may tend to the elevation of the profession in the social scale of life—has not, until recently, been freely discussed in the South. Since the outbreak of the present war, the necessity of such an organization has been made more apparent, by the continued increase in the prices of such articles as we find necessary to health and comfort, by the insufficient salaries paid by the various telegraph companies in the Confederate States, and by the restrictions and requirements of the managers of certain companies. Telegraphers are the only class of men who labor from seven and a half a. m. until ten p. m. six days out of seven; and they are the only class of men who are called upon to perform certain duties on the Sabbath and at such hours as to almost totally monopolize the day of rest which is even allowed the slave by his master.

"We seek to do good, and ask the co-operation of each and every telegrapher in the Confederate States. We would bestow our benefits on all alike. We would give to the needy, encourage the despondent, help the sick and afflicted, and fulfill our duties as brothers laboring in a common cause and seeking one common end. We have no salaried President to absorb our pecuniary gains; no august Superintendent to clip the reward of our toil down to a bare sufficiency for the most ordinary life. Our benefits fall on one and all alike, and our assessments are made with leniency and equity.

"In perfecting this organization, we disclaim any disposition to gain notoriety by the device and introduction of novel expedients to control the legitimate action of the telegraphic craft, and profess to be actuated by a simple sense of that necessity which has, in all past ages, operated on the minds of men of like vocation and identity of interest, to form societies for mutual aid and protection.

"Our first aim should be to secure credit and respectability to the vocation. The very nature of the vocation demands truth and faithfulness in the performance. There is no agency known to society that so fully challenges the confidence of man. It is entrusted with every one's secrets, and employed in the furtherance of every one's concerns, no matter whether public or private, trivial or momentous. Operators, therefore, should be good and true men; and such only, it will be seen by the provisions of our constitution, we endeavor to bring into and sustain in the service.

"Personal attachments, which usually elicit the kindly offices of a society in business, must be extremely limited in the telegraphic fraternity. It is, therefore, needful to supply such deficiencies by social organization, and although it may not be found convenient to convene the society oftener than the constitution designates, once a year, still it will be eminently conducive to the end proposed, and serve as a bond of union.

"It is the duty of all societies to make provision for the support of disabled, sick or superannuated members, and it will be felt incumbent on the association, as it may have the means to appropriate a portion to the relief of the unfortunate; hence, the tax of one per cent. per month, which will be levied upon the salaries of all members. If the tax should prove too extravagant, it may be lessened, and made to correspond with the expenses of the association.

"Let us, as operators and as members of the Southern Telegraphic Association, so conduct ourselves towards company officers, towards those with whom we may have to do business, and towards each other, as to deserve the confidence of the first, the esteem of the second and the respect and friendship of the last. Let our intercourse towards each other over the wires and elsewhere be courteous and gentlemanly, avoiding, as far as possible, the too common practice among operators of indulging in personalities over the lines. Let us remember to establish our reputation as reliable operators and make it to the interest of the managers of telegraph lines to secure the services of members of the Southern Telegraphic Association in preference to others.

"There is little or nothing in the avocation itself, but its utility and the respectability of its employers, to inspire deference and win the appreciation of the world. As a business of life it admits of no expansion and affords no lucre. If, therefore, we bemean our attainments and cheapen our services, it will soon be that a more despondent and subservient class of men does not exist. Let us, then, combine and co-operate in the laudable aim to merit the esteem and win the support of the world. The Supreme Arbiter of Right still so sways the judgment of an erring world, that it will concede claims based on pure and lofty aims."

Book Review.

Telephonology, by H. R. Van Deventer (McGraw Hill Book Company, New York, 586 pages, 700 illustrations) is the latest addition to the literature of the telephone. The number of books which have been written upon this subject, which are of value to the telephone engineer is very small, and most of those which have been published are now, by reason of the rapid advances made in this industry in the past decade, of little value to one who is connected with the operation of a modern telephone system. For this reason if for no other, the new book will appeal to the practical man who is looking for up-to-date information.

The new book is divided into sixteen chapters, upon the following subjects: first principles; talking equipment; signalling equipment; commercial talking equipment; magneto instruments and circuits, magneto switchboards; selective and lock-out systems; batteries; testing telephone parts; testing equipment and fault location; measuring instruments and their uses; common battery equipment; harmonic party line systems; line and cable construction; the automatic system;

composite systems and wireless telephony. The author very wisely refrains from attempting to give any history of the development of the telephone, but after a brief discussion of the general subject of telephony, devotes the remainder of his book to describing apparatus, systems and methods in common use at the present time. The subject which has ever appeared in any work on is one which is of the utmost importance to the practical man; yet is one which has received scant elucidation by previous authors. Over one hundred pages of this new book are devoted to explanation of methods of testing for trouble, instruments used, etc. The chapter upon composite systems is probably the best and most concise exposition of this question, of such importance at the present time to both telegraph and telephone people, that has ever been produced, being, in fact, the first general discussion of this subject which has ever appeared in any work on telephony. This chapter is well illustrated with circuit diagrams, showing the various combinations of apparatus which can be used to secure composite and phantom circuits. These are but a few of the many points contained therein which make the work a valuable one to the engineer or student. Copies of Telephonology may be obtained by addressing J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y. Price \$4.00.

The Vacuum Lightning Arrester.

The toothed-plate lightning arresters generally employed for telegraph and telephone lines, while efficacious in case of atmospheric discharges are not sensitive enough to protect apparatus and cables, if the circuit contains any, against the effects of static discharges which may take place in the lines. By means of the vacuum lightning arrester, says a French periodical, it is possible to insure the conduction to the ground of all charges having a tension of 300 volts or over. For this reason the arrester is particularly useful in protecting two-wire circuits, in which the formation of static charges is generally pronounced. The device consists of a vacuum tube containing the toothed electrodes. The rarefaction of the air facilitates the passage of the discharges, and the electrodes are placed at a sufficient distance to insure good working. As this lightning arrester is protected from humidity and dust, its operation is more reliable than that of the ordinary instruments. The device is constructed in the form of a cartridge, similar to enclosed fuses, and can be connected in the circuit by placing it between flat springs. Pointed lightning arresters and fuses may be used in connection with the same in order to protect it against very violent discharges and excessive currents.

Telegraph and Telephone Age constitutes a "school of instruction" to every would-be telegrapher. It is accurate and authoritative and worth many times the price of subscription (\$2.00) to any who would inform themselves respecting the telegraph.

The Collins Long Distance Wireless Telephone.

A plan for the extension of the wireless service for the United States Navy has been submitted to Congress by Rear Admiral Cowles, chief of the Bureau of Equipment, in which he advocates that wireless apparatus of the latest type be supplied to all the new vessels of the navy, including destroyers and all auxiliaries.

Wireless telephony will receive its share of consideration as well as wireless telegraphy and the conditions required is a system which will be operative over distances of 100 miles and to remain in adjustment for five minutes at a time. The Collins system will be one of those competing and as the result of recent tests it is believed that it will easily fulfil the requirements cited.



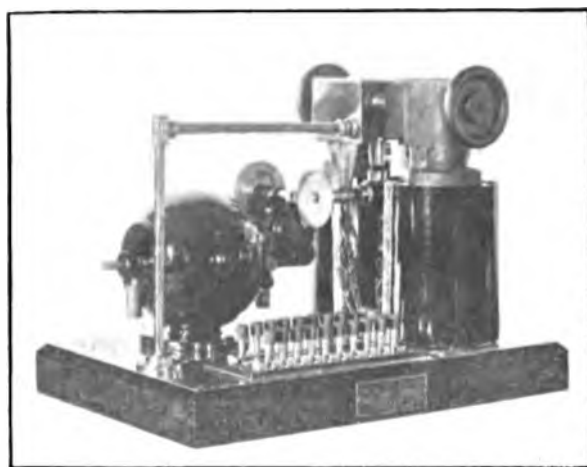
COLLINS LONG DISTANCE WIRELESS TELEPHONE SET

The transmitting apparatus in its entirety includes a Collins revolving oscillation arc-lamp, a high-frequency and high potential variable tuning inductance transformer, an adjustable tuning auto transformer, and the usual revolving variable condenser. These separate devices are designed to withstand potential strains of upwards of 5000 volts.

The initial current is 500 volts direct current, and this is increased to 5000 volts by a direct connected motor generator set. The latter high voltage current is used to energize the revolving oscillation arc-lamp which is an improvement on those previously employed. The lamp proper consists of a pair of hard carbon disk electrodes and these are mounted on parallel spindles so that they are in the same plane and are connected by means of bevel gears secured to an insulated shaft. The disks are insulated from each other by mica bushings fitted in the gearing, the casing forming one of the connections while the insulated bearing in the bottom of the casing forms the other.

The gearing is so arranged that the disk electrodes are rotated in opposite directions, the power being furnished by a small motor. One of the bearings of the shaft is mounted in a keyed sleeve which permits the spindle carrying one of the carbon disks to be moved towards or away from the opposite disk so that the length of the arc may be varied while the lamp is in operation. The carbon electrodes are placed in a metal casing while the rotating mechanism is attached to the bottom of the casing.

The casing is supported between the poles of an electromagnet and through the ends of the poles and at right angles to them are polar projections of soft iron which are threaded and these are screwed through the extremities of the magnet and at right angles to the arc, thus permitting the magnetic field



ROTATING OSCILLATION ARC.

to be varied within wide limits. The coils of the magnet are also used as a portion of the primary circuit of the transmitter serving the purpose of choke coils and so preventing the oscillations from backing up into the high-tension direct current generator.

The rotating oscillation arc obviates the disadvantageous features of the stationary arc in that a constantly fresh and cool surface is presented to the arc and in that it prevents the uneven burning away of the electrodes which give rise to untoward variations in the frequency of the oscillations and thereby throwing the circuits out of resonance and in that the optimum length of the arc, namely, the length at which the resistance of the arc is best proportioned to the capacity and inductance of the closed circuit, and finally in that a constant arc may be maintained for very much longer periods of time than is possible where the carbons are stationary.

The chief improvement in the combination tuning inductance transformer is that a new and novel means of contact is introduced whereby any variation of the inductance can be had and in tuning a wireless telephone transmitter this is vitally necessary. The contact is made by a ring provided with

three small grooved pulleys which press against the turns of the tubing forming the primary.

Having a spiral form, this coil causes the ring, when it is rotated, to travel back and forth from end to end. A small track under the coil serves to guide a carriage which in turn makes contact with the ring. With this arrangement the inductance can be varied, thus making it easy to put the closed oscillation circuit in resonance with the open radiating circuit. The secondary is arranged to slide in or out of the primary and making a loose coupling, which is another essential in the production of high frequency undamped oscillation. The adjustable tuning auto transformer is designed to be used in the aerial wire circuit and more or less inductance can be had by turning the wheel causing the contact spring to travel back and forth. The variable condenser consists of a number of semi-circular fixed plates of metal and built up in a cylinder of insulating oil, while a second series of movable plates is secured to a spindle meshed with the first set, but insulated from it. A handle attached to the rod permits any variation of capacity within the limits of the condenser to be obtained. A scale divided into thousandths and ten thousandths of a microfarad and a pointer indicates the value of capacity at any point.

The receptor comprises a thermo-electric detector of Mr. Collins' invention. It is said that this detector is sensitive to oscillations of one five-thousandth of an erg and is especially well adapted for the relaying of speech oscillations. A variable electrolytic potentiometer is used to control the source of current while the tuning inductance and condenser are very much the same as those employed in other systems.

Phantom Circuits.

BY J. H. AINSWORTH.

General Manager of Home Telephone Company,
Dayton, Ohio.

There is one branch of multiplex telephony which it occurs to me, is of quite vital importance to the Independent companies, most of which are operating magneto apparatus, and that is the phantoming of long rural lines.

It was my opinion, when the question first came to me, that to undertake to phantom these circuits a very considerable amount of both noise and cross talk would probably result. In preparation for that I took one typical case of two lines about ten miles long which paralleled each other to a point seven miles from the exchange, each of which had subscribers between the exchange and the seven mile point and beyond. The ten mile circuit had but three subscribers beyond the seven mile point.

As a natural precaution, knowing the predilection of phantom circuits to noise, I had my manager carefully go over both these circuits and clear them of grounds and insulate them well. I then mounted

repeating coils in the office and for experimental purposes persuaded a farmer at the seven mile point to let me mount the other coils on a board, with a lightning arrester around them, in his house.

When I had done this, I cut off the three mile end of the ten mile physical circuit and attached it to the phantom portions of the coil. These coils, are bridging coils and not repeating coils, or, at least, they are operated as bridging coils and not as repeating coils.

When this had been done, I found that my circuit was noisy, and in undertaking to discover the cause of this noise, I found that the physical circuits paralleled a street railroad company's lines for a distance of about one mile. I instructed my lineman to go to the middle of the distance and transpose the phantoms, which he did, without any very material benefit. That being done, I had him put a transposition in half way between the middle and each end, and this quieted the circuit.

The reason for the attempt to construct this phantom circuit was that I had five subscribers between the seven mile point and along the route of the ten mile circuit whom I desired to connect, but did not feel disposed to construct seven miles of circuit to get them.

I found the subscribers could ring in nicely and could talk well, and everything went along all right until I began to get complaints that when one of the subscribers on one of the physical circuits tried to talk to subscribers on the other physical circuit and some one tried to use the phantom circuit that we were in trouble, cross talk being almost as plain as if they were all on the same circuit. Hence it became necessary to equip each pair of cords at the exchange with repeating coils, and since that has been done we have had practically no trouble on these circuits.

I have made up my mind from this success that I probably will not again construct a long line for farm lines. It must be borne in mind, however, that the physical circuits must be of reasonable efficiency and clear of grounds.

I think the manufacture of the phantom circuit for telegraph purposes is simple enough that there need be no explanation of that, but it is one of the by-products of this business with which every manager should be acquainted.

It is amusing to the man who knows differently how many articles are printed in the course of a year, written to show conclusively how a telegraph company can greatly increase its earnings by reducing its rates. The authors are usually ignorant of telegraph methods or affairs. One author says the same rule applies to the telegraph as to the provision market. He states that if the price of lamb chops was reduced sufficiently to attract attention people would eat more mutton than beef if they can save money, and that if the telegraph companies reduced their rates low enough a greater number of people would use the telegraph instead of the mails.

*Abstract of a paper presented at the Ohio Independent Telephone Association convention.

A Comparison of the Telegraph and the Telephone.

BY CHARLES SELDEN, BALTIMORE.

Superintendent of Telegraph of the Baltimore and Ohio Railroad.

I believe that the telegraph will be continued in use for many years to come, and at the same time the growth of the telephone method of transmission of intelligence will increase to a very large extent, but they will go hand in hand, as both will be found necessary.

Until some genius develops a practical telephone repeater, or other improvements in the telephonic art admit of commercial transmission over longer distances, and with a less expensive character of line wire, I feel that the telegraph must fill the gap.

The comparative cost of transmission between points widely apart even now, undoubtedly, has a tendency to have the telegraph used more frequently than it would be if it were possible to maintain proper equipment for telephone service at as low a cost as that of the telegraph, and thus afford lower rates than now charged.

Where the conditions of a telephone circuit admit of perfectly clear transmission of speech, I consider it as safe and, of course, more rapid than the telegraph; even in exchanging messages between large centers, for the reason that the circuit could be manned by persons versed in the use of the typewriter, and a greater average of speed be had in transmission, even though it was necessary at times to repeat certain words which do not carry well, or to spell them out.

I have been for years impressed with the fact that railroads particularly have neglected to use the telephone for the transmission of train orders, at a very decided loss to them, and I have been a constant advocate, in personal communication, and in articles and papers which I have written upon that question, in favor of such use.

My second paper, read before the Association of Railway Telegraph Superintendents in Detroit in 1894, in order to overcome the conservatism of railroad people, indicated how certain words and figures could be transmitted telephonically with perfect safety.

In the last year or two railroad companies have been making rapid strides in the use of the telephone for train despatching, with the result that where it has been employed for this purpose the reports show it has been found fully as safe as the telegraph, and much more advantageous in many ways.

There is one feature largely in favor of the telegraph, which is its flexibility in times of wire trouble, especially upon large systems which ramify in various directions, and where their rails connect one division with another at quite a distance from the train despatching headquarters, and this connection made by a division entirely separated from the point from which the ramification began, for instance, with us,—train des-

patchers located at Connellsville, Pa. move trains upon track extending from that point to Fairmont, a general western direction. If the telegraph wire should fail between these two places, we arrange for the movement of trains by using a telegraph wire running east from Connellsville 95 miles, to Cumberland, Md., west from Cumberland to Grafton, W. Va., over another division, northwest from Grafton to Fairmont over still another division, a total distance of 125 miles, and connecting these wires from Fairmont to the point of the break.

By means of repeaters we have worked this 220 mile rambling circuit as quickly and successfully as if there was no break, reaching all of the points, and our trains were, therefore, moved promptly.

Recently we had several poles down near Chicago, and our train despatching circuits between Garrett and Chicago, a distance of 131 miles, were, therefore, out of service and could not be reached by the despatchers from Garrett beyond the point of the break, but we secured a wire over the Nickel Plate road, put it on repeaters at Chicago, used the Nickel Plate wire to Fostoria, which is east of Garrett, repeated there to a wire that lead to Garrett, making a round circuit from Garrett, east to Fostoria, west over the Nickel Plate to Chicago, east over the Baltimore and Ohio to the point of break, and thus were enabled to handle our trains, the length of such circuit being 377 miles.

We have had to use circuits for the transmission of our general telegraph business extending from Baltimore to New York, thence to Buffalo, and then to Pittsburg, instead of by our direct route, and these instances which I cite give the idea of the flexibility of the telegraph which I attempt to convey, and owing to the long distances and round about ways, it would be a difficult thing to secure clear transmission conditions for telephone service.

For the ordinary train despatching circuits, which as a usual thing do not extend over 150 miles, and many of them are much less, clear transmission can be arranged without difficulty and without using a very large gauge of copper wire, but it requires two wires instead of one, as does the telegraph, and it is not as easy to handle such circuits in wire trouble cases as it is those of the telegraph.

Briefly, it seems to me the situation is about as follows:

Under normal conditions for railroad service for train despatching and ordinary local message work, the telephone is better than the telegraph. Under abnormal conditions the telegraph is better than the telephone.

The normal conditions obtain in probably ninety per cent. of the time, and it is possible that the better service rendered under normal conditions by telephone would more than re-pay the constructive or actual losses in the movement of trains during the abnormal period.

It is also possible that the percentages named herein are not absolutely correct, and it may be that the abnormal conditions would not amount to over five per cent. of the entire time.

In expressing my opinion I have not taken into consideration any difference in rate of wage that might be applied, and have dealt with the question, therefore, entirely on the merits of the case so far as I can see, and the expressions in favor of the telephone are, therefore, based upon a condition carrying with it the same rate of pay for telephone operators as would be paid to telegraphers.

It is but fair and proper to state, however, that there is no doubt that perfectly efficient railroad men who can operate telephones can, and should be had for a less rate of wage, which would be but another argument in favor of the more general use of the telephone for the purposes indicated.

Perhaps in the future there may be evolved a comparatively simple electrical typewriter device which would enable communication to be had by this means between the long distances which the telephone does not now meet, in which event the use of Morse telegraphy would be reduced to a minimum, if not practically dispensed with.

The Telegraph and Telephone in the Future.

BY W. J. CAMP, MONTREAL.
Electrical Engineer Canadian Pacific
Railway Company's Telegraph.

I notice that the name of the "Age" has been changed to "Telegraph and Telephone Age." In view of the fact that the telephone is coming into such general use on railways, not only for the interchange of railway messages and intercommunications between officials, but for train despatching, I think the change in the title is a good one. In fact, in looking over the issues of the "Age" for some years back, we find that considerable space has been devoted to the telephone, more particularly with regard to its use for train despatching. It is also certain that the telephone will be, in a very short time, practically the only means for handling trains as it has been proven on every section where installed, that it is capable of handling at least fifty per cent. more traffic than can be done by telegraph.

When I was train despatcher in 1877 (in the early days of the telephone), I expressed the opinion that the day might come when the telephone would be generally used for ordinary telegraph business, but that it would never come into use for trains despatching. Shortly after joining the Association of Railway Telegraph Superintendents (in 1904) I began to change my opinion, and finally, two years ago, came to the conclusion that the telephone would very rapidly come into general use for train despatching, but that for a certain class of commercial telegraph business it is not suitable. To-day I have no hesitation whatever in saying that I consider the telephone far

safer for train despatching than is the telegraph, and that for general railway work its use results not only in an enormous saving of time, but in the various officials of the railway being able to obtain more accurate and definite information regarding the operation of the railway.

As regards the use of the telephone for handling commercial telegraph business, I believe that it will gradually replace the telegraph in all small places where most of the telegrams are in ordinary English language, but for through traffic and on important or heavy circuits, it will take a long time to replace the telegraph. On such circuits a very large proportion of the business today is in code or cipher, which is difficult to handle over the telephone and messages cannot be transmitted nearly as rapidly as by telegraph. In addition to this, we are able to work multiple circuits by telegraph. For instance, between Montreal and Toronto, the Canadian Pacific Railway has four wires worked quadruplex. On these four wires we are able to work sixteen operators at high speed, while if the telephone were adopted we could only obtain out of the four wires, three telephone circuits, which could not be worked at anything like the speed obtained by the telegraph on account of the code and cipher messages handled, the actual result being that only three-sixteenths of the volume of business could be handled and probably even less, and with a lesser degree of accuracy. Another point in favor of the telegraph for commercial work is that by its use we are able to work extremely long distances, for instance, New York to San Francisco, Montreal to Vancouver, etc., at almost the same speed as for short distance.

To sum up, my opinion is that the telephone, in the course of the next few years, will be in general use throughout the continent for both train despatching and general railway work and for commercial business with small unimportant points, but that the telegraph will continue to be used almost entirely for long distances and for commercial work between important points where traffic is heavy.

Among a number of books on the market treating of the general subject of train despatching, that bearing the generic title of "The Train Dispatcher," written by A. W. Early, a train despatcher himself, has gained a wide popularity, its value being based on the fact that it is one of the best books of the kind ever produced. It supplies a certain practical information of a class desired by the ambitious worker as a guide and inspiration to him in his daily work. Its 104 well printed pages are packed full of educatory matter, and the volume should be, as it has been, a welcome possession to every telegraph operator and train despatcher in the railway service. This book will be sent to any address on receipt of price, \$1.00. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Indianapolis Belt Railway Adopts New Selective Intercommunicating System.

The rapid growth of business upon the Belt Railway at Indianapolis in the early part of last summer caused the officials of that road to look for a faster and more efficient system for communication than the telegraph. In looking about they investigated the Sandwich System then in use upon the Chicago Division of the Big Four Railway, and considered the application of similar apparatus to their needs. The system desired was to be inter-communicating. The Belt Railway was at that time using a bridging telephone

telephones were used upon both lines by means of a patent cordless jack box.

The dispatcher's office is equipped with two sets of apparatus so that two men can work at once when business demands. The use of a jack box allows the one adjustable arm phone to be employed upon several circuits, which is a great advantage to the dispatcher who is a very busy man.

The Belt Line is over thirteen miles long, double track the whole length, four track more than half, and doing a very heavy business, as all trains of all roads entering Indianapolis pass over their tracks and they appreciate to the fullest the great saving in time gained by the use of the new apparatus.



DESPATCHER'S OFFICE.

system divided into two circuits, one east, the other west from the Stock Yards Dispatchers Office, with sixteen stations on the east and eight on the west. The code ringing was very unsatisfactory because the switch tenders were compelled to be very attentive to the bell in order to distinguish their calls, which manifestly was a detriment to the perfect performance of their duties throwing switches.

The engineers of the Sandwich Company took charge of this circuit, and installed selectors at each station. This eliminated the code signals. The east and west divisions were united as one, making a total of twenty-four stations. A call box was installed at each station, which, working on an entirely new idea, made it possible for any station to signal any other selectively. The Belt Railway is the first to use this system of calling. All battery is at the dispatcher's office.

The railroad constructed on the east end a short metallic circuit to be used between several stations in a congested district for local use as an auxiliary to the main or dispatcher's circuit. The same thing was done at a congested point on the west side. The bells in the telephones were connected to these short lines and the selector bells were upon the main line. The same



STATION IN SWITCHTENDER'S SHANTY.

The train master is supplied with a portable telephone and jointed connecting pole for use in emergency, and finds it a very valuable adjunct to the service.

They plan now to extend the service to the Union tracks, which form the network about the Union Station, and this equipment will be an important factor in handling the hundreds of trains that daily use the Union tracks.

Mr. G. C. Kinsman, superintendent of telegraph of the Wabash Railroad, Decatur, Ills., in renewing his subscription, says:

"I wish to express my appreciation and to congratulate you upon the appearance and contents of the Age, which shows continued improvement."



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KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

Efficiency and safety in electrical installations depend chiefly on insulation. For fifty years KERITE insulation has been the standard of excellence.

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The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

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Railway Exchange, CHICAGO, ILL.**



The Railroad.

Mr. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line, Wilmington, N. C., was a recent New York visitor.

Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad, Los Angeles, Cal., has been appointed a member of the telegraphy and telephony committee of the American Institute of Electrical Engineers.

The Rock Island Railroad Company has instituted the regular news service of the United Press upon their fast train, the Rock Island Golden State Limited. Passengers upon this train are now able to keep in touch with events transpiring throughout the world during their overland journey as well as though supplied with the latest papers.

One of the longest telephone despatching circuits in operation is that of the Canadian Pacific Railway Company's Telegraph between White River and Fort William, Ont., a distance of 251 miles, with nineteen stations. This circuit is giving entire satisfaction, even when all of the stations are in on the line simultaneously, the transmission is all that could be desired.

Mr. William Kline, superintendent of telegraph of the Lake Shore and Michigan Southern railroad, with headquarters at Toledo, O., has been retired under the operation of the pension system, which went into effect on January 1, on the New York Central lines. Mr. Kline was the dean of the railroad telegraph superintendents, he having held his position for over forty years.

The Union Pacific Railway has established an educational bureau of information. The purpose of this bureau is to furnish courses of reading and study especially prepared under the direction of an advisory board to cover as much of the so-called unwritten law of railway operation as possible. The course will be conducted somewhat on the method of now existing correspondence schools. Any employe can state to the bureau the line of work he is ambitious to master, and if he has the necessary qualifications he is provided with books and given instruction along the line desired.

Mr. John H. McDonald has been appointed chief clerk in the telephone department of the Pennsylvania Railroad to succeed Mr. J. C. Johnson, recently promoted to be superintendent of telegraph. Mr. McDonald was born in 1875, and entered the service of the Pennsylvania in 1893 as telegraph operator. January 1, 1902, he became manager of the main office of the Middle Division at Harrisburg. July 1, 1903, the division headquarters were moved to Altoona and Mr. McDonald was made manager of the superintendents office at that place. November 1, 1909 he was appointed assistant trainmaster which position he held at the time of his present promotion.

The Railway Telegraph and Telephone Appliance Association was organized February 9 in New York. The object of this association is similar to that of the Signal Appliance Association, namely to provide suitable entertainment for the superintendents of telegraph and their friends who attend the annual meetings of the Association of Railway Telegraph Superintendents. About twenty firms have signified their intention of joining the new association and several others have expressed their approval and will probably join later on. The following officers were elected: Percy W. Miller, chairman; A. P. Eckert, vice-chairman; Hiram Buck, secretary-treasurer; executive committee, W. E. Harkness and H. E. Merrill, New York; H. O. Rugh, Sandwich, Ill.; C. E. Brown, Chicago; A. B. Saurman, San Francisco.

J. C. Johnson, Superintendent of Telegraph of the Pennsylvania Railroad.

Mr. J. C. Johnson, whose appointment as superintendent of telegraph of the Pennsylvania Railroad at Philadelphia to succeed Mr. J. B. Fisher, was announced briefly in our February 1 issue is by reason of long, intelligent and meritorious ser-



J. C. JOHNSON, PHILADELPHIA.

Superintendent of Telegraph of the Pennsylvania Railroad.

vice in the telegraph department of which he is now the head, well qualified to fill the new position. Mr. Johnson was born at Curtin, Pa., April 26, 1865. He first entered the telegraph service of the Pennsylvania Railroad January 5, 1885, as an operator on the Schuylkill Division. June 1, 1887, he became train despatcher on that division and on January 1, 1903, was appointed assistant trainmaster of the same division. November 16, 1905, he became division operator and assistant trainmaster on the Schuylkill Division. On October 24, 1907, he entered the office of the Superintendent of Telegraph as Chief Clerk, which position he held until his present advancement.

Morse Electric Club Annual Dinner.

The third annual dinner of the Morse Electric Club was held at the Hotel Savoy, New York, on the evening of February 5. There were about one hundred and seventy-five members and guests present a large number of the out-of-town members of the club being in attendance. At the head table were seated John B. Van Every, president of the club who also acted as toastmaster, Colonel Robert C. Clowry, Thomas F. Clark, Hon. J. J. Delaney, M. J. Drummond, E. T. Jeffery W. J. Dealy and M. J. O'Leary.

After coffee had been served and cigars lighted M. Van Every proposed a toast to Colonel Robert C. Clowry, president of the Western Union Telegraph Company. After this had been drunk toastmaster Van Every read a letter of regret from Theodore N. Vail, president of the American Telephone and Telegraph Company who had expected to be present but who was unable to attend because of business calling him west.

Mr. W. J. Dealy, the first speaker of the evening in his usual entertaining manner spoke of the sentiment of the wires which should inspire every one connected with their operation to do his best.

Hon. J. J. Delaney, ex-Corporation Counsel of New York City, the next speaker bestowed a most fitting tribute upon Professor Morse dwelling upon the great service which he rendered to mankind by his invention. He did not believe that Professor Morse labored for the perfection of his invention with the idea of personal advantage alone but that he looked forward to the elevation of mankind and the spreading of the idea of the fraternity of the human race by reason of easy and rapid communication between distant points. By his invention he helped to solve some of the greatest problems of the human race and caused a feeling of kinship to spring up between men of all nations the like of which was never seen before in the history of the world. The telegrapher has a high mission. His occupation is full of dignity and he should be proud of his calling. In closing Mr. Delaney advised all to not be disturbed by the clamor about the oppression of corporations, that in the end all of these things which seem wrong now will adjust themselves and justice will prevail. Mr. M. J. O'Leary who followed Mr. Delaney spoke of the spirit of loyalty which has always pervaded the service and dwelt especially upon the good work which had been done by the insurance organizations supported by and for telegraphers.

Mr. Thomas F. Clark spoke of former days in telegraphy in New York when the main office of the Western Union Telegraph Company was located at 145 Broadway, the wires were all overhead and Thomas A. Edison was developing his quadruplex system. Mr. Clark recalled the names of many of the former prominent mem-

bers of the staff and found that most of them were remembered by many of those present.

Mr. E. T. Jeffery, president of the Denver and Rio Grande Railroad, the next speaker referred to the recent union of telegraph and telephone interests and expressed his belief that it would be to the lasting benefit of the American public at large and of the two great corporations concerned. Unless it does advance the public interest it cannot be sustained. He said that it was now the duty of those connected with the telegraph to demonstrate the fact that this is a step for the benefit of the public at large and he expressed his confidence that they would respond to the occasion. Mr. Jeffery spoke of the great wonders which have been accomplished in the past fifty years by combinations of capital which could not have been carried out except by the co-operation of those concerned. He said that corporation and co-operation were practically synonymous terms. He also spoke of the struggles of his boyhood to get a start and contrasted the conditions which prevailed at that period with the opportunities which are open to a young man at the present time. Mr. Jeffery's remarks were listened to with great interest and in view of the publicity which is being given to the faults of combinations of capital, furnished those present with much food for thought on the other side of the question which receives but little attention.

Mr. M. J. Drummond, Commissioner of Charities of New York City, the last speaker of the evening told briefly of the way in which the Department of Charities of New York is conducted.

The speeches were interspersed with the singing of popular and patriotic songs and the occasion ended with the singing of the "Ode to Morse." Among those present were the following:

Albany, N. Y.—T. J. Meade.
 Baltimore, Md.—J. M. Creamer.
 Binghamton, N. Y.—E. A. Baird.
 Boston, Mass.—C. F. Ames.
 Buffalo, N. Y.—W. J. Higgins, W. J. Bagby.
 Hartford, Conn.—E. Ryder.
 Newark, N. J.—W. H. Spry.
 New Haven, Conn.—F. E. Clary and J. E. Jenkins.
 New York.—W. J. Austin, W. J. Ackerly, G. W. E. Atkins, T. M. Brennan, J. A. Berry, L. D. Beall, C. A. Bauer, W. P. Bowman, A. R. Brewer, H. C. Brewer, Orton Brewer, R. D. Brixey, J. R. Beard, J. B. Bertholf, F. W. Barth, G. R. Benjamin, A. T. Benedict, W. C. Bower, E. T. Burrill, H. S. Bullock, Jas. J. Brennan, Jr., W. H. Butler, Col. R. C. Clowry, M. R. Cockey, A. R. Carmichael, J. E. Coan, J. J. E. Creamer, J. W. Connolly, J. T. Carberry, S. M. Cullison, P. J. Casey, Thos. F. Clark, Harold Content, F. E. Coyle, E. G. Carley, L. Dresdner, M. deMendonca, J. A. Dierks, H. E. Dunham, Walter J. Drummond, Hon. J. J. Delaney, W. J. Dealy, M. J. Drum-

Franklin, W. N. Fashbaugh, I. B. Ferguson, A. C. Gibbs, D. J. Gallagher, E. P. Griffith, P. E. Grogan, J. J. Ghegan, W. L. Gechr, F. D. Giles, Chas. C. D. Gott, J. W. Gibbons, E. F. Howell, M. J. Hayden, G. W. Hickey, R. Hopkins, J. F. E. Hopkins, J. A. Hill, G. A. Holle, Wm. Holmes, Wentworth Holmes, Gardner Irving, C. F. H. Johnson, C. Jacobson, W. H. Jackson, E. T. Jeffery, C. C. Johnson, C. A. Kilfoyle, F. Kitton, A. Kline, M. H. Kerner, James Kempster, A. F. Kelley, A. M. Lewis, F. S. Lewis, Col. W. A. Murray, J. F. McGuire, T. A. McCammon, R. L. McCann, D. W. McAneney, W. A. McAllister, Jos. Maxwell, F. A. Mombert, J. T. Mulhall, R. J. Marrin, Wm. Marshall, J. Mowat, C. H. Murphy, R. F. Murphy, R. J. Murphy, W. H. Martin, W. C. Merly, E. E. Morison, G. H. Messner, E. M. Mulford, J. F. Nathan, B. Nachmann, A. Nachmann, M. J. O'Leary, M. J. O'Brien, R. F. Parkinson, H. W. Pope, W. S. Porch, M. W. Rayens, J. J. Riley, A. Rittenhouse, D. Roth, George Roehm, H. E. Roberts, W. E. Rath, F. J. Scherrer, Otto Strubel, D. Skelton, G. Schreiner, E. J. Schaedler, D. C. Sullivan, P. J. Sullivan, W. D. Schram, F. J. Sheridan, J. Simmonds, A. G. Saylor, H. V. Shelley, T. G. Singleton, J. W. Schmults, G. F. Stainton, C. Schudt, W. A. Schudt, P. J. Tierney, S. M. Taylor, J. B. Taltavall, C. R. Tilghman, F. S. Vickery, J. B. Van Every, B. J. Van Cott, H. F. Van Every, E. B. Van Every, J. C. Willever, H. C. Worthen, J. N. Weisiger, A. O. Wallis, J. Wiseman.

Oswego, N. Y.—J. P. Doyle.

Philadelphia, Pa.—W. A. Sawyer, J. W. Reed, F. G. Lamb.

Portland, Me.—H. H. White.

Saratoga, N. Y.—H. L. Waterbury.

Schnectady, N. Y.—A. E. Reynolds.

Syracuse, N. Y.—J. E. Bierhardt.

Troy, N. Y.—I. W. Copeland.

Utica, N. Y.—F. E. Howell.

Washington, D. C.—H. F. Taff.

Wilmington, N. C.—W. P. Cline.

At a special meeting of the board of directors of the Associated Press held recently in New York it was decided to establish a sporting news service on a special wire, beginning in April at the start of the sporting season. This wire will be used for sporting news exclusively, the regular matter being carried as before, and will be operated between three and six o'clock for such morning and afternoon members as desire the service.

In a recent lecture before the Manchester section of the Institution of Electrical Engineers of Great Britain, Professor A. Schwartz described a machine which he had devised and methods which he used in testing rubber for electrical purposes. He told of numerous tests made to learn the behavior of rubber under various conditions and pointed out how the quality of the rubber could be determined from these tests.

OLD AND RECENT TOURNAMENTS.

General Information as to Early and Late Speed Trials, with Incidental Comments on the Persons Concerned in Them, and Unnecessarily Complete Reports, Perhaps, as to the Part I Myself Played in Them and in Other Related Events.

BY WALTER P. PHILLIPS.

(Continued from page 133, February 1, issue.)

It has been my weakness, always, to have "an outside job," and during the time I was night manager of the Western Union in Providence—1866-1871—I had more newspaper work to do, at certain times, than any three newspaper men in town. For several years I did all the race meetings at Narragansett Park for the New York Tribune, and I was constantly called upon to do for the Boston papers, race events that were not considered sufficiently important for them to cover by a special representative from the home office. Whether I inherited my taste for horse events, from some distant ancestor, I know not, but I maintained the reputation of the family name, which is made up of the two Greek words, *philos* and *hippos*, signifying a lover of horses. The Providence manager of the telegraph office, Henry Carpenter Bradford, was a character, in many ways, and my methods were, from the first, unfortunate in that they aroused his distinct disapproval. He was not a Morse operator, having come in with the consolidation of the American Telegraph Company, using the modified House printing telegraph, with the Union Telegraph Company, using the Morse system. The American Company being the stronger, dominated the Union interests, although Morse practically superseded, the printer on the combined lines. Once when racing was going on at Narragansett Park, and I had farmed out my task of working No. 4 East for three or four nights, Mr. Bradford had noted my failure to appear at 6 p. m., and it was clear that he did not like it. As he sat whirling in his chair, one afternoon, some friend of mine called to see if I were on duty, as I often was in the day time, and propounded an inquiry to which Mr. Bradford, or "Horace," as we called him behind his back, replied with a puzzled frown: "Phillips, Phillips? That name sounds familiar, and I am positive I have heard it somewhere. Bogle," he shouted to my brother-in-law, addressing that gentleman at the farther end of the room, "tell me, is there a man named Phillips still working for us?" He was full of these sardonic pleasantries. On another occasion he was equally jocose. Michael H. Crane, then a clerk and gradually becoming an operator, and I had a working arrangement by which we had a nocturnal luncheon on very simple lines. I bought the coffee, milk and sugar, and Mike brought

the food from home. One of the linemen had rigged us up a cupboard of rough boards, and the furnace heat was disastrous to it. Big cracks began to show and the cockroaches walked in and took possession. One day I arranged with a chap to come and caulk the cracks, change one or two shelves, etc., and he had been expressly told to come to the back door where Mike and I were lying in wait. But while we were out in the back alley having a smoke, our builder arrived in the front office and with a tray of saws, hammers, bits, augurs, hatchets and such, attempted to enter by a small, narrow door that was used only by employes. It was a sort of bear trap, under the most favorable circumstances, and there were those who thought that if Manager Bradford could have caught some intruding stranger and deprived him of an arm or a leg before he could be released, it would have been a cause of great solace to him. Anything that would have tangled up an intruder in a way rendering a surgical operation necessary would have delighted him. Our man's saw or the axe or something would not come through the door, and he at once started to swear and to bang away at things in a way that threatened the partition. Mr. Bradford was swinging about in his revolving chair when he fully realized the situation. He looked at the intruder and then down the long room where Crane and I stood wondering, not to say weeping, and then he inquired in a plaintive, hopeless sort of way, pointing to the carpenter who was still unable to free himself: "Hurlburt, this is—I suppose—some one—who has come—to engineer—the alterations—that Mr. Phillips desires—to have made—in the building?"

One day an office message was received, reading:

Providence Office.

Please give items on which you check me June 3rd and 10th.

Berry.

Everybody in the office knew that Berry, who had been an old operator on the House lines with Bradford, was now a clerk in the Washington office. Indeed, he and Bradford had been old friends and comrades in previous years, but that made no difference, and this is the answer that was returned:

To Huckleberry,

Wherever you are.

Check you nothing on June 3rd and 10th, nor any other date. Never heard of you before. How are you?

Bradford.

Your old House operator was a singularly difficult proposition. He would not believe that Morse was really read, but was guessed at, and the difference between a \$100 per month operator and one for \$50 was that the former was a better guesser. When the Grand Army met in Boston in the late sixties, and Henry Pope sent me a despatch in which he ran the initials A. N. into "an" and I succeeded in getting it that

Post No. 1 was commanded by an Irishman from New Bedford instead of by A. N. Cushman. Manager Bradford had his inning. I had been in the speed trials and had won renown and here I was making the worst bull that had ever been perpetrated. I could make no defence that would appeal to him, and for years he eyed me askance, but one day I wrote "Tip McCloskey" and attributed that old error of mine to Tip. Mr. Bradford was a reader and he knew literature as a warm and personal friend. He saw that Tip had come to stay, a thing that it has taken me many years to thoroughly believe. So Mr. Bradford and I buried the hatchet and smoked the pipe of peace. The fact that the bull that had disgraced his office for several years, as he viewed the matter, had been utilized for literary purposes, the humor that had been obvious to everybody else for a long time became excruciatingly plain to him the moment it was transferred from the realm of fact to the arena of fiction. With all his faults he was a good fellow at heart and now that he is gone, those who served under him and winced under his caustic speeches have no thoughts of him that are not kindly, and all that memory holds are recollections tinged with the remembrance of the pleasant and deliciously funny things he was wont to say when the sun was shining and the world seemed gay.

My work on No. 4 East during these numerous absences, was done to a very considerable extent by Albert L. Suesman and Preston J. Hurlburt. The former worked the New York wire, days, and had, one time and another at the other end of it, George F. Durant, Theodore Fullon, Robert B. Lown, David W. McAneeny and many others temporarily, but in 1868, William H. Hoyt was assigned to the circuit and he and Mr. Suesman continued to work together until 1880, when Mr. Hoyt was made a chief operator, a position he still holds with the Western Union. It is probable that this period of twelve years is one of the longest on record that two men worked together continuously. From the departure of Mr. Hoyt until the latter part of 1881, when Mr. Suesman was appointed manager for the American Rapid Telegraph Company, many operators of note were assigned to the circuit, and among them Charles P. Bruch and "Wallie" Grant.

Mr. Hurlburt worked No. 4 East in the day time and had for sending operators, in New York, George A. Gustin, D. W. McAneeny, M. C. Laven, William J. Landy, Charles Hambright, Thomas Allen and Robert H. Morris. Mr. Suesman is my oldest friend and one of my most fondly cherished. For fifty years we have alternately played the roles of Damon and Pythias. We were boys together, in 1859, and about the time he went to the War in 1862. I had served some fifteen months as a messenger, but became

an operator during his absence, and when he came home bronzed and full of ardor to get into some sort of business I taught him to telegraph. So he was rather under obligations to help me out and Hurlburt is built on principles that will not admit of his doing any less to assist than is being done by others, no matter what relation they may bear to the recipient of their favors—friend, grandfather or what not. These men had done a full day's work before they sat in for me on a vague uncertainty as to when they would be relieved. But they never complained and in a sleepy and weary sort of way I used to come to the office, in the day time, for weeks at a time, when there was nothing doing with the ponies and thus enable them to take their vacations. Loss of sleep and aching bones are uncomfortable reminders that we are not half such intangible beings as Mrs. Eddy and her followers would have us believe, but when one is younger—and come to think of it, the whole three of us were younger—working extra isn't hard and the spirit of accommodation is one of the graces of human kind that we should cultivate to the last—that should be practiced until the habit becomes a fixed one. There is no other logical foundation for the proposition we call the golden rule and to whatever the Saviour said we should give heed not tomorrow, or next month, or the day after never, but today and we should give that heed not only with promptness but with undaunted cheerfulness and splendid vigor. Both of these men were born to the purple in respect of their fealty to a comrade. Suesman had outside interests. For fifteen years he successfully conducted a newspaper advertising agency and performed his regular duties in the office; he wrote dramatic criticisms for one of the local papers and was more largely interested in outside things than he was in the telegraph business, though he worked his wire to the satisfaction of a first-class man at the other end. It was Hurlburt who concentrated his attention on the telegraph business, becoming manager of the Western Union in Providence, a position he held for years and until he entered the service of the United Press as an editor, in New York in 1896. He is now my fellow worker in the service of the Columbia Phonograph Company in Bridgeport.

Early environment has much to do with our development. Mr. Hurlburt was born in Great Barrington, Mass., where he had the benefit of the society in his youth of Frank L. Pope, one of the greatest men of his time, and of Frank's brothers, Ralph and Henry, and when he could telegraph fairly well he came to Bridgeport and improved so rapidly that he was invited to go to New Haven where he saw some real telegraphers at work—Fred Fairchild, Dwight B. Case and J. Murray Fairchild. Naturally he absorbed what was in the air and when he arrived in Providence to take the day press report, he

was perfectly equipped for his work and he grew as the years passed and became the most finished operator Providence had ever had, taking into account as a whole his sending, receiving and penmanship. Among the other really first class operators Providence had possessed was Julius J. Bates, the original of Pop Donaldson in "Sketches Old and New," but he was an inferior sender, though a beautiful penman and so intelligent that nothing ever got by him. He gave me the alphabet and some good advice, some of it brutally frank but well meant and always acceptable. Then there were Nelson D. Pratt and William H. Allen, the latter now secretary to Fourth Assistant Postmaster General DeGraw. Allen represented the sort of wine that needs no bush. As recently as when he was the manager of the Postal in Washington, he sent 5,000 words of encoded matter in one hour and forty-five minutes over the leased wire of the St. Louis Republic. Pratt was my ideal. He was a young fellow from Southbridge, Mass., who worked the Phelps Combination Printer as well as Morse. He was skilled in handling them both, a dressy, high-stepping, church-going youngster who carried his head very high and thought Sunday work a most reprehensible and unnecessary proceeding. He is now a successful wire merchant in Chicago, where all the theatres are open Sunday night—in fact the opening performances of all the new plays and light operas are reserved for Sunday. I wonder how Mr. Pratt's present viewpoint compares with the Congregational Church ideas he brought over to Providence from the neighboring Massachusetts town. But he could telegraph in his own peculiar way, better than any one I had ever seen, without even making a pretence of keeping his mind on his work. He could receive anything that anybody could send, and his penmanship was the easiest and most graceful achievement I have ever witnessed in any telegrapher. He was not only my hero, but my model. He could whistle "Marching Through Georgia," "Tenting Tonight on the Old Camp Ground," and other popular airs, when he was copying press reports. How many times I have tried it and failed! And when I recall the number of errors I made attempting to carry on conversations, when at work, with the delightful abandon and fluency that marked Pratt's conversation, I marvel that my youthful assistance was not dispensed with "for the benefit of the service." As for whistling when I was receiving, I abandoned that undertaking quite early in my telegraphic career. Only the Saviour, as far as history records, ever successfully walked on the water, and as far as my observation had gone, at that time, no one excepting Pratt ever whistled, for pastime, and faultlessly worked a telegraph wire at the same time. Later on, however, that youthful operator, John Perley Munroe, to whom I have already referred as being at Worcester in the late sixties,

likewise operated a sibilant attachment in connection with operating his wire. Munroe was musically inclined, and it was a common thing for a vocal quartette and a guitar player to come and lift up their voices and strum the tuneful guitar, while Ferley went on receiving without any added effort that was apparent to the beholder. When his ears were uncertain, however, he would give the sounder a quick inquisitive glance, seem to get an answer, proceed with his writing and continue to supply the newspapers with an accurate copy of whatever the Associated Press happened to be sending out. He also practiced writing with his left hand until he was practically ambidextrous, and in copying press reports he often changed from one hand to the other, as suited his mood, going so far, upon occasion, as to copy a full night's report with his left hand.

When Pratt went away he was succeeded by Frank Pope, the man who was criticized for writing in Scribner's Magazine, twenty years ago, that with the proper electrical equipment trains could no doubt be run between New York and Boston in five hours. His prophecy has come more than true, but alas! he is not here to witness the great developments in the railroad service as the outcome of using electricity as a motive power. He was killed at Great Barrington, Mass., several years ago while experimenting with a commutator that he had placed in the cellar of his residence in connection with the public lighting plant. He is survived by his brother, Ralph, for a quarter of a century the valued secretary of the American Institute of Electrical Engineers, and Henry W. Pope, of the Bell Telephone Company, both of them also operators at Providence in my time, and like Bates, Allen and Pratt, they ranked with the very best. After Bates had forsaken us, my tuition was taken up by Frank Pope, and through the combined aid of them all, I was made an acceptable operator in my teens, though, as I have already related, men like Fred Seibert were still an abomination in my eyes. In good time, however, I caught up with all of them, marching a little lamely, sometimes, when I got into the society of the Catlins, the Hutchinsons, the Kettleses, the Marcans, the Reynoldses and men of their class who never broke anybody and who were not quite happy if they were themselves broken more than once or twice a year. Reynolds, in particular, was quite a shock until one became accustomed to him. On the very second the sending operator said n. m., Harvey would start in and before one could find a pen he had sent his first message down to the period. It used to be very amusing to watch an operator, who knew Reynold's peculiarity, begin to get ready as he neared the end of his last message, saying "anr" and then stopping while he dated up a few blanks, got his pen dipped and then adding "msk" put his nose down on his desk as a wild stream of dots and dashes came drifting in from Buffalo, which resolved themselves into a message about

once in every forty or forty-five seconds. Seventy messages an hour was just play for Harvey. And play for the receiver? Well, we all know how it is ourselves.

This luminous idea of "anr" and "msk" was born in the fertile brain of "Dad" Benett and at once became popular. He was one of the most genial and resourceful of men and a splendid telegrapher. Once when I was speaking of something by Dickens that especially pleased me, he smiled and told me that they were both born on February 7th, though not in the same year, an interesting fact that a man of his modesty would never have thought of mentioning unless it were sort of surprised out of him in the course of conversation.

(To be Continued.)

Obituary.

Dr. William McGregor Ash, a military telegrapher, died at his home, Woodside Park, Md., January 26, aged sixty-five years.

Ellis W. Rhivers, an old-time telegrapher of Ogden, Utah, died on January 12 at San Francisco.

Walter C. Lee, a telegraph operator of Manchester, Va., who has lately been employed on a Chattanooga, Tenn., daily paper, committed suicide January 27.

Neil S. Brown, aged fifty-five years, for thirty-five years identified with the Western Union Telegraph Company at Nashville, Tenn., as wire chief operator and lately as repeater chief, died at that place on January 18.

John C. Reilly, who had been connected with telephone development in Brooklyn and throughout Long Island for thirty-two years, died February 5 at his home in Brooklyn, aged fifty-four years. Mr. Reilly was vice-president of the New York and New Jersey Telephone Company for many years, until the consolidation of that company with the New York Telephone Company about a year ago. Since that time he has acted as an associate of Vice-President U. N. Bethell, of the latter company.

B. R. McAlpine, a former vice-president of the Western Union Telegraph Company, died February 1 in New York, aged ninety-one years. Mr. McAlpine was born in Rochester, studied law, and was admitted to the bar at the age of twenty-one. Later he became a member of the legal staff of the telegraph company, and served as vice-president from 1865 to 1869, when he retired to go to Europe. He also served as general financial agent for the company for a time, being appointed to that position in 1866. At the time of his retirement the board of directors passed complimentary resolutions of thanks for his very efficient and faithful services. Mr. McAlpine also drew up the contract which appears upon the back of the message blanks. He had lived in retirement in New York for the past thirty-five years.

Trade Notes.

The plant of the Westinghouse Storage Battery Company, at Boonton, N. J., was destroyed by fire on February 6.

The Electric Storage Battery Company, of Philadelphia, has recently issued a bulletin, No. 119, describing their low reading pocket voltmeter, designed for battery testing.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., has issued a finely illustrated bulletin No. 1001 describing their "Despatcher's Signals for Electric Inter-urban Railroads," which are operated by their selective system.

The General Railway Signal Company of Rochester, N. Y., has recently issued an illustrated bulletin upon "The Use of Alternating Currents in Railway Signaling," which is a reprint of a paper upon that subject read by Mr. A. K. Howe, chief engineer of the company, at a meeting of the Railway Signal Association in New York.

The Western Electric Company has issued an attractively illustrated little booklet describing briefly their manufacturing plant in which they make lead-covered telephone cable. The factory has a capacity of 200,000,000 conductor feet or over 37,000 miles per week. Another booklet sent out by the Western Electric Company describes their intercommunicating telephone systems, which will henceforth be designated as "Inter-Phone."

At the recent annual meeting of the Kellogg Switchboard and Supply Company the capital stock of the company was increased from \$500,000 to \$1,000,000, a stock dividend of 100 per cent being declared out of the surplus. Several changes have been made recently in the Kellogg sales force. Mr. C. D. Boyd has been appointed Michigan representative, with headquarters at Grand Rapids. Mr. C. Norsman has been transferred from the Michigan territory to the newly created Rocky Mountain district. Mr. B. Woodbury has been transferred from Minnesota to the Ohio district, with headquarters at Columbus, and Mr. E. G. Lawrence has been appointed his successor in Minnesota. Mr. G. A. Joy has been appointed sales engineer for the territory west of Chicago.

At the annual meeting of the Western Electric Company held in Chicago, February 3, directors were elected as follows: Messrs. E. M. Barton, Henry S. Howe, A. D. Wheeler, H. B. Thayer, Theodore N. Vail, John I. Waterbury, W. H. Miner, E. J. Hall, F. R. Welles, S. L. Schoonmaker, B. E. Sunny and C. G. DuBois.

At the meeting of the directors, held on the same day, the following officers were elected: Chairman of board of directors, E. M. Barton; president, H. B. Thayer; vice-presidents, H. A. Halligan; F. R. Welles and W. P. Sidley; secretary, G. C. Pratt; assistant secretary and assistant treasurer, R. E. McEwen; treasurer, J. W. Johnston; assistant treasurer, E. R. Gilmore and J. B. Forbes.

Miscellaneous Items.

It is reported that there is such difficulty in securing messenger boys in Lincoln, Neb., that the district messenger companies have had to discontinue the delivery of packages and use the telephone whenever possible for delivering messages.

The supply of telegraph poles in England is now obtained principally from Russia. Formerly Norway furnished most of the poles required, but the forests there, becoming largely exhausted, the English telegraph management was obliged to turn to other sources and in 1905 they began to import poles from the vast forests of Russia. To supply the needs of the English telegraph system about 50,000 poles are required annually.

In a recent lecture delivered before the Institution of Electrical Engineers of Great Britain, Professor J. A. Ewing spoke of the important work of the late Lord Kelvin in telegraphy and navigation, reviewing his accomplishments in those lines, referring especially to his invention of the mirror galvanometer, and the siphon recorder, and the means which he devised to neutralize the effect of the magnetism of the ship upon the compass.

In the course of a lecture delivered recently, on the Peary North Pole expedition, Professor D. B. McMillan, who was one of the party, told an amusing story of the efforts of an Eskimo to construct a telephone line. During a stop at a hut which had been occupied by the Greeley expedition an Eskimo found a long piece of wire. Never having seen a wire, he asked Professor McMillan what it was and what it was for. He was told that the white men strung wire like it on poles stuck in the ground and by talking into an instrument at one end the voice could be heard at the other end. Next morning the Eskimo was missing. After a search he was found carrying on some telephone experiments of his own. He had stuck some sticks in the ground and hung his wire on them. He held one end of the wire up to his mouth and talked to it at the top of his voice. Then he ran as fast as he could to the other end and held the wire to his ear expecting to hear his own words repeated. When he failed to hear any sounds the expression on his face clearly indicated what he thought of his white friend.

The Telegraph Situation in Canada.

In spite of the fact that operators' wages throughout Canada are as high, if not higher, than those in the United States, there is a great scarcity in the supply of operators all over the Dominion. There are comparatively few operators who go from the United States to Canada, perhaps because they think the conditions of living are much more severe than in the United States, but those who have tried the country generally found that not only the conditions of living, but the climate, are equal, if not better, than south of the line.

LETTERS FROM OUR AGENTS.

DULUTH, MINN., WESTERN UNION.

Manager C. A. Crane reports a large increase in both telegraph and district receipts for the month of January over the corresponding month of last year. If excellent service will get the business, Manager Crane is certain to secure his share.

Ernest Zender, formerly of the St. Paul force, has accepted the position as manager at the Marshall, Wells Hardware Company branch office, vice Miss Edith Hancock, resigned, on account of ill health.

OTHER NEW YORK NEWS.

The New York News Bureau gave a dinner Saturday evening, February 5, at Delmonico's, to celebrate their recent removal from 44 Stone Street to the new building of the Stock Quotation Telegraph Company, at 26 Beaver Street. Among those present were James Rascovar, president, W. H. Hurst, treasurer, Edward Rascovar, secretary, and J. J. Walsh, director, of the News Bureau, and Henry Myers, president of the Hamilton Press.

A New Sending Machine.

The Hulit Transmitter Company, of Topeka, Kansas, has recently placed on the market a telegraph sending machine, which is giving satisfactory results to those who are already using the device. The new machine, which is operated by a spring motor, has two finger keys, one for making dots and the other for making dashes, but all characters are made by the same circuit closer. A touch on either key starts the motor and thus makes the contacts. The machine automatically measures not only the dots and the spaces between the dots, but also the spaces between succeeding dots and dashes and between succeeding dashes. The operator may, by manipulation of the keys, make as long a space or dash as he desires, but he cannot make a shorter dot or space than that automatically made by the machine. By means of a thumb screw the speed may be quickly adjusted and in the same manner the contact may be set to give a light or heavy character, thus adapting the device for use on any circuit.

The terms of the competition for the design of the monument to be erected at Berne, Switzerland, to commemorate the formation of the International Telegraph Union, have been announced. The competition is open to the artists of the entire world. The artist chosen will be entrusted with the erection of the monument at a cost not exceeding 170,000 francs, all fees and charges included, with the exception of transportation expenses, customs duties and the cost of the foundation up to the ground level, which will be borne by the Federal Council. The jury will have at their disposal 20,000 francs to reward deserving competitors. Models must be deposited at the Federal Palace, Berne, before August 15, 1910.

Mr. Oscar Moll, managing director of the Deutsch-Atlantische Telegraphen Gesellschaft, in renewing that company's subscription for another

year, says: "We find that Telegraph Age, as regarding the scientific, commercial and personal information contained therein is in every way up-to-date. As a matter of fact, we frequently refer to it when in want of some information useful to our company or personally."

That the making of costly errors is not confined, as some people suppose, to telegraph companies, is shown by the fact that the United States Government some time ago destroyed 4,000,000 telegraph forms because of the misspelling of a single word. Several hundred thousand greenbacks were destroyed before issue at one time for the same reason.

The annual dinner of the American Institute of Electrical Engineers will be held at the Hotel Astor, New York, February 24, Prof. Elihu Thomson will be the guest of honor.

G. W. HICKEY, INSURANCE, All kinds, Coal for Family use. The best kind. 30 Church St., New York; 209 Jefferson Ave., Brooklyn.

Every Telegrapher can own a home.—The Serial Building Loan and Savings Institution, of 195 Broadway, New York, has assisted more than a thousand telegraphers to save money and buy homes and will assist others who have a similar ambition. Address them at their place of business, 195 Broadway, New York, and they will tell you how you can own a home of your own by saving a small amount monthly.

Advertising will be accepted to appear in this column at the rate of fifty cents a line, estimating eight words to the line.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Leg. Pattern \$3.50
Legless Pattern 4.00
F.O.B. Columbia, Pa.



THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,
Columbia, Pa. R. F. D. No. 1

Telegraph and Telephone Age

No. 5.

NEW YORK, MARCH 1, 1910.

Twenty-seventh Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Brief History of Distinguished Persons Whose Names Represent Electrical Terms.

As may be easily inferred by noting the connection of some ones name representing an electrical term with certain achievements, the advancement of electrical knowledge in a given direction by such persons, no doubt led to the selection of the name which most fittingly recalls work done in a particular line.

Ampere—The Unit of Current Volume.

Andre Marie Ampere was a distinguished French electrician who was born in 1775 and who died in 1836. The name Ampere, representing as it does the unit of current volume, appropriately honors the man who originated the term electric current. After Oersted in 1819 made the great discovery that magnetism existed around the conductor only during the period during which electricity was actually flowing and ceased when the circuit was broken, Ampere in explaining the actions of a magnetized needle in being deflected in one direction when placed above a wire and in the opposite when underneath, said that the force which deflected the needle must be circular in motion and compared it to the manner in which a man's body floating or swimming in a circular current of water would be affected, hence the origin of the term "electric current" which he applied to the the force influencing the needle.

Electrical progress was also greatly advanced by Ampere's various discoveries, especially by the publication of a book by him in 1830 giving his theory* of electro-dynamics, and original views that electricity and magnetism are identical.

James Watt.

The watt, or unit of electrical power is so called in honor of James Watt, an inventor born in Scotland in 1736, and who died in 1819. His life work is identified with his persistent efforts to improve the steam engine during its early stages, hence his name is fittingly suggestive of power. When the electrical equivalent of a unit of mechanical power was found the said unit was called a watt.

Georg Simon Ohm.

Georg Simon Ohm, a German professor of physics at Cologne, and subsequently at the University of Munich, discovered the laws which govern the volume of current flowing through a conductor and formulated the rule $E/R=C$, which is the fundamental basis of electrical measurement. He declared that with a given electrical pressure in volts the resistance of the conductor determined the volume of current flowing therein. The unit of resistance is an ohm, so named in his honor. Professor Ohm was born in 1787 and died in 1853.

James Prescott Joule.

James Prescott Joule was born in 1818 and died in 1889. He was an English physicist. He discovered the mechanical equivalent of heat $C'R=W$. One W develops .24 calories of heat per second. From this he evolved the complete formula which is, $\text{Heat}=C'R \times t \times .24$ where t represents the time in seconds.

Joseph Henry.

Joseph Henry was an American electrician who was born in 1797 and who died in 1878. He is credited with having built in 1830, the first electro-magnetic telegraph line and which was one mile in length. He discovered the fact that the strength of a magnet could be greatly increased by winding the core with several layers of insulated wire and thus contributed much towards the improvement of that device.

Although up to that time the electro-magnet originally invented by Sturgeon in 1827 was much used in the way of experiments; the coil consisted of but one layer of wire and consequently required a great volume of current to create a strong magnet.

The term henry represents the unit of inductance, and is equal to the inductance of a circuit when the electro-motive force induced therein equals one volt, while the inducing current varies at the rate of one ampere per second.

The Leyden Jar.

The term Leyden is not taken from the name of the inventor or discoverer of that well known reservoir of electricity but from the city of Leyden where experiments with it by Cuneus during its early stage attracted considerable attention.

The original discovery was made by VonKleist in 1745 while endeavoring to isolate electricity by passing a charge from a frictional machine into a bottle filled with water, by means of a wire inserted therein. While holding the bottle in one hand, he received a strong shock when he accidentally discharged it during the course of his investigation.

Recent Telegraph and Telephone Patents.

A patent, No. 947,966, for a telephone-transmitter, has been granted to Evan T. Evans, of Westerville, Ohio.

A patent, No. 948,753, for a pay-station box for telephones, has been taken out by Clarence A. Anderson, of Salina, Kans.

A patent, No. 948,941, for a telephone call system, has been awarded to William E. Zabst, of Portage, Wis.

The following patents have expired:

Patent No. 491,133, for a printing telegraph receiver, issued to Major D. Porter, of Brooklyn, N. Y.

Patent No. 491,163, for vibratory telegraphy, held by Stephen D. Field, of Stockbridge, Mass.

Patent No. 491,347, for a telautograph, issued to Elisha Gray of Highland Park, Ill.

Patent No. 491,595, for a telegraph transmitter, issued to Robert S. Roberts, of Philadelphia.

Personal.

Colonel Charles S. Diehl, acting general manager of the Associated Press, New York, was a recent business visitor in Chicago.

Mr. Fred. G. Boyer, superintendent of telegraph of the Standard Oil Company, with headquarters at Oil City, Pa., was a recent New York visitor.

Mr. George E. Hudson has been appointed special agent in charge of the leased wire service of the American Telephone and Telegraph Company, New York, to succeed W. E. Athearn, appointed engineer of equipment of the Western Union Telegraph Company. Mr. Hudson was formerly connected with the telegraph service at Pittsburg, but for some time past has been chief assistant to Mr. Athearn in the service over which he now assumes charge.

Inauguration of Telegraph Letter Service by the Western Union Telegraph Company.

Announcement has been made by the Western Union Telegraph Company that they will shortly inaugurate a new service to be known as a "night letter service. This proposed service will permit any one to send fifty words at night for the price of ten words sent in the day, with one-

fifth of the day rate for each additional ten words or fraction of ten.

These letters will be handled in combination by the telegraph and telephone when that is the quickest and most convenient way. When the messages reach their destination in the early morning hours they will be put in the mails in time to be delivered in the first morning distribution.

In announcing the new service the company stipulates that only plain English letters will be received. Code words are excluded.

"We are inaugurating this 'night letter' plan in order to keep our idle wires busy at night," said an official of both the American Telegraph and Telephone and the Western Union Telegraph Companies. "It will be a great economy to business men and an additional convenience to them.

"Messages handed in a Western Union office in one city up to midnight will be transmitted to their destination with customary rapidity. The office of destination will place the messages in stamped and addressed envelopes and messengers will carry them to the local Post Office, depositing them before the first morning mail goes out.

"The 'night letter' service is really meant for letters. It insures quick transmission. If I send a letter from here to St. Louis, for example, by mail to-day it will reach its destination to-morrow afternoon, and may not be delivered until next day. If I send the same letter by our 'night letter' service this evening the letter will be delivered in St. Louis to-morrow morning in the first mail."

People who live remote from the telegraph office, where the telegraph office closes early in the evening, are to have city accommodations under the new plans that have been worked out. They may call up the Bell Telephone Company "central" in their locality and dictate their telegraphic messages. "Central" will communicate the message to the nearest office of the American Telephone and Telegraph Company, and it will from there be despatched to its destination over the telegraph wires.

As the American Telephone and Telegraph Company's offices in the large cities are open day and night, every private person who has access to a Bell telephone may send a telegram to any distant part of the country at any hour of the day or night. The answer also can be delivered to the sender over his telephone.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

At the weekly meeting of the executive committee, held on Wednesday, February 16, Colonel R. C. Clowry tendered his resignation as general manager of the company in order that as president, he may devote more time to administrative matters and to the working out of the broad progressive policies of the new management and

recommended the appointment of Mr. Belvidere Brooks as his successor. The resignation was accepted and Mr. Brooks was appointed general manager of the company in charge of its lines, offices and service.

Mr. A. G. Saylor, assistant general superintendent was appointed general superintendent of the eastern division to fill the vacancy created by the promotion of Mr. Brooks.

The resignation of Mr. J. C. Barclay, as assistant general manager has been accepted and that office has been abolished.

Mr. W. E. Athearn has been appointed engineer of equipment, a newly created position.

Mr. E. G. Gallaher, auditor of the American Telephone and Telegraph Company, Boston, has been appointed auditor of the company, vice Mr. J. B. Van Every. Mr. Van Every continues as vice-president in charge of the accounting and statistical departments.

Among the recent executive office visitors was Mr. I. McMichael, vice-president and general manager of the Great North Western Telegraph Company, Toronto.

Mr. C. H. Bristol, general superintendent of construction, has returned to his office after an extended trip of inspection through the southern division.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Edward J. Nally, vice-president and general manager of the company, in speaking of the announcement made by the Western Union Telegraph Company, of the new service to be known as the "night letter service," stated that the idea was not a new one; that it was something that had been discussed by telegraph men for a number of years, and that for his company he had made a very exhaustive study of the question during the last few years, and that recently he had called in his general superintendents and superintendents in conference, when every feature of the proposed service had been discussed, and that, further, his officials, both directly and through the managers of their larger offices, had gotten themselves in touch with the large business interests throughout the country, and interviewed extensive users of the telegraph, for the purpose of finding out if there was a demand for such a service; and after a thorough canvass, the reports received were generally to the effect that what the public wanted was not a deferred service, but an instantaneous service; and that consequently his company last August inaugurated their "special rush service," under which they undertake to handle messages between all important places, from customer to customer within twenty minutes. That this service was an instantaneous and great success, and that his company was now giving the fastest telegraph service in the world.

As regards the announcement of the Western

Union that arrangements had been made by which all persons having a telephone, or using a telephone, could get in touch with the most remote telegraph office at all hours of the night, Mr. Nally stated that this was not new. On the contrary, such facilities had been furnished the public since the very inception of the telephone service; that his company keeps telephone operators on hand in their offices at all hours for the special purpose of accommodating the public who may desire to send a telegram from their homes or their offices and that messages are also delivered by telephone, and that bills covering the tolls for such telegraph service by telephone are rendered monthly.

Mr. S. B. Haig, superintendent of traffic, has returned to his office after a trip to Chicago on business connected with the service.

The first meeting of the Postal Telegraph Club of Atlanta held in that city February 26 was a success from every standpoint. Among the speakers were: Hon. R. F. Maddox, mayor of Atlanta, on "The Atlanta Spirit and Our Future;" Hon. Fred. J. Paxon, president of the chamber of commerce, on "Greater Atlanta;" Dr. John E. White, pastor of the Second Baptist Church, on "The Operator as a Happy Citizen;" Colonel W. B. Kenny of the Associated Press, on "Some Operators I have Known;" and S. W. Wilkes, commercial agent of the Georgia Railroad.

RESIGNATIONS AND APPOINTMENTS.

Mr. F. A. Bardwell is acting manager at Springfield, Mass., vice Mr. Charles H. Goddu, resigned.

Mr. W. C. Griffin, for twenty years identified with the Detroit office and for several years past, all night chief operator, has resigned his position to accept an appointment with the American Telephone and Telegraph Company.

Great North Western Notes.

Mr. S. B. McMichael, general assistant of the company, accompanied by his wife, is spending a vacation at Altamonte Springs, Fla.

Mr. David Adams, chief operator of the London, Ont., office of the company, has been advanced to the position of acting manager, vice W. C. Furness, deceased.

W. C. Furness, manager for the Great North Western Telegraph Company at London, Ont., died February 13, after a long illness, aged sixty-nine years. Mr. Furness was one of the best known telegraphers in the Dominion. He first entered the service with the Montreal Telegraph Company and was for a time local manager for that company at Hamilton, Ont. Forty-five years ago he became manager at London and when the Montreal Company was merged with the Great North Western he retained that position which he has since occupied.

Obstacles are regarded by men as but the stepping stones to successes.

The Cable.

Mr. William Miles has been appointed secretary of the Direct United States Cable Company, and Mr. S. Fenn, superintendent at Halifax, N. S., has been appointed manager at London to succeed Mr. T. Finnis, deceased, who held the position of general manager and secretary.

Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company, has announced that on account of the increased demand for cable facilities his company will soon lay an additional transatlantic cable. This will be the sixth cable crossing the Atlantic owned by the Commercial Cable Company.

Legal.

In an opinion recently delivered by Judge Foster of the Municipal Court of Chicago, it was held that the law of the state wherein a telegram originates governs in an action for damages arising from a mistake in the transmission of the telegram, and not the law of the state in which the message is received.

Following the decision in the case of the Western Union Telegraph Company against the State of Kansas, Judge Day of the United States Supreme Court has declared that the Arkansas law seeking to impose an incorporation fee on foreign organizations, doing business in that State, based upon their entire capital stock, is unconstitutional. This decision was rendered in a suit brought by the Western Union Telegraph Company to enjoin the Secretary of State of Arkansas from ousting the company for failure to pay the fee.

Western Union Telephone Case.

The long drawn out case of the Western Union Telegraph Company against the American Telephone and Telegraph Company again came up February 15 when exceptions to the master's report were made at Boston, before Judge Colt of the United States Circuit Court. The report of Everett W. Burdett, as master in the case, was filed last August and allowed the Western Union \$2,579,914 in cash and 20,087 shares of stock as settlement of a claim which they had under a contract made November 10, 1879. Both companies have taken exception to this report.

Bound Volumes of Telegraph Age.

For those of our readers who desire to have the past year's issue of *Telegraph Age* in a form in which they can readily preserve all of the copies for future reference we would recommend a bound volume. We are now able to supply these containing the twenty-four issues of 1909 for the nominal price of \$3.00. There are several features in one of these volumes which comprise nearly 900 pages of reading matter, which are alone worth much more than the amount asked. The series of articles by Willis H. Jones entitled "Some Points on Electricity" are in themselves worth the price of the book to any

student. We have also published articles by the best informed authors upon the developments in wireless telegraphy, and, in fact, there will be found recorded in this book all of the important improvements in the wireless art during the past year. The use of the telephone for train despatching has largely increased since January, 1909, and we have kept pace with its development by presenting to our readers many articles upon this subject, written by some of the best posted men in the railway and telephone world. These are but a few of the many features presented in *Telegraph Age*, during 1909, and those interested in any branch of the telegraphic industry will find much valuable information in one of these bound volumes. A copy of this work will be sent to any address upon receipt of price, \$3.00, by J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

The Quadruplex.

"The Quadruplex," by Maver and Davis, is doubtless the most thoroughly practical low-priced work treating on this subject ever published.

It is clear and lucid in its style, a text-book free of all technicalities and easily comprehended. It contains 128 large pages, is copiously illustrated, bound in cloth and well printed on heavy paper.

It embraces just the ideas that should find a place in every telegraph office, and no telegrapher who desires to acquire a complete knowledge of multiplex telegraphy, the perfect understanding of which is so essential in these days, should fail to promptly obtain a copy of this important book.

Its chapters include: Development of the Quadruplex; Introduction and Explanation; The Transmitter, Rheostat and Condenser; Stearns Duplex; Instruments of the Polar Duplex; The Polar Duplex; The Quadruplex; The Dynamo-Electric Machine in Relation to the Quadruplex; The Practical Working of the Quadruplex; Telegraph Repeaters; The Wheatstone Automatic Telegraph.

It will be seen at a glance that such chapters as these fully cover the modern apparatus found in the telegraph offices of to-day. Copies of this book can be obtained from us at \$1.50 each, express charges prepaid. Address J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

As there are only a few copies of this important work on hand and as a new edition of the book is not contemplated, it will be well to secure a copy before the supply is exhausted.

"The Practical Management of Dynamos and Motors," by F. B. Crocker and S. S. Wheeler, as indicated by its title, affords a clear understanding of the use, care and operation of these important adjuncts of the well equipped modern telegraph office. There is a constant demand for this book, for telegraphers find it an invaluable addition to their working library. There are 206 pages, and 99 illustrations; price, \$1. Address J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

Radio-Telegraphy.

Experiments in wireless telephony under the water are being carried on by one of the submarine torpedo boats of the French Navy.

Thomas A. Smith, a student of the school of wireless telegraphy of the Brooklyn Navy Yard, has been detailed on the U. S. S. Paducah, now in southern waters.

The station of the United Wireless Telegraph Company at Manhattan Beach has been abandoned, the business formerly handled from that point being taken care of now by the station on the roof of the Waldorf-Astoria.

A patent, No. 948,068, for wireless telegraphy, has been granted to R. A. Fessenden, of Washington, D. C. Tuning antennae by altering the capacity by varying the electrostatic inductive relation between them.

The Southern Wireless Telephone and Telegraph Company of Atlanta, Georgia, has filed articles of incorporation with a capital stock of \$1,000,000. The new company proposes to establish a main office at Atlanta and install wireless stations throughout the surrounding country.

The United Wireless Telegraph Company is making arrangements to construct a high power wireless station at Montauk Point, Long Island, and a similar station on the coast of France with a view of establishing a regular trans-Atlantic wireless service.

Mr. William Marconi was in New York recently on his way to Cape Breton, N. S., where he is superintending the completion of the high power wireless station which is being installed to replace the one destroyed by fire last August. He expects to have the new station in operation by April 1.

A patent, No. 948,086, for directed wireless telegraphy, has been awarded to E. Bellini and A. Tosi, of Paris, France. Combines with the dirigible system a uniformly radiating system, the aerial part of which is substantially co-incident with the symmetrical axis of the aerial of the dirigible system.

G. J. deGuillen Garcia, a Spanish investigator, at his wireless station in Spain, records atmospheric discharges occurring during thunder storms anywhere within a radius of 500 miles. By noting the variation in the intensity of these discharges he is able not only to give warning of the approach of a storm but also to form an idea of the course which the storm is taking.

A patent, No. 948,156, for a system for the transmission of electro-magnetic waves with sound regulating frequencies, has been secured by W. H. Bathrick, of Somerville, Mass., for transmitting sound controlled radiant energy by means of a pair of secondaries, a pair of primaries, a primary generator of high frequency currents, secondaries connected with the conductors of electrical oscillations. Waves of sound actuate a diaphragm which vary the current strength of the primaries.

Patent, No. 948,348, for apparatus for producing high frequency oscillations, has been granted to I. Schonberg, of St. Petersburg, Russia. The apparatus is herein shown as provided with an oscillatory circuit having therein a sparking gap and a rectifier for arresting the oscillations when moving in one direction and for permitting them to move in the other direction.

Patent, No. 948,609, for a wireless telephone transmitter, has been taken out by A. A. Jahnke, San Francisco, Cal. A telephone transmitter adapted for wireless telephones, said transmitter having a chamber containing granular material, a porous wall, and means for supplying a volatile liquid through the walls to the chamber.

The wireless telegraph danger signal "S. O. S." which is now used by vessels at sea has been the occasion of much conjecture as to its origin and meaning. This call was adopted by the Berlin International Wireless Telegraph Convention held in 1906, and means "Stop other service." Previous to that time there had been no generally recognized distress signal in use. The signal "C. Q. D." signifying "Come, quick, danger," was devised by the Marconi Company, but was never officially adopted by other interests.

The United States Navy Department maintains at the Brooklyn Navy Yard one of the largest wireless telegraph schools in the country. Enlisted men in the navy are detailed to attend this school and learn telegraphy, including the construction, operation and care of instruments used in wireless telegraphy in order to qualify as operators on the vessels of the navy. At times as many as 250 students have been in attendance. The operators must attain a high degree of efficiency before they are assigned to take charge of apparatus on board a vessel of the navy.

Mr. C. J. Raby, of Estero, Fla., in renewing his subscription for another year, says:

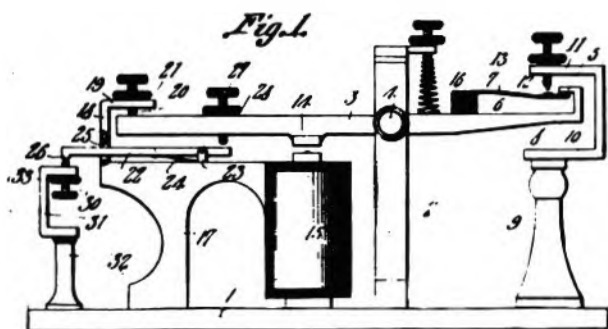
"The Age is so valuable that I would feel lost if I were not to get it. The information given under the head of Radio-Telegraphy is in itself worth the price of the journal. May 1910 see it prosper beyond any previous year."

For the convenience of our readers we have prepared and published in our catalogue, together with prices, a carefully selected list of standard books treating on wireless telegraphy. These volumes, which include the most up-to-date works upon the subject, furnish the best information obtainable, the kind giving the most efficient aid and direction to the student. Orders for the books enumerated, or indeed for any others that may be required, which must be accompanied by the cash, will be filled on the day of their receipt, and sent with all the carrying charges prepaid. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

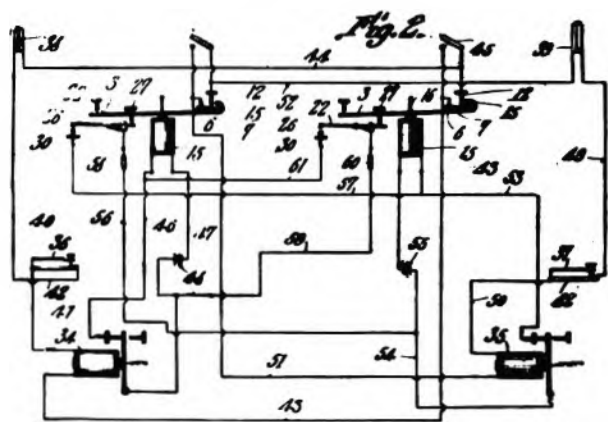
A New Repeater.

The following described repeater, the invention of R. H. Tudor, manager for the Western Union Telegraph Company at Corinth, Miss., possesses several novel features, requiring no extra magnet, repeating sounder or extra armature to keep the opposite transmitter operative.

The instrument slightly resembles the Atkinson repeater-transmitter. That is, in respect to the main line contacts, magnets, etc. It is a 6-ohm transmitter. Referring to Figure 1, the main feature is the shunting device, which is a little lever 22 carried by small standards 23 on a pivot just under the transmitter beam. The lever extends to the left through a passage 25



in over-hang 18 and carries a platinum contact 26. The lever is held down on contact 26 by its own weight assisted by spring 24, until it receives a stroke from the set-screw 27 of the transmitter beam on its short end near pivot 23. This stroke causes the little lever to raise at the left and break contact at 26, which takes the



shunt circuit from around the local posts of the opposite relay, but not until after the main line circuit has been closed at 7 and 12. Now, when the transmitter beam starts on its upward movement the little lever again falls on contact at 26 and puts the shunt around the opposite relay's local posts before the main line circuit is broken at 7 and 12, consequently one of the two circuits leading out from the instrument is always closed before the other is opened.

Referring to Figure 2, assume that an operator on the right is sending and some distant station on the opposite circuit, or the left, desires to break the sender. He first opens the circuit which opens relay 34, this in turn opens the transmitter at the left. As soon as this transmitter beam starts on its upward movement, its lever 22 puts a shunt circuit around the local posts of the sending relay 35 and closes the sending transmitter. Then as the transmitter on the left completes its upward movement it breaks the main line on which the sending operator is at work; thus completing the break through the repeaters.

It is immaterial how rapidly an operator may be sending, the man on the other circuit can break through the repeaters the instant he opens the circuit, for the shunt circuit of the sending transmitter is broken each and every time the transmitter closes, whether it be closed on a quickly made dot, or a dash. Then as the operator on the opposite circuit opens his transmitter, the sending transmitter is forced to close by the fall of lever 22.

The front-stop of the transmitter beam might be called a solid stop, since the short end of lever 22 can scarcely be seen to move; the long end having to move only enough to break contact at 26.

Tests of a New Telephone Transmitter.

Tests were made recently over the lines of the American Telephone and Telegraph Company, of a new form of microphone, patented by a French inventor. In the first test a line from New York to Pittsburg and return was used, the total length being 778 miles. With one cell of battery the sound of the voice came from the receiving instrument in greater volume and better quality than from the ordinary telephone with a battery of three cells. From Pittsburg the line was then connected with Chicago with a return wire to New York. Tests made with one, two and three cells of battery showed highly satisfactory results. Even when the repeating coil, which is generally used to carry the voice from New York to Chicago, was omitted the tones came back clear and strong.

In the new device the voice is received on a microphone, where a special combination of drums raises it two octaves and a third. It is sent over wire at that pitch. The receiver at the other end, by a combination of drums, brings the vibrations back to normal, so that the voice is heard in its speaking tones.

The diagrams appearing in "Official Diagrams of the Postal Telegraph-Cable Company's Apparatus and Rules Governing the Construction and Repair of Lines" were made from the company's blueprints and are absolutely correct. This volume, which is published by Telegraph and Telephone Age, under official sanction and supervision, is of especial value to operators and linemen. It will be sent to anyone, postpaid, on receipt of fifty cents. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Annual Meeting of Mackay Companies.

The annual meeting of the stockholders of the Mackay Companies was held in Boston February 15. In the annual report attention was called to the changes which have been made in the Atlantic cable system of the Commercial Cable Company during the past year. The part of the transatlantic cable from the Flemish Cap to Canso, N. S., which was released from use by the running of a new cable from the Flemish Cap to Newfoundland and thence to New York, was recovered, resheathed and retaped so that it was as good as new and was then joined to the second of the two 1884 cables, near the Flemish Cap, and laid to Newfoundland and southwards towards New York City, until it again met the second cable and was there connected with it, so that at present that entire transatlantic cable begins at Waterville, Ireland, and runs thence to Newfoundland; thence to Canso, and thence to New York. During the coming Spring the old cable released by this change will be reclaimed from the bottom of the ocean and will be resheathed and retaped and used again to complete the extension of this second cable to New York City direct from Newfoundland. The greatest development in the land line system, known as the Postal Telegraph-Cable Company, during the past year has been the building of a new line from Sacramento, Cal., to Reno, Nev. This line consists of two 435-pound copper wires which can also be used for telephone purposes and when completed to Salt Lake City, as it will be during the coming summer, will furnish an entirely new transcontinental route from the East to the Pacific Coast.

The following announcement in regard to the stock of the American Telephone and Telegraph Company held by the Mackay Companies was also made:

"The Mackay Companies will sell its entire holding of stock in the American Telephone and Telegraph Company. That step being in deference to public opinion, which views with suspicion this large holding of stock in a company which has recently purchased the control of the Western Union Telegraph Company. Moreover, that stock was acquired by the Mackay Companies with a view to bringing about economies in the construction and maintenance of joint-pole lines over long stretches of country, where the business was not sufficient to justify either company constructing an independent pole line by itself. Many such arrangements were made, each company owning one-half of the pole line, but having nothing to do with the business of the other company. Since, however, the American Telephone and Telegraph Company has acquired control of the Western Union Telegraph Company the time has come for the Mackay Companies to sell its holdings of stock in the American Telephone and Telegraph Company, and that will be done. The Postal Telegraph system will continue to be free and independent, prepared to maintain the competition which it has furnished for twenty-five years."

The financial report shows an income of \$3,808,779 during the year ending February 1. After paying dividends of \$2,000,000 on the preferred stock and \$1,758,667 on the common stock and operating expenses of \$32,335, a balance of \$17,777 was left. The present surplus of the company amounts to \$903,766.

The seven trustees were re-elected as follows: Clarence H. Mackay, William W. Cook, George G. Ward, Edward C. Platt and Milton W. Blackmar, of New York; Robert A. Smith, of Toronto, and H. Vincent Meredith, of Montreal.

Municipal Electricians.

Mr. James Grant, superintendent of fire alarm telegraphs, New Haven, Conn., has recommended the installation of a new fire alarm system in that city.

The fourteenth annual report of the International Association of Municipal Electricians giving a full account of the convention held at Atlantic City, September 14, 15, and 16, 1909, has been issued in book form and distributed among the members. All of the papers read at that gathering together with the discussion following the same are presented in this work which contains 153 pages. It is bound in the usual black cloth and contains engravings of the officers and members of the executive committee and numerous diagrams illustrating the papers delivered. Taken as a whole the report reflects great credit upon its compiler, Frank P. Foster of Corning, N. Y., secretary of the association and is a valuable addition to the library of every municipal electrician.

A Valuable Telegraph Book.

"The Hughes and Baudot Telegraphs," by Arthur Crotch, of London, the well-known electrical engineer and author, is a book that everyone interested in printing telegraph systems should possess. The volume contains a very full description of the two mentioned type-printing telegraph systems used so generally in Europe, the Baudot in France and the Hughes elsewhere on the Continent. The illustrations are numerous and clear, and all together, the book furnishes a fund of carefully stated information valuable to the student and also of interest to the lay reader. This book may be obtained of J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, and will be sent to any address, carrying charges prepaid, on receipt of price, \$1.00.

The South African Institute of Electrical Engineers has been formed at Johannesburg, Transvaal, for the purpose of promoting the general advancement of electrical science. The new organization has started with a membership of about one hundred and twenty-five, and hopes soon to increase this number to five hundred. Mr. C. W. R. Campbell is president and Mr. Fred Rowland, Johannesburg, is secretary.

The Telephone.

The Montevideo Telephone Company of Montevideo, Uruguay, has 4,594 telephone stations in operation and 11,767 miles of wire.

The report of the Pacific Telephone and Telegraph Company for the year ended December 31, 1909, shows an increase in the gross earnings of \$1,068,000 over the preceding year and an increase of \$68,000 in the net revenue.

The State Railroad Commission of Pennsylvania has decided that an exclusive contract between two telephone companies for the interchange of business in that State is illegal and recommends that there be an exchange of business between all companies in the field.

Extensive improvements will soon be made in the telephone service on the Isthmus of Panama. Existing iron wire circuits will be replaced by copper and old magneto telephones will be replaced by common battery instruments. The latest telephone directory of the Canal zone contains about 1,300 names.

The report of the Chicago Telephone Company for the year ending December 31, 1909, shows that the company has 262,359 telephones in operation, an increase of 31,179 during the past year. The phenomenal increase in the telephone service of that city during the past decade is shown by the fact that ten years ago only 27,773 stations were in operation.

One of the longest, if not the longest submarine telephone cables in the United States was laid recently across San Francisco Bay between San Francisco and Oakland. This cable, the submarine portion of which is 3.7 miles in length contains fifty pairs of No. 19 B. and S. gauge, double paper insulated wires. The armor consisting of twenty-six No. 6 B. W. gauge galvanized steel wires is laid over a serving of jute covering the lead sheath, and this armor itself is covered with jute treated with tar, sand and lime. The cable has a weight of seven and a half pounds per lineal foot and an outside diameter of 2.3 inches.

M. Millerand, minister of posts and telegraphs of France, has asked Mr. U. N. Bethell, vice-president of the New York Telephone Company, if his company would take six young officials from the telephone staff in Paris and give them a practical training in all the branches of the telephone business, so that the telephone system of Paris can be overhauled and put on a more economical and scientific basis. Mr. Bethell has advised the French Minister that the New York Telephone Company will be glad to give the French officials instruction and to aid the French telephone administration in every way.

The six men from Minister Millerand's staff will each spend six months in studying the telephone system in New York. They will be put through every branch of the service, beginning with the instrument setters and ending with observation of the administrative department in the main offices.

The annual report of the Cumberland Telephone and Telegraph Company for the year 1909 shows an increase of \$474,000 in the gross receipts over the preceding year and an increase of \$167,000 in the net earnings. In his statement to the stockholders President James F. Caldwell called attention to the fact that each year for twenty years without a break there had been an increase in the business of the company.

The transfer of the control of the Central District and Printing Telegraph Company of Pittsburgh, to the American Telephone and Telegraph Company was completed at the annual meeting of the stockholders of the former company February 10. The officers elected were: Union N. Bethell, president; D. Leet Wilson, vice-president and chairman of the board of directors; F. H. Bethell, vice-president and W. S. Piersol, secretary and treasurer.

At a recent meeting of the Chicago Electric Club Mr. August S. Hibbard, vice-president and general manager of the Chicago Telephone Company gave a very interesting talk on "Telephone Traffic and Problems." Mr. Hibbard discussed many of the problems which confront a telephone company with a large system such as that in Chicago, speaking especially of the necessity of forecasting the growth of the city in order to provide adequate equipment to handle the business.

The inquiry by the minority stockholders into the sale of the Ohio telephone properties to J. P. Morgan and Company which was begun in New York, February 9 and 10, and was to have been continued February 16, when Theodore N. Vail, president of the American Telephone and Telegraph Company and H. P. Davison of the firm of J. P. Morgan and Company were expected to testify, was on the latter date brought to an abrupt close without hearing any testimony further than that brought out at the first sessions. All of the testimony given substantiated that of Mr. E. J. Hall, mentioned briefly in our February 16 issue.

Mr. Charles H. O'Brien has resigned his position as manager of the Augusta district of the New England Telephone and Telegraph Company which he has held for the past sixteen years. Before entering the telephone field Mr. O'Brien was a well-known telegrapher. He was employed in the Augusta, Me., office of the Western Union Telegraph Company, when Frank A. Munsey, the magazine publisher, was manager at that place. He later became the first manager of the Postal office in Augusta. Mr. O'Brien has considerable inventive ability and has resigned his present position to devote his time to developing several ideas which he has for telephone and telegraph improvements.

Mr. U. W. Boggess, manager of the Western Union Telegraph Company, Clarksburg, W. Va., in renewing his subscription recently, says: "Telegraph and Telephone Age looks and sounds good to me. It is like a good old friend, always welcome."

The Hudson Word Register.



The Hudson Word Register for counting the number of words written on a typewriter is now on the market and may be obtained with attachments for applying it to the standard makes of machines. When properly attached, the greatest confidence may be placed in this invention. It can be rendered inaccurate only by the playful and careless operator who forces

the space-key far below the spacing point and allows the fingers to slip from the key, releasing it with a snap, causing the register lever to fly upward with uncalled for violence. This motion, which is unnecessary and unnatural, might cause the register to jump. The space-key may be struck with any force desired, but should be released in the usual manner with a smooth, even motion. This insures accurate results.

There being no limit to the continuous forward movement of this register, any number of words may be counted without re-setting by simply taking note of the first 1,500 words and adding thereto the number registered when the work is complete.

To ascertain the number of words written, add the amount registered on the dial to the number appearing through the face.

This useful device is easily set by, first, turning the lower button in the direction of the arrow until it locks, and the pointer rests at 50 on the dial. Next, turn the upper button in like manner until it reaches the stop and the number 1500 appears through the face.

For message work the writer disregards the upper numbers, using the dial and pointer only, which is set by simply turning the button forward until it locks, requiring but one movement, and as little attention as is given in returning the typewriter carriage to commence a new line.

The additional tension on the space key is very light, and in no way interferes with the working of the machine. The register being thoroughly made, nickel plated and of neat appearance, is an ornament to any typewriter and is practically indestructible. Every operator who uses a typewriter will find this invention of great assistance, and it has been the general testimony of those who have used these registers that they would not do without one.

Special directions accompany each counter telling how to attach it to the particular type of machine for which it is wanted.

The price of this useful adjunct to a telegrapher's equipment is \$5.00, and orders may be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y. In ordering,

be sure to specify the make of the typewriter for which the counter is intended, so that the proper attachments and directions may be sent with it.

Bound Volumes of Telegraph Age Covering a Memorable Year in the Telegraph.

The year 1902 was especially significant in the annals of the telegraph, inasmuch as that date marked the accession to office of the present official heads of the Western Union Telegraph Company. The story as told in *Telegraph Age* distributed over the months of that year, chronicling the numerous changes that eventful period witnessed, is of interest, one viewed with importance by many as being of high referential value, furnishing data and dates nowhere else so readily available. A portrait of Colonel Robert C. Clowry, the incoming president and general manager of the company, and of General Thomas T. Eckert, whom he succeeded, as well as others prominent in the Western Union service, were included in the issues of the paper during that year.

In that year, also, occurred the death of John W. Mackay, the head of the Postal telegraph and Commercial Cable companies. His passing necessarily wrought changes in the great telegraph interests under his control, their direction descending as a possession to his son, Clarence H. Mackay, their present head. Full-page engravings of both the Messrs. Mackay also appeared.

It was in 1902, also, that *Telegraph Age* printed a comprehensive, instructive and illustrated article descriptive of the famous Buckingham Long Distance Page-Printing Telegraph, a chapter covering nine pages and of profound interest. Again, it was in this same year that the notable telegraph tournament, known as the American Telegraphers' Tournament, was held at Atlanta, Ga., when some well remembered records for fast sending were established, an event altogether of achievement of which telegraphers are proud and delight to refer.

Enough has been indicated to show that the year 1902 was an eventful one in the telegraph. The bound volumes of *Telegraph Age* for that year possess a special value. A few are on hand and are offered for sale at \$2.50 apiece. These will be delivered to any address in this country, carrying charges prepaid, on receipt of price. Address all orders to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

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MARCH 1, 1910.

The Book Department of *Telegraph and Telephone Age* has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Telegraph Letters.

The announcement of the fifty word night message plan of the Western Union Telegraph Company is strong evidence of the enterprize of the management which is now directing the affairs of that corporation. We predict that an enormous night traffic will be created between the large business centers, separate by distances of from one to three or four thousand miles. In the present age the question of time is a most important one and the possibility of sending a satisfactory business letter and receiving a reply to the same with a saving in time of from one to eight days or even more over the time required by the mails ought to make the new service popular. It will probably take some time to bring about the general use of this innovation which is intermediate between a postal and a telegraph service. As people become more accustomed to its use, however, and form a closer acquaintance with its operation and advantages the patronage is bound to increase.

When the acquisition by the American Telephone and Telegraph Company of the controlling interest in the Western Union Telegraph Company was announced last fall a cry of protest was at once raised by those who condemn, on general principles, all combinations of capital, without regard to their nature, and forces were at once set to work to prove that the new combination was in restraint of trade and in violation of the anti-trust law. The statement of the president of the larger company, that the merging of interests was brought about because of the advantages which might accrue to the companies concerned and for the improvement in the service rendered the public, which might be accomplished by an interchange of the facilities of the two great systems, was not taken seriously by the zealous guardians of our liberties. It would seem, however, that the questions of those opposing forces would be satisfactorily answered by this announcement and their fears that this combination is one contrary to the public welfare, would be allayed.

Wireless Legislation.

The resolution of Congressman Roberts for the appointment of a wireless board of seven members to draw up a comprehensive system of regulations to govern the operation of all wireless plants seems to be meeting with considerable disapproval among the many amateur experimenters who fear that the measures recommended by such a board would be calculated to entirely suppress all amateur stations. It will be surprising to some to learn that there are upwards of 60,000 such stations in the United States at least 1,000 of which are in New York and the immediate vicinity. Fortunately for the commercial systems, however, but a small percentage of these are equipped with sending apparatus powerful enough to reach more than a very short distance. If all were equipped with sending apparatus of even moderate power it is hard to imagine the wireless bedlam which would reign on the evening in the atmosphere around the metropolis when all were trying to work at once. For the greater majority of these amateurs, it may be said that they are entirely sincere in their efforts to learn all they can of the wireless art and improve upon the same if possible. If they do interfere at all with regular wireless service it is usually unintentional and much oftener due to lack of knowledge than to any intent to disturb legitimate service. That cases do occur, however, of intentional interference, the sending out of false messages as jokes, etc., is claimed by many expert operators and is admitted by those who have the opportunity of investigating the subject thoroughly. In the present status of the case there is no law which can prevent such interference or punish these offenders of common decency. It must be admitted then that there is need of legislation which will reach both the ignorant experimenter, who

does not know when he is interfering and the better educated one who does so maliciously. To suppress all experimenters would undoubtedly, as the opponents of this measure claim, work an injury to the development of the art. Hence, the adoption of a measure requiring all stations to take out a license and providing a penalty for misuse of the privileges accorded would seem to be the best plan of taking care of the situation as it exists to-day.

Perhaps the amateurs are unduly alarmed over the effect which the passing of Representative Roberts' resolution would have upon them. The board which he proposes to create would consist of three government members, three representatives of commercial interests and one scientist well versed in the wireless art. While such a board would naturally recommend a system of regulation which would safeguard commercial and government interests it is not probable that they would recommend any measure which would seriously hamper legitimate investigation. The commercial interests do not find it easy to secure all of the competent operators that they require and any thing which discouraged the learning of the art by young men would be an indirect blow at their own business. The Government also is spending much money at their two wireless schools at the Philadelphia and Brooklyn Navy Yards in training operators for their service. This extra expenditure would be unnecessary if they could secure enough operators in any other way. Hence it would seem that the chances are very good that the course which will be taken if this resolution is passed will be the one which ought to be approved by every well wisher of and laborer for the development of the wireless art—namely the adoption of a middle course which will insure justice to all concerned.

Status of Legislation for Military Telegraphers.

Little has been heard recently in regard to legislation in Congress recognizing the pension rights of the members of the United States Military Telegraph Corps. That vigorous efforts are being made to secure such recognition, however, is shown by the following letter issued recently by Colonel William Bender Wilson, president of the Society of the United States Military Telegraph Corps:

COMRADES:

The status of National legislation with a view of securing for you the rights of pension is as follows:—

The Hon. N. B. Scott, United States Senator from West Virginia, has introduced a bill in the Senate, having such object in view, and which has been referred to the Pension Committee of which he is a member. In addition he has introduced a resolution calling upon the Secretary of War to inform the Senate of the number of war telegraphers who were engaged in the war between the states who are not on the pension roll. That resolution is now before the Senate Committee on Military Affairs of which he is also a member. Senator Scott is a sincere and earnest advocate of your claims and can be relied upon to leave no stone unturned to secure them. In the House

the Hon. Edward L. Taylor, Jr., a representative from Ohio, has prepared a bill along the lines of that of Senator Scott and will introduce it at once. Mr. Taylor is thoroughly convinced of the justice of your claims, is a resourceful man of indomitable energy and has never been known to allow "sleep" to any measure in which he is interested. You thus have at least two active champions in Congress and it behooves you to put yourself in communication with the United States Senators from your state and the representative in Congress from your district urging them to join with Messrs. Scott and Taylor in securing the passage of the measure. Now is the time. Up and at it.

Fraternally,

William Bender Wilson, President.

Attest: David Homer Bates, Secretary.

Subjects for Discussion at the Paris 1910 International Telegraph Conference.

Among the subjects, which will be discussed, at the second international congress of telegraph and telephone engineers, which will be held in Paris during the Summer of the present year, are the following:

(1) Manual versus automatic systems of telephone working.

(2) (a) Simplification of telephone circuits; (b) selection of frequency and secondary potential (for purposes of theoretical investigation) with a view to facilitating the approach of the telephone current to the sine wave-form; (c) the circumstances conditioning the adaptability of telephone apparatus to the lines, induction coils, microphone resistance, etc.

(3) Precautions to be taken for the avoidance of mutual disturbance in the case of power circuits running in close proximity to telegraph and telephone lines.

(4) Telephony between places at great distances from each other. Construction of cables for long-distance use, relays, combination of aerial lines with cables.

(5) Wooden poles—new process for impregnation and preservation—and procedure described from actual practice as to staying and strutting.

(6) Party lines and selective calling upon telegraph and telephone lines.

(7) Telegraph systems for heavy traffic. Multiple type-printing telegraphs and the Mercadier system.

United Press Changes.

W. E. Hall, who has been in charge of the Indianapolis bureau, has been transferred to the Pittsburg bureau, relieving F. S. Ferguson, the manager there, who goes to the management of the St. Louis bureau. R. L. Hall, the present manager of the St. Louis bureau, has been transferred to the Pacific Coast territory.

E. O. Tomlinson, of the Seattle bureau, has been appointed manager of the northwestern division, with headquarters at Portland, Ore., vice Joseph W. Partridge, resigned.

John N. Beffel, of the Chicago bureau, has been transferred to New York as editor of the west-wire.

OLD AND RECENT TOURNAMENTS.

General Information as to Early and Late Speed Trials, with Incidental Comments on the Persons Concerned in Them, and Unnecessarily Complete Reports, Perhaps, as to the Part I Myself Played in Them and in Other Related Events.

BY WALTER P. PHILLIPS.

(Concluded from page 166, February 16, issue.)

Whenever I meet a young operator, I always ask him where he learned and how he happened to go into the business, so those two items may be of interest in my own case. I was visiting with my cousin, in Providence, one Sunday afternoon, and she said she was expecting a young man to call presently and if I would keep out of the parlor during his stay, she would ask him to take me down to the telegraph office and show me all about the wires. He was on duty at 7 p. m. and I went with him and thus began my acquaintance, fifty years ago, with that charming man, and septuagenarian now—Gerrit Smith. His first wife was the cousin who was responsible for my first appearance behind the railing of a telegraph office and my visits there have been pretty nearly uninterrupted from then till now.

Not long ago I passed a pleasant afternoon with Mr. Smith at his home on Long Island. Our conversation ran on the fact of the quadruplex to which Mr. Smith has devoted his attention for many years having been abandoned and the duplex having been substituted for it. Among the many interesting things that Gerrit told me was that the quadruplex would probably never have been a success, on long circuits, if it had not been for Fred Catlin. "When we had done everything we could think of to make it work through and the results were yet very unsatisfactory, George Hamilton, or somebody, would suggest finding Catlin and making one more effort to get the signals through on the second side. Fred never failed to bring us relief. Something about his sending, some gift not vouchsafed to other great senders, by which he lengthened his dashes or made his dots heavier than usual to meet the changeful conditions of the complex circuit, made him a success where others failed and, incidentally, the fact that Catlin could make our embryo quadruplex work under exacting circumstances encouraged us to go on trying to perfect it, with the result, as you know, that ultimately it was worked very successfully over long distances by all operators who were competent to work the duplex or an undivided wire in first class shape. The quadruplex owes much to the many men who took it up and pushed it forward from the point where Edison

left it, but I really think it was Catlin who saved the situation on many occasions and at junctures that were extremely critical."

Earlier in this article I spoke of there having been no official record taken at Philadelphia. This was due to the fact that on the day when the tournament was to open, Roderick H. Weiny, for many years my associate in all my inventions, died suddenly of apoplexy. He was about to start for Philadelphia to take the necessary records when the summons came. In his death a loss was sustained that can never be quite repaired. He was not only a very able and useful man but he was kind hearted and helpful to all in whatever walk of life he met them. The various railroad companies, the United Press (No. 1) and the Telephone Company, by which he was employed at the time of his death—all of his employers, at all times, felt that he was thoroughly in earnest and that he added to his surpassing integrity of purpose a degree of capability that rendered him a most valuable and resourceful employee. But aside from this he was a man in every sense of the word—steadfast in his friendships and kind and considerate in all his personal dealings. In his home life he was at his very best and his demise brought to his widow a measure of sorrow that only time can soften and a loss to his little son that is none the less great because he was too young to grasp the full meaning of the calamity that had befallen him.

When such a man as Mr. Weiny is abruptly called hence—a man so full of life, so useful, so greatly loved and so true withal, words do not come readily to tongue or pen. We stand appalled by the suddenness of the blow and with tears upon our faces and with aching hearts, we humbly murmur, "Thy will be done," as, still wondering, we resume life's burdens and try to school ourselves to believe that, in some inscrutable way, everything that happens is for our eventual good.

Very few men have done more than William R. Plum to stimulate interest in and to secure the progress of post-war undertakings, but there is one thing that he and his associates have seemingly overlooked and that is that the United States Military Telegraph Corps should establish some authority for creating memberships such as the colleges have to confer degrees. The man who fails of graduation and who distinguishes himself in later life often gets a college degree the same as if he had graduated and in some cases men who have won recognition as authors, poets, statesmen, soldiers and what not and whose college record was by no means satisfactory, have been loaded with honors in their later life. Eugene Field, for example, was the bane of the Faculty's existence when he was a student at the University of Missouri. To emphasize their objection to all his mischievous pranks the Faculty submitted to one escapade after another

and reserved his punishment for the very end of Field's final term. On the fateful day when he was to graduate and with honors, too, for he was a great student and a master in the Greek and Latin classics, as his poetry shows conclusively, the pig-headed Faculty expelled him. So the man who had made things lively in Springfield for four years went out into the world and gave his fellow men out of the abundance within him, such things as "Casey's Table d' Hote," and transmuted from their laughter the touching homage of their tears when he told us of Little Boy Blue and the little tin soldier that was covered with rust. Bye and bye which, according to Hamlet, is easily said, the State University of Missouri discovered that Eugene Field was her most distinguished son and very gracefully, indeed, the members of a new Faculty, with here and there one of the old misguided ones suffering perhaps a little pang of humiliation for his former blindness, sent for Field, fell on his neck and received him into the fold. I think the United States Military Telegraph Corps should do the same by Fred Catlin. He was offered, at the beginning of the war, a position by the man whom now we all reverence, almost—General Eckert—and fully intended to enter the military service. Some accident, some family bereavement—no one remembers what—changed the course of events, but he was no less a soldier of the wire, though serving outside the cordon that fixed the limits of military service. Really, Mr. Catlin, and possibly some others, are entitled to have the military degree conferred upon them for services of a high order, amid scenes of peace, it is true, but whose intention and expectation it was to follow where the soldiers led, and the value to our armies of those who served with the military cannot be overestimated. I once saw the autograph letter from the youthful Eckert to the man with whose services he has now been familiar for forty-five years, and who, now grown to be a veteran, should be honored with membership in the United States Military Telegraph Corps, even if such a proceeding does establish a precedent. It cannot be regarded as a dangerous precedent, for not many men have a record that would justify their aspiration to be enrolled, in an honorary way, and however many such there be, their names cannot but add to the honor and glory of a roster that is growing thinner and more fragmentary as the gliding years flash by. "Peace hath her victories no less renowned than war," has been wisely said, and those whose names are linked with achievement, whether of peace or war, cannot be too highly honored or too long cherished and remembered. There stands in Paris, the beautiful copy of one of the most perfect specimens of Athenian architecture. As he beholds it, the visitor may well exclaim, in wonder: "Am I in Paris or in Athens?" It has been called the Parthenon of Western Europe, and in it the student of archi-

tecture discerns those classic lines that had the Acropolis for a pedestal, Pentelic marble for material, and for a background the Athenian sky. Those noble Grecian models have conquered time. It was two thousand years ago that the Hellenic architects and sculptors placed before the world the best expression of their almost heavenly dreams. So strongly does this magnificent building, with its stately flight of steps, its long perspective of imposing columns and the grand height of its majestic roof, recall the temples of antiquity that it seems strange indeed that it should have now become the sanctuary of Christian faith, the wonderful church of La Madeleine. It was not always thus. In the great days of Napoleon he called it the Temple of Glory, and here were presented in bronze and stone, on canvas and in the perfect language of the French, an outward expression of those whose names were linked in glory—or infamy as you choose to think—with that of the invincible Napoleon, the names of soldiers, statesmen and citizens. Here, every year, the anniversaries of the battles of Austerlitz and Jena were celebrated, with imposing ceremonies, and eulogies were pronounced upon those who had fallen upon the never-to-be-forgotten fields of slaughter, heart-ache and—glory! To me, Napoleon was that imperial impersonation of force and murder that he has been described, and I reject him as no true son of God, but war was the element with which the United States Military Telegraph Corps was identified—a dreadful art in which the little Corsican, even in his retirement at St. Helena, "gazing out upon the sad and solemn sea," as Colonel Ingersoll expresses it, was the most heroic figure of the modern world, and the things he did, such as the paying of honors to those he deemed to be worthy, those acts to which he was urged by the gentler side of his nature as when he glorified the names of men, both great and small, who had served their country, not necessarily on tented fields or in serried ranks, but in civil as well as in military ways—that example the men of our time can well afford to follow.

Bridgeport, Conn., 1909-1910.

Weber's Handy Electrical Dictionary is a practical handbook of reference, containing definitions of every term or phrase used in the electrical industry. This vest pocket size indexed handbook contains over two hundred pages and over three thousand definitions. Notwithstanding the limitations of space, the work is so clear and lucid in its definitions, and so comprehensive in its scope, that it is not only an indispensable guide to the electrician in the intelligent performance and understanding of the duties of his profession, but is a work of the highest order of educational merit as well. Price, 25 cents. Address orders to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.



EDWARD JULIUS HALL.

Vice-President of the American Telephone and Telegraph Company and Chairman of the Executive Committee of the Western Union Telegraph Company, New York.

Edward Julius Hall.

One of the most prominent figures in the telephone and telegraph field today is Edward Julius Hall, vice-president of the American Telephone and Telegraph Company and chairman of the executive committee of the Western Union Telegraph Company. Mr. Hall is one of the pioneers in the telephone industry having been connected with the development of the great system of the American Telephone and Telegraph Company since its inception and has probably been the most active and prominent executive leader in the extension, organization and management of the telephone business since the adaptation of Professor Bell's invention to commercial uses.

Mr. Hall was born in Perth Amboy, New Jersey, March 31, 1853. His father, also Edward Julius Hall, was a member of the firm of A. Hall and Sons, manufacturers of fire brick and other clay products. In 1866 Mr. Hall, senior, moved to Buffalo, N. Y., and there established a branch of the Perth Amboy works under the name of Hall and Sons. Edward Julius Hall, Jr., prepared for college in public and private schools in Buffalo and entered the Sheffield Scientific School, Yale University, in 1870, taking the prize for the best entrance examination in his class, and graduating in 1873 with the degree of Ph. B. He was a member of the Delta Psi Fraternity and of the Yale Glee Club, and was much interested in music during his college life and afterward.

After graduation until 1875, he devoted much time to metallurgy, with especial attention to blast furnace work. From 1875 to 1879 he managed the firebrick factory of Hall and Sons, Black Rock, Buffalo, and was also a contributor to the "Iron Age" of New York, and conducted a column in the Buffalo "Courier" devoted to "Business Enterprises of the City." This led to his being approached in regard to the starting of a telephone company at Buffalo in 1878. He found great difficulty in interesting people, and convincing them of the value and importance of the new invention, but finally induced Mr. Harlow C. Palmer to start with him under the firm name of Hall and Palmer. In 1879, he organized the Bell Telephone Company of Buffalo, to succeed Hall and Palmer, and was elected vice-president and general manager.

On February 1, 1882, he resigned that position to go to New York, and take the presidency of the Perth Amboy Terra Cotta Company, the successor of the old firm of A. Hall and Sons, which office he held up to 1906. In 1885 he gave up the active management of the Terra Cotta Company, and took up the organization and became vice-president and general manager of the American Telephone and Telegraph Company of which company he is still the vice-president. From December 31, 1896, to February 27, 1909, he was president of the Southern Bell Telephone Company, and is still a director. He is also a director

of the Atlantic Terra Cotta Company successor to the Perth Amboy Terra Cotta Company, the New York Telephone Company, the Bell Telephone Company of Pennsylvania and a number of other companies connected with the Bell system.

Unlike many of our industrial leaders, Mr. Hall finds time for recreation, being a first-class whup and also a good sailor, frequently spending his vacations on the water. He is a member of the New York Yacht Club; Larchmont Yacht Club; the University, Lawyers' and Railroad Clubs of New York; an associate member of the Press Club of New York, a member of the Exchange Club of Boston, the Institute of Electrical Engineers, London, the American Institute of Electrical Engineers, the American Institute of Mining Engineers, the Morristown Club, and of the Morris County Golf Club of Morristown, where he lives the greater part of the year.

In addition to his other accomplishments, Mr. Hall is a fine musician having served as organist in two of the leading churches in Buffalo while a resident of that city, from 1873 to 1879. He was married October 25, 1875, and has two daughters and one son.

When the duties of chairman of the executive committee of the Western Union Telegraph Company were added to his many other activities upon the merging of the interests of that company with the American Telephone and Telegraph Company, Mr. Hall at once began with great energy to make a study of the new problems which confronted him and since then has devoted a large amount of his time to investigating telegraph conditions. He has a faculty of getting through the surface of things down to the very root without any delay and it is safe to predict that his active connection with the telegraph business will result in substantial benefits to the service.

Danger and Daring in a Commonplace Calling.

BY CHARLES P. BRUCH, NEW YORK.

Third Vice-President of the Postal Telegraph-Cable Company.

The invention and development of the telegraph have made possible the marvelous progress in civilization that has rendered the times in which we live noteworthy beyond all others in the history of the world. Without the telegraph—and the applications of electricity that have been directly or indirectly the outgrowth of the telegraph—commerce, manufacture, science and art, as they are to-day, would not have been developed and could not exist. The pioneers in the world's progress during the nineteenth century were the men who on the foundation of the American Morse's invention built up the network of wires that encircle the globe, and upon the telegrapher of to-day depends primarily the carrying on of the world's affairs.

The story of the hardships endured and the dangers faced in the truceless fight against the elements by men whose lives are devoted to the telegraph service, would, if fully told, fill volumes, and its

thrilling incidents would surpass in vital interest any tale of adventure and daring ever written.

In mid-Pacific, a thousand miles from the nearest civilization and out of the track of vessels, is a coral atoll scarcely three square miles in extent. Its white sands gleam in the glare of the tropic sun, and are soaked with salty spray driven by the merciless storms that sweep those lonely seas. Fancy living on such an island, wholly dependent upon infrequent supply ships for every necessary of life, ever on the alert and prepared to defend with arms; and without news, save for meagre items gained in intervals when for a moment the passing stream of meaningless code messages ceases to flow over a fragile copper thread.

And yet this is what a little company of men are now doing in order that communication between the far west and the far east may be unbroken. There is no other way; no other available spot for the necessary repeating station could be found.

But these men are envied by many a member of the cable repair ships' crews, who are always waiting and ready at all seasons to put to sea upon a few hours' notice, uncertain as to their destination or how long it may take to finish their task and return to port. Under discipline more strict than that of a man-o'-war, the cable ship sailor spends long months in port, doing over and over from day to day the wearisome work necessary to keep the ship in perfect condition. At other times he tosses at sea—often for weeks together—in winter gale or smothering fog, waiting a clear day and smooth water to enable him to get his bearings and grapple and repair the damaged cable. His family ties, everything in his life, are all subject to orders to put to sea.

Even the marooned islanders and the sailors seldom or never have to face the discomforts, hardships and unseen perils that regularly fall to the lot of the land-line repairer. He must tramp by day and night, through flood, snow and summer heat, keeping up the wires. The worse the weather the more certain it is that he must "go out on the line," for sleet and gale are the wires' worst enemies and the lineman is their sole defender. Not only by exposure to Nature's dangers does he risk life and limb. On a peaceful summer day he climbs a pole to make some slight repairs, perhaps to replace an insulator that has been the target of a thoughtless sportsman. Miles away, where the village authorities have by law forced electric light wires to be carried on telegraph poles, his wire, normally harmless, is, by accident, in contact with a power feeder. He has no warning and cannot know that a deadly shock will follow his first touch; and he is dashed to the ground, a subject for the hospital or for the coroner.

Nor does the telegraph operator lead a life of ease. He is comfortably housed, as a rule, but upon his brain and nerves falls the strain of "keeping the traffic moving." He maintains a perpetual struggle with time; seconds and fractions of seconds count with him—none may be lost; and until his "hooks are clear" he knows no quitting time. At times he

also has his share of physical discomfort and even danger. He marches with the army, reeling out his wires, pausing now and again to send reports or receive orders while his clicking sounder plays an accompaniment to the songs of bullets. On the heaving deck of an anchored schooner, he grits his teeth in a seasick struggle to decipher the yacht race "copy" of a still more seasick reporter. He coolly transmits from the swaying basket of a captive balloon an account of the movements of yachts almost beneath him, heedless of the danger that the restive balloon will break away and drive to sea on the north-west gale. He stands on a scaffold under the July sun, translating dots and dashes into chalk marks that tell the yelling crowd of victory at Santiago. He sits, half frozen and unsheltered from drizzling rain, and flashes with stiffened fingers the story of a great football match. From the platform of the convention hall, calm and observant amidst excitement and din, he steadily ticks the details of the scene and announces results so promptly that all the country has the news sooner than those within the building itself. Amid the horrors of earthquake he calmly sends the news while the building crumbles. He sticks to his post in the plague-stricken town and falls down and dies beside his table. He continues to work in a burning structure until flames scorch him and drive him to safety. From a sinking liner he flashes messages of farewell from hopeless passengers to friends on shore until the waters choke him.

He is not only brave—he is trustworthy. In his keeping are the social and business secrets of the community. He never betrays them even for great personal gain.

It is the patient, self-sacrificing devotion to duty, not alone of telegraphers, but of all men in the service of the public, that makes possible the uplifting of the race by development of a mighty civilization. Their deeds are common, but not commonplace. Neither wishing nor seeking praise or great reward, they are intent only upon the tasks that each day brings and content in the satisfaction of work well done.—Postal Telegraph.

An astronomer of St. Paul, Minnesota, predicts that when Halley's Comet comes within 12,000,000 miles of the earth on May 19, or 20, as it has been estimated it will, the only perceptible effect will be an electrical display similar to the aurora borealis accompanied by great disturbances to the magnetic needle and all telegraph systems.

Miss Camille Sheppard, daughter of W. A. Sheppard, manager of the Postal Telegraph-Cable Company at Montgomery, Ala., is one of the contestants in a voting contest instituted by the Montgomery Evening Journal, which closes March 14. The prize for which Miss Sheppard is working is a one year scholarship in Judson Institute, Marion, Ala., and she is earnestly soliciting the subscriptions of her friends to the publication mentioned, to aid her in securing the coveted prize.



BELVIDERE BROOKS.
General Manager Western Union Telegraph Company, New York.

Belvidere Brooks, General Manager of the Western Union Telegraph Company.

Belvidere Brooks, who has now assumed the general managership of the Western Union Telegraph Company has during the last eight years been one of the prominent figures in telegraph circles in New York. As he is over six feet tall and proportionately large he naturally commands the attention of strangers, his personality attracts all, and his ready grasp of problems with which he is confronted impresses all who have occasion to do business with him. In the course of his career he has acquired a very comprehensive knowledge of the telegraph system of this country and a wide and intimate acquaintance with the personnel of the organization, which renders him especially well fitted to perform the duties which will now fall to his lot.

It should not be inferred from these facts mentioned, however, that the task which has been assigned to him is an easy one for Mr. Brooks. The general managership of such a large and far reaching institution as the Western Union Telegraph Company is a difficult position for any man to fill, no matter how well equipped he may be, but the new incumbent has a great capacity for hard work. His methods inspire the confidence of his subordinates, and he is what might be termed a conservatively aggressive leader: conservative in his conduct of the company's affairs and aggressive in his efforts to increase its business and give the public a first-class telegraph service.

Mr. Brooks was born at Wheelock, Texas, July 6, 1859. When but twelve years of age he became a telegraph messenger at Navasota, that state. Young lad that he was, he was early filled with an ambition to get ahead and succeed in life. He worked hard, was attentive and after serving for five months as messenger he was able to send and receive well enough so that he was given a place at the key. During the years of 1877 and 1878 he served in this capacity and in other positions of trust at various places on the Houston and Texas Central Railroad. His preference, however, was for the commercial telegraph service, not that of the railroad, and this prompted him to seek employment with the Western Union Telegraph Company. This he obtained in 1879. At twenty years of age, he was accounted a good operator and had already begun to display traits of executive ability that afterward rapidly developed as opportunity was afforded for their growth. In 1880 he was given the management of the Navasota office. Here he attracted such favorable attention that after an incumbency of but a few months, he was tendered a clerkship in the office of the superintendent at Dallas. From Dallas, he was selected to become manager of the Western Union office at Waco, subsequently being transferred to like positions, first at El Paso and afterward at Galveston, both being in the nature of promotions. On November 1, 1890, came the appointment as manager of the larger and more important office at Denver, Colo.

On January 1, 1893, when an assistant superintendent was wanted at Denver, Mr. Brooks was the logical man for the position and received the appointment. Denver, always an important point telegraphically as well as commercially, was growing rapidly in population and the extensive district, in the welfare of which he was now especially interested, was filling up; new towns were being settled, new telegraph offices opened and new lines of wire extended. It was a field of much activity and Mr. Brooks found abundant opportunity for the exercise and development of his executive abilities. He fulfilled the trust that had been reposed in him and met the exactions of his office.

It was a big jump from Denver to New York, from the position of assistant superintendent, to the general superintendency of the most important division in the entire telegraph system. Yet Mr. Brooks was equal to the demands placed upon him and when, early in the year 1902, he assumed the position which he has since held, it was with a spirit marked by courage, self-confidence and determination to succeed, the same vital force that animated the messenger boy thirty-one years before.

When the Executive Committee of the Western Union decided to relieve Colonel Clowry of part of the burdens which he has carried so ably since 1902, Mr. Brooks was the logical choice for the position and there was no hesitation on their part in offering him the important post.

According to a London paper a telewriter exchange will be opened in that city some time in March. Telewriters are already used by several London business houses.

A legislative committee in New Zealand has recommended that telegrapher's cramp should be added to the list of diseases for which the employer must compensate the workmen thereby incapacitated.

Congressman James T. McDermott, of Chicago, was a telegraph operator before being elected to Congress in 1906. Mr. McDermott is frequently seen around the telegraph offices in Washington, the click of the sounder still having a strong fascination for him.

An important improvement in the art of television, it is stated, has been discovered by Herr Ruhmer, the German inventor. The improvement consists in a selenium cell in which the sluggishness of selenium in responding to changes in the strength of light has been largely overcome.

It is not often that a telegraph operator, after being married, has the honor of being serenaded by a band and a large number of his friends all wearing high hats. Such, however, was the tribute paid recently to Mr. Frederick Snyder, a press operator of Wilmington, Delaware, by the members of a club to which he belongs.



ASHTON G. SAYLOR,
General Superintendent, Eastern Division, Western Union Telegraph Company, New York.

**Ashton G. Saylor, General Superintendent
Eastern Division, Western Union
Telegraph Company.**

The appointment of Mr. A. G. Saylor as general superintendent of the eastern division of the Western Union Telegraph Company to succeed Mr. Belvidere Brooks, promoted to the general managership, is one which meets with universal approval among those familiar with the telegraph personnel and brings to this high position a man eminently well fitted, both by reason of long training and personal qualifications, to fill the duties which now devolve on him.

Mr. Saylor is one of the large number of Canadian-born telegraphers who have achieved prominence in the profession of their choice. He was born at Bloomfield, Ont., June 11, 1859. From his earliest boyhood he showed a great interest in telegraph affairs. At the age of eleven years he graduated from the Ingersoll, Ont., Grammar School and then entered the service of the Dominion Telegraph Company as messenger at that point, and at twelve years of age was an operator, at Walkerton, Ont. In 1872, he returned to Ingersoll as an operator for the same company. In 1873 and 1874 he served the Montreal Telegraph Company at Ottawa and Montreal, in the latter year, transferring his residence to the United States and accepting a position as night operator for the Grand Trunk Railway at Portland, Me. He soon after entered the employ of the Atlantic and Pacific Telegraph Company and then that of the Western Union, with which company he has ever since been associated. In 1881 he transferred his services to the Philadelphia office. During the years of his apprenticeship at the key, Mr. Saylor not only became an operator of the highest class, but being of an observing turn of mind and a close student he acquired a thorough knowledge of the electrical branches of the service. As a result of this application to the mastery of the details of the business he was in 1884 advanced to the position of wire chief in the Philadelphia office and soon after became traffic chief and then chief operator. The marked ability which he displayed in the conduct of the duties of these positions brought him further promotion in 1887 to the position of manager of the company at Philadelphia. His next advancement was to the position of assistant to superintendent Gill at that point, which position he held until 1902 when he was transferred to New York as chief clerk to General Superintendent Brooks. On January 1, 1907 he was made assistant general superintendent, which position he held until his present promotion. Mr. Saylor's success has been due to hard and intelligent work, and close application to details. He is a close observer with a keen analytical mind and steadfastly adheres to the policy of fully understanding every subject that is brought before him, believing that if each detail is fully understood and the facts brought out, nothing is dif-

ficult and work becomes a pleasure as well as a duty. Mr. Saylor's parents were Quakers and he possesses many of the attributes of character derived from that source, chief among which are a well poised temperament and a personality which naturally attracts all with whom he comes in contact. His methods in conducting the telegraph business tend to inspire those under him with confidence in their leader and he for his part places confidence in his subordinates.

**William E. Athearn, Engineer of Equipment of
the Western Union Telegraph Company.**

The appointment of William E. Athearn to the position of engineer of equipment of the Western Union Telegraph Company brings back into the service after an absence of seven years one of the most competent electrical engineers who has ever been engaged in telegraphic circles. Mr. Athearn is especially well qualified for the new position as he has had a long training in the telegraph field and has always been a close student in electricity. His mastery of the problems involved in telegraphic operation is indicated by the large number of patents of telegraph apparatus which he has to his credit.



W. E. ATHEARN, NEW YORK.
Engineer of Equipment, Western Union Telegraph Company.

Mr. Athearn was born November 15, 1856, at West Tisbury, Martha's Vineyard, Mass. While pursuing a classical course in Williams College in 1877 he became interested in the study of electricity. As the most important field at that time in which electricity played a part was that of the telegraph, his attention was naturally turned in that direction and as a means of assisting him in his advancement in the study of electricity he learned the art of telegraphy. His first position was that of operator at Williamstown, Mass., in 1878. He afterward held positions as

chief operator, manager and electrician for various companies. He entered the service of the Western Union Telegraph Company in 1890 as night chief at the main office, 195 Broadway, New York. In 1894 he was appointed electrician of the first district. Later he was transferred to the electrical engineer's office and became assistant electrical engineer. In 1903 he resigned to accept a position on the engineer's staff of the American Telephone and Telegraph Company. About two years ago he was transferred to the plant department of that company as special agent in charge of the operation of the leased wire service, which position he held until his present appointment.

A New Telegraphic Transmitter.

The patent, No. 947,224, for a telegraphic transmitter, granted recently to Mr. Patrick B. Delany, as briefly mentioned in our February 16 issue, relates to a class of hand operated telegraph keys which the inventor designates as auto-dot keys for the reason that upon movement of the key into dot position, it will automatically transmit dots up to the maximum number required as long as it is so held, thereby relieving strain upon the operator and improving the quality of the transmitted signals.

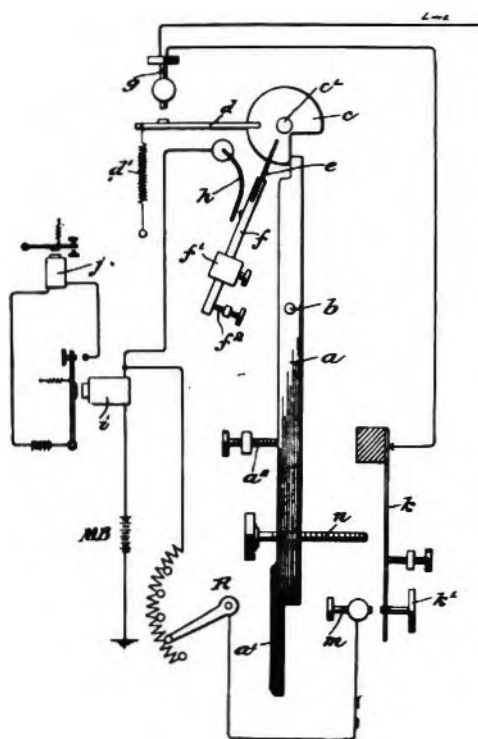
Referring to the accompanying drawing the operation of the transmitter is as follows:

The dot key lever *a* pivoted at *b* and having a thumb screw piece *a'* engages in its outer end a shoulder or projection on a rocking part or block *c* having rigidly attached to it an arm *d* to which is applied a spring *d'* the reaction of which tends to carry the shoulder upon the block against the end of the key lever and hold the latter against its adjustable limiting stop *a''*. The block *c* also has rigidly attached to it a spring blade *e* carrying at its end a rigid rod *f* upon which is mounted an adjustable sliding weight *f'* and co-operating with which is an adjustable limiting or muffling stop *f''*. When the key lever is thrown to the right which is dot position, an impulse of rotation is imparted to the block *c* and impact of the arm *d* upon the line contact post *g* sets the parts *e, f*, in vibration causing it to successively make, at uniform periods, contact with a spring finger *h* connected through the transmitting battery *M B* to earth, the circuit being completed to line at each completion of the contact with *h* through the parts *f, e, c, d, g*. The maximum number of dots required for the Morse alphabet is six and vibration of the part *e, f*, will produce with relatively perfect uniformity and precision such number of dots as may be required. In order that the operator may know what signals are passing to line and govern the use of his key accordingly, the circuit wire from *h* passes through a relay *i* in the local circuit of which is a sounder *j*.

To transmit dashes a separate key is provided. This key is indicated in the form of a laterally movable flat spring supported at one end in a suit-

able post or block and at the other end, equipped with a finger piece *k'*. When moved to the left, it makes contact with a contact post *m* connected through a resistance *R*, that may be and preferably is adjustable, and the coil of relay *i* to earth through the main battery. Key *k* is connected by wire with the line contact post *g*.

Experience has shown that the key for transmitting dots constructed in the general manner described,—that is equipped with the rocking pivoted block *c* acted upon by the key lever and carrying the impact arm *d* and vibrating member *e, f*,—produces highly satisfactory and efficient results. This is believed to be largely because of the arrangement of leverages, the mounting of the vibrator being very firm, and the vibrations not being felt at the thumb piece of the key lever.



The introduction of the resistance in the circuit of the dash lever is an important feature. If a circuit has much capacity, the dash impulses leave a charge in the line causing the signals to run together and requiring a higher adjustment of the receiving relay than is necessary for the dot signals,—that is, ordinarily, in order to make the dashes clear, the dots are made unnecessarily light. This trouble is particularly noticeable on long circuits using repeaters and on underground and composite circuits. By using weaker current for dash signals than is used for dot signals, the receiver may be adjusted for the best dot condition and both kinds of impulses be equalized in clearness. The line discharge from a dash impulse of diminished strength does not deplete the next succeeding dot to anything like the same degree as it would were the dash impulses of the

same strength of current required for effective transmission of the dots. By using a resistance *R*, which is preferably adjustable, the most satisfactory conditions for any given circuit may be readily attained. It has been found in practice that a resistance of about five hundred ohms affords excellent results for substantially all circuits.

A further feature of this invention is the employment of a non-interfering device, shown in this instance as an adjustable screw bolt *n* mounted in and passing through the key lever into the path of and into suitable proximity to the dash lever *k*. With this device properly adjusted, the dash lever cannot make contact with *m* until by movement of key lever *a* the anti-interference pin or bolt *m* has been withdrawn from the path of the dash key. Similarly, the dot key lever *a* cannot be moved to its limit until the dash lever has returned to its normal retracted position.

A controlling feature of construction of the dot transmitting devices described is the impact arm *d* and vibrator *e* projecting from, or radial to, the axis *c'* of the rocking part or block *c*. As shown, the parts *d* and *e* are secured in the body of the block. This is a suitable arrangement but is not an essential one.

Wireless Telegraph Legislation.

The bill introduced in Congress by Representative Roberts of Massachusetts providing for the appointment of a board consisting of seven members to outline a system of regulations to govern the operation of all wireless telegraph plans in this country and other measures aiming to regulate the wireless art have aroused considerable opposition among the many amateur experimenters in the wireless field. One of these critics of the proposed measures characterizes them as un-American, impractical and opposed to the best interests of wireless telegraphy. He asserts that most of the interference which hinders the transmission of regular business is caused by inefficient operators in the Army and Navy service and that the equipment used by the Government is out of date and inefficient.

Brigadier-General James Allen, chief signal officer of the United States Army believes that the amateur wireless telegraphers are unduly alarmed, because it is not the intention of Congress to enact any legislation that will deprive any one of his just rights. "This hit-and-miss sort of business should cease, however," he declared emphatically; "there are too great interests at stake to permit every wireless operator to run unbridled. Regulation can be had that will correct all the present evils and interfere with no one that should not be stopped. A license would protect every legitimate amateur; and it would enable the authorities to get hold of the fellow who should be out of the work to the benefit of everybody, for indiscriminate use of wireless works great harm in many cases, especially when false calls for help are sent out from coast towns."

Rear-Admiral Cowles, who until recently was at the head of the Bureau of Equipment of the Navy which has charge of the wireless branch of the service, states that the bureau has kept pace with the growth of the art by purchasing new apparatus to stimulate the activities of the manufacturing companies, by standardizing as many parts of the apparatus as possible, and by carrying on tests leading to a more thorough understanding of the subject of all wireless communication.

Another prominent naval officer has made the following statements: The attacks of certain wireless interests in private life made upon the enlisted personnel in charge of naval wireless stations are not only unfounded but unjust. This personnel needs no defense, but since the force has been so gratuitously and savagely attacked it may be well to say:

"That wireless operators are specially educated for their work by the Government at the Brooklyn Navy Yard and at the Mare Island Navy Yard.

"That the schools are by no means elementary and the course of instruction is thorough.

"That the records of the Bureau of Navigation do not show a report questioning in the slightest degree the efficiency of an operator, but on the contrary nothing but praise.

"That for the fourteen months of the cruise of the battleship fleet not a ship was out of touch of its wireless chain.

"That Government operators are leaving the service continually to accept good positions with commercial companies."

A bill introduced by Representative Burke of Pennsylvania provides for licensing all wireless stations with penalties of fine and imprisonment; regulates the wave amplitude, prohibits false signalling, provides secrecy, all under drastic penalties, and authorizes the President in time of war or public danger to suspend the operation of any or all wireless stations within the jurisdiction of the United States.

Another measure introduced by Representative Peters of Massachusetts, makes it an offense punishable by a fine not exceeding \$2,000 and imprisonment not exceeding one year, or both, for the sending of a false message purporting to be official, and limits the wave lengths of commercial or private interests.

A bill introduced in the Senate by Senator Frye of Maine, provides: "That it shall be unlawful for any ocean-going steamer, certified to carry, or carrying, fifty passengers or more, to carry passengers between ports two hundred miles or more apart by sea unless on leaving her port of departure such steamer shall be equipped with an efficient apparatus for radio-communication in good working order and in charge of a person skilled in the use of such apparatus."

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The Military Telegrapher in the Civil War.

PART XXXIV.—CONCLUDED.

The interesting recital by John H. Emerick of his war time experience while a member of the United States Military Telegraph Corps which was begun in our February 1 issue and continued in our February 16 number is concluded as follows:

"On October 9, 1863 we advanced from Centreville and two days later arrived at Warrenton and established communication with Washington. On October 24 I started on horseback at 8 p. m. with a cavalry escort to open an office at Catlett's Station for the use of General French who was in camp at that point. I opened the office at 10:30 p. m. and during the night suffered considerably from cold as I had no blankets and no provision for fire. After two days at this point I was relieved by operators Shreffler and Glazier and rode back to the headquarters of the Army of the Potomac at Warrenton. The next day the headquarters were moved to Auburn but I remained to keep the office open at Warrenton for the use of the sixth corps, until I was relieved by operators Ryan and Samuel Edwards from Washington.

"On October 30 I was again selected to do the rough work and was sent on horseback and alone to open an office in the advance at Bealton Station. I found Bealton to be outside our picket lines and so returned two miles to the camp of our construction corps at Licking Run. The latter were building a line towards Culpepper as fast as our picket lines were advanced. Dennis Doren acted the good samaritan by caring for me and making me comfortable. I had been riding in the rain all day and could not boast of a single dry thread.

"On December 2 we moved back to Brandy Station over muddy roads the object of our expedition not having been accomplished. On January 7, 1864 I was assigned to cipher duty temporarily in the War Department office, C. A. Tinker, and D. H. Bates both being sick, A. B. Chandler and myself had to do the cipher work day and night. I remained here until February 28 when I returned to headquarters. James Murray started the same day with Kilpatrick's cavalry on a raid toward Richmond.

"On April 8 notwithstanding the protestations of Harper Caldwell and my own reluctance I was ordered to the War Department again for cipher duty. I remained there this time until April 29, when I returned to headquarters accompanied by James Murray. May 4 we broke camp and crossed the Rapidan at Germania Ford camping on the south bank. During the next two days the battle of the Wilderness was fought. No telegraph lines being in use we had a chance to witness the battle.

"On the night of May 7 we marched all night and went into camp early in the morning of the eighth between Tods' Tavern and Spottsylvania

Court House. While there I assisted General Grant's cipher clerk, S. H. Beckwith, the despatches coming across country by mounted scouts from long distances, some of them getting through and others falling into the enemy's hands. On May 11 General Hancock commanding the second corps proposed to General Meade to attempt a surprise on the enemy's works in his front at Spottsylvania Court House. The arrangement was made and the attack took place before day break on the morning of May 12. Hancock's attack was a complete surprise and General Edward Johnson, commanding a division of the enemy's forces was captured with his entire division numbering seven thousand men. The military telegraph played an important part in this movement, in fact the details could not have been arranged with sufficient promptness without it. The office at Hancock's headquarters was in a tent and consisted of two cracker boxes, one relay instrument, and two operators.

"On May 13 I went into camp at Hancock's House. There was considerable fighting going on every day. The military telegraph was at that time so thoroughly organized that though every corps of the army moved nearly every day each corps headquarters was in communication with the headquarters of the army and with each other every night. Field wire consisting of seven small soft iron wires coated with rubber was strung upon trees, fences or lances carried for the purpose the reels being carried upon mules' backs. A wire could be put up as fast as a mule could walk and sometimes he was urged to a sharper pace. We operators, three at the army headquarters and two at each corps headquarters were provided with a light wagon for carrying provisions, supplies, a tent, etc., and each had a saddle horse. A large battery wagon made for the purpose with porous cups of leather accompanied the army headquarters. This wagon also contained all the requisites of a telegraph office. When a movement was made, a portion of the battery was transferred to the light wagon and retained at the old headquarters, supplying the wire with current until the large wagon reached the new location and its battery was put in the circuit. The light wagon then made a rapid march to rejoin headquarters. Remaining back with this wagon often became dangerous business as perhaps the whole army had abandoned the surrounding country and the enemy's cavalry were close upon the operator and his attendants before he was at liberty to move. Often a portion of the wire in use was necessarily abandoned.

"On May 19 the Confederate General Ewell's corps attempted to turn our right but was repulsed after a sharp fight. The battle began in close proximity to our office which we moved a half mile to the left upon very short notice. May 25 we camped on the north side of the North Anna River. Our office was in full view of the enemy's pickets on the opposite bank though

there was no picket firing going on. On May 27 Caldwell, Doren and myself remained back with the battery wagon the headquarters having moved on. When we finally started and the wagon was moving along a road parallel to the river and where it was impossible to retreat the enemy opened a brisk musketry fire on us. The mules drawing the battery wagon became unmanageable and ran the wagon into a gate post badly damaging it, though the driver stuck to his team and finally brought the wagon inside our picket lines and out of danger. The rest of us claim to have made the quickest time on record in the telegraph corps, all being well mounted. None of us received a scratch but the manner in which the bullets whizzed around us was far from agreeable.

"On June 2 our headquarters were moved to a point near Cold Harbor. Doren and myself remained with the light battery wagon at the old headquarters until the new headquarters were established. The enemy's cavalry were close upon us when we finally started to join headquarters and we felt somewhat uneasy but arrived all right. Sergeant Carrigan, formerly of the signal corps and detailed to our construction corps, who went back with a wagon and a guard to take down wire we had just left was not so fortunate. Before he had arrived at the point we had left, his party was fired on. They retreated in good order and arrived back at headquarters with all their men and animals. The Sergeant, however, was shot through the knee and so badly wounded that he died the next day.

"The following day the battle of Cold Harbor was fought. The telegraph played an important part in this battle offices being opened at headquarters in the rear of the center of the army and at each corps headquarters. The operators at the ninth corps headquarters on the right were under heavy fire and one or two of them retreated in decidedly bad order. Operator Samuel Edwards was ordered to fill their place and did so fearlessly though exposed to great danger. I am not sure whether Edwards was alone or whether Edward Hall was with him. I do know, however, that these operators on several occasions during this and the following two days distinguished themselves by their bravery, being constantly exposed to heavy fire and in danger of capture.

"Two days later there was a strong attack on the front of the second corps commanded by General Hancock. The corps headquarters operators on occasions like this were always more or less exposed to danger of the most demoralizing character but with the exception of the case of the two operators of the ninth corps previously mentioned I do not remember that one of them ever flinched.

"On June 18 the enemy's works at Petersburg were attacked at all points but we were repulsed after most terrific fighting. The telegraphers at each corps headquarters and at the army headquarters did constant and most important service during this battle. General Grant was at

City Point a few miles away but in telegraphic communication with Meade who made his headquarters during the battle at the ninth corps headquarters near the right of the line. I was sent to that point to do the telegraphing for General Meade, he receiving occasional instructions from Grant at City Point and forwarding them by telegraph to Generals Warren and Hancock on our left. General Meade expostulated against the useless slaughter contingent upon attempting to carry the enemy's works which he deemed impregnable, as they really proved to be, Grant's reply to Meade's final appeal to give up the attack after successive bloody repulses was 'Pile in the men.' They were piled in and piled up by the thousands until Grant finally ordered the abandonment of the attack and telegraphed Meade, 'I am satisfied. Now we can rest and use the spade.'

"On June 20 I was ordered temporarily to the headquarters of the second corps. Two days later we were attacked and driven back. We had to move our battery wagon and in so doing got in the line of fire but none of us were hurt. On July 12, the army headquarters was moved to the rear of the ninth corps where we went into camp in a sort of permanent way and settled down for the siege of Petersburg.

"The second corps operators especially who were located in a house near the front were shelled constantly, shells often passing through the house. The enemy amused themselves often at night by shelling our headquarters but never got the exact range. Mortar shells, however, often dropped very near us and disturbed our sleep. A stray 'Whitworth' shot dropped into our next door neighbor's tent one morning while we were at breakfast but during the entire siege none of the telegraphers were hurt.

"On July 30 a mine was set off in front of the ninth corps. Those of us who were on duty at four o'clock that morning knew that this event was to take place, the correspondence concerning it having been carried on principally by telegraph. Though the headquarters office was less than a mile from the mine, the shock was scarcely perceptible. Our troops, principally colored, who made the subsequent attack through the breach were repulsed with heavy slaughter. The failure of this attack by Burnside's troops gave rise to dissatisfaction on the part of Generals Grant and Meade with Burnside's management. A spirited telegraphic correspondence on the subject was carried on between our headquarters and Grant's headquarters at City Point and General Burnside was soon after relieved of his command.

"On September 10 I was again ordered to the War Department for cipher duty. A few days later Hampton's Cavalry made a raid upon our cattle herd three or four miles below City Point capturing a very large number, the entire supply of the army. Our Fort Monroe wire ran past this point and MacKintosh then lineman at City Point, at this writing superintendent of construc-

tion at the Western Union Telegraph Company in New York, being out on a break was captured and taken to Libby prison, his second visit to that place, he having been captured with Robert F. Weitbrecht at Fairfax Station. I have in my possession a telegram from Lee to Wade Hampton conceiving the idea of this cattle raid. I found the telegram in Richmond after our occupation of that city. On November 29 I returned to duty at the headquarters of the Army of the Potomac in front of Petersburg and on December 22 I was left in charge there until further orders, Harper Caldwell having gone north and not being sure of returning. Major Eckert, however, induced him to go back and he returned to headquarters December 30. On February 3, 1865 I reported at the headquarters of the army of the James before Richmond, General Ord commanding, to take the position of chief operator, Richard O'Brien having been ordered to North Carolina. I found a line here about a dozen miles long, extending from Bermuda Hundred on the James River on the left, to Kautz's cavalry headquarters on the right, with offices at Bermuda Hundred, Varina Landing, headquarters of the Army of the James, twenty-fifth corps headquarters, twenty-fourth corps headquarters and cavalry headquarters. On March 23 by order from the War Department I made requisition for material for an independent field line of fifteen miles. March 28 General Ord and staff and a portion of the cavalry and infantry went to reinforce the Army of the Potomac.

"On April 1 I sent Operators Nichols, Snow and take charge of our construction train which was expected to arrive shortly. The next day I was ordered to send a portion of my operators to the Army of the Potomac. I had an argument with General Abbott who was located at the crossing of the Appomattox about closing his office which I had been ordered to do and being sustained by the War Department of course came out ahead.

"On April 1 I sent Operators Nichols, Snow and McKenna to join General Ord on the other side of the Appomattox. The same day our train of five four mule teams and a battery wagon with field material arrived. Palmer Gulick was in charge with Edward A. Eckert as wagon master and assistant.

"On April 1 I sent Operators Nichols, Snow and daylight and of course all of the operators were very much excited and it was very hard to keep them within bounds. Operator W. K. Applebaugh had the honor of being the first military operator in Richmond, he going in with the advance cavalry. Of course we turned our attention at once to extending our line into the city and succeeded in getting to the suburbs by night-fall but the circuit failed between us and City Point almost as soon as we had opened our office. The next day we got the wire into good working order and opened an office in the custom house building in the heart of the city. This building having been occupied as executive of-

fices by Jefferson Davis, and his cabinet, and hastily evacuated thirty-six hours previously, we of course found many interesting relics and were surrounded by piles of Confederate bonds, etc. The boys made haste to possess themselves of such things as struck their fancy. We all secured interesting official documents, etc., containing autographs of all the prominent Confederate leaders.

"On April 7, we commenced building a line toward Petersburg. The next day I had the pleasure of sending a cipher of 1,600 words for Assistant Secretary of War Dana. On April 9 we got our wire working to Petersburg and received the news of Lee's surrender.

"April 11 we commenced working to City Point via Petersburg, a much more desirable route than our old one. The next day our troops occupied Lynchburg and General Ord took command in Richmond. On April 14 we built a line to Rockett's Landing, the head of navigation at the lower end of the City of Richmond and opened an office there. The next morning the news of Lincoln's assassination was received but was kept from the people. Secretary of War Stanton ordered the arrest and confinement in Libby prison of Judge Campbell and all paroled Confederate officers but, at the solicitation of General Ord, afterward countermanded the order.

"On April 16 I opened an office in Manchester on the opposite side of the James River and did business from that point, our wire across the river being down. Lincoln's assassination becoming known that day the residents became exceedingly turbulent and extra precautions against riot or surprise of any kind were taken by General Ord. On April 20 we were obliged to refuse private business as with our one wire we were unable to handle it. The next day we received via Fort Monroe news of the cessation of hostilities between Generals Sherman and Joseph Johnson.

"On April 27 Solmon Palmer and his building party started to repair the line to Weldon, N. C. Two days later I was ordered by General Eckert to put the line in order to Fredericksburg. I started Palmer Gulick and his party with a hand car, operator Wm. B. Wood accompanying them.

"May 3 Harper Caldwell arrived at Richmond and assumed charge of the military telegraph affairs at that point. Two days later the Army of the Potomac passed through Richmond. J. B. Norris and Charles H. Mixer went with them overland to Washington. Charles Hammond went to Fredericksburg to assist W. B. Wood who was located at that point. By May 16 we had a line working south as far as Pascagoula, Fla. On May 20 we received the news of the appointment of General Eckert as Assistant Secretary of War.

"I remained in the service until the lines were turned over to the commercial companies and then took up my residence in New York."

Interesting Subjects Treated in Back Numbers.

Telegraph and Telephone Age publishes the best articles which can be obtained anywhere upon telegraphic subjects. We enumerate herewith a few of the many important subjects treated in our columns during the past few years, together with the dates of the papers containing the same. We have a limited supply of the back numbers containing these articles which we will send to any address upon receipt of price, 25 cents each. Any of these issues less than six months old are not regarded as back numbers, but will be sent upon receipt of the regular price, 10 cents. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

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The publisher of Telegraph and Telephone Age urges upon subscribers to this journal the desirability of having the paper sent to their home address rather than to their place of business. The reason is obvious. If it goes to your home it reaches you without danger of obstruction or abstraction by your office associates who are sometimes prone to borrow your copy to your discomfort and their edification, but at your expense. This naturally is a source of irritation and of course you don't like it. If a man wants Telegraph and Telephone Age he should pay for it, and the individual who is paying for his copy should be guaranteed in his rights.

As we regard our subscribers as our friends, and believe we are supplying them with a telegraph paper the like of which does not elsewhere exist, we dislike to see them disappointed, and wish to protect them in their prerogative so far as we are able. We believe that a good many disappointments of non-receipt of the paper might be averted if our suggestion of sending it in all cases to the homes of its subscribers were adopted. Changes of address will be made as often as desired.

Directory of Annual Meetings.

Association of Railway Telegraph Superintendents meets at Los Angeles, Calif., May, 16-20, 1910.

Commercial Cable Company meets the first Monday in March, at New York.

Great North Western Telegraph Company meets the fourth Thursday in September, at Toronto, Ont.

International Association of Municipal Electricians meets at Rochester, N. Y., in 1910. Date to be selected later.

Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, will meet at Chicago in 1910, date to be selected later.

Postal Telegraph-Cable Company meets the fourth Tuesday in February, at New York.

Telegraphers' Mutual Benefit Association meets the third Wednesday in November, at New York.

Train Despatchers Associations meets in Spokane, Wash., June 21, 1910.

The stockholders of the Western Union Telegraph Company meet the second Wednesday in October, at New York; election of officers occurs on the third Wednesday in October.



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The Railroad.

Telephone despatching equipment has been installed recently and placed in service on the Chicago, Indiana and Southern Railroad, between Gibson City, Ind. and Franklin Park, Ill.

The telegraph department of the Pennsylvania Railroad, it is reported, is about to begin experiments in wireless telegraphy with a view of determining its utility and practicability for railway work.

Mr. Charles T. Day, formerly of the Southern Pacific Railroad, at San Francisco, has been appointed assistant superintendent of telegraph of the Sonora Railway and Southern Pacific Lines in Mexico, with headquarters at Empalme, Sonora, Mexico.

The Georgia Railroad is preparing to install telephone equipment for despatching trains between Augusta and Atlanta, Georgia, a distance of one hundred and seventy-one miles, and from Camak, Georgia, to Macon, Georgia, a distance of seventy-four miles. There will be twenty-eight regular stations and five siding telephones on the line from Augusta to Atlanta, and twenty regular stations from Camak to Macon. This installation is the first one in that section of the country.

The next meeting of the eastern division of the Association of Railway Telegraph Superintendents will be held at the Ponce de Leon Hotel, St. Augustine, Fla., March 25. Among other things which will come up for discussion will be a report of the Committee on the Standard Railway Telephone Contract. The questions discussed at the January meeting of the western division will also be considered. A report will be made and those present will try to decide upon a route to be taken by those attending the next annual convention which meets in Los Angeles, May 16 to 20.

A reduction in the length of their working day from ten to eight hours, without decrease in pay, has been granted to the telegraph operators of the Illinois Central Railroad in the principal relay offices at Chicago, Memphis and New Orleans. This reduction in hours of service comes as a compromise of the recent demand made by the railroad telegraphers of that system for a ten per cent. increase in pay. The adjusting of the differences between the company and the telegraphers was brought about by an arbitration committee, appointed under the Erdman act, which included representatives of both the operators and the company. By the terms of the same award operators in the train-despatching offices are granted a decrease from ten to nine hours, and all operators on the system who are required to work ten hours or more a day are to be allowed an annual fifteen day leave-of-absence with full pay. The arbitration board consisted of Professor B. H. Meyer, of the University of Wisconsin, umpire; President I. G. Rawn, of the Monon Railroad, representative for the company, and John A. Newman, of the Order of Railway Telegraphers, for the operators.

The next meeting of the Railway Signal Association will be held at Chicago, March 14. Among the papers to be presented will be one on "Lightning Protection," by Otto Holstein, of the Central Railway of Peru, Lima, Peru. Mr. Holstein is well qualified to write upon this subject as the telegraph and signal wires of the road upon which he is employed and which reaches high elevations in the Andes, are especially subject to the effects of lightning, discharges upon the lines being of almost daily occurrence.

The Boston and Maine Railroad is equipping two additional divisions of its line with telephone equipment for train despatching. One of these extends from Concord, N. H., to White River Junction, Vt., a distance of seventy miles, and the other from Concord to Woodsville, N. H., ninety-five miles. Each circuit is to be equipped with twenty-five way stations. On the first of these divisions the dispatcher is located at Concord and on the other at Woodsville.

Among the papers which it is expected will be presented at the Los Angeles Meeting of the Association of Railway Telegraph Superintendents, May 16-20, will be one by Mr. D. C. Buell, chief of the educational bureau of information of the Union Pacific Railroad, outlining the work of his department. As the Union Pacific is foremost among the railway systems of this country in its efforts to educate its employes, Mr. Buell's paper will undoubtedly be received with great interest.

We are in receipt from Mr. E. P. Griffith, superintendent of telegraph of the Erie Railroad, of a photograph of a portable telephone set in operation upon his system. The picture shows a train which has stopped while the conductor is receiving orders by means of the portable instrument which is connected to the line by the use of a jointed pole carried for that purpose. The photograph was taken to illustrate an article which Mr. Griffith is preparing for the Erie Employees Magazine.

Telephone despatching equipment has been installed by the Pennsylvania Railroad upon the Buffalo, the Allegheny and the Monongahela divisions. On the last named division the double call system was installed, one selector operating one bell to call the operator to the dispatcher's circuit and the second bell being operated to call the operator to the message circuit. This is accomplished by means of two call boxes in the main office, each one controlling its own set of bells. Additional telephone despatching equipment is now being installed by the Pennsylvania Railroad on their Sunbury division between Mt. Carmel and Sunbury and Lewiston Junction and Sunbury.

The testimony of progressive operators is that Telegraph and Telephone Age is so thoroughly comprehensive in character as to make it absolutely indispensable to those who would keep informed. Its technical articles are of high practical value. Write for a free sample copy.

Meeting of Western Division of Association of Railway Telegraph Superintendents.

The January meeting of the Western Division of the Association of Railway Telegraph Superintendents was held in the office of Superintendent Bennett, of the Chicago and Northwestern Railway, on January 19.

After some discussion as to the best method for advancing the matter of high tension wire crossings, the following motion was carried by the meeting:

"That it is the sense of the western division, that Secretary Drew be requested to obtain a sufficient number of copies of the report made by the committee on high tension wire crossings, together with the forms submitted in connection therewith, and to distribute them to each telegraph department representative of the railroads throughout the country, whether a member of the Association or not, in order that they may secure through the management of their railroads, the universal adoption of the proposed uniform contract."

It was then decided that members of the western division should submit to the management of the railroad which each represents, copies of the report of the committee on wire crossings, recommending adoption of the specifications, and urging the need of action as nearly uniform as practicable by public bodies having jurisdiction in such matters.

The proposed new standard telephone agreement was then discussed, and Mr. E. P. Griffith of the eastern division said for the committee of his division which is considering this question that they had been busy and made considerable progress, but had not heard from a sufficient number of the members to make a final report. The committee has analyzed the proposition very carefully, but the members feel that a complete report cannot be made at present. He thought that by the time of the next eastern division meeting in March, they would have something definite to report.

The following letter from Mr. I. T. Dyer, superintendent of telegraph, of the San Pedro, Los Angeles and Salt Lake Railroad, regarding the annual convention to be held in Los Angeles, May 16-20, was read:

"Among the entertainment features arranged for are trips to Mt. Lowe, which include a stop at the Ostrich Farm and in Pasadena, going, and at Mt. Lowe Observatory returning, with dinner at Alpine Tavern. This means leaving the city at 12:30 p. m. The Kite trip contemplates leaving Los Angeles at 8 or 9 o'clock in the morning, the day to be consumed in going through the orange groves, Redlands and San Bernardino, dinner at the Glenwood Mission Hotel Riverside; returning via Baldwin's ranch, arriving about 5:30 p. m. On the Balloon Route trip over the Los Angeles Pacific Railway, we would leave Los Angeles at 12:30, going to Redondo, via Hollywood, Soldiers' Home, the Palisades, Santa Monica, Ocean

Park, Venice, arriving at Redondo Beach about 6:30, dinner at the Dolphin, returning along the beach to Venice, and thence to Los Angeles, arriving there at 9 p. m.

"On the trip to Avalon and Catalina, we would leave Los Angeles over the Salt Lake Route at 8:50 a. m., and take the boat at San Pedro, arriving at Avalon at 12:30. Those who desire may return on the next boat at 3 p. m., or 9 p. m., on the steamship Hermosa. I am figuring on Saturday for the Avalon trip for the reason that I expect a great many would like to remain over until Sunday, or possibly longer. All of these trips are delightful and I am only sorry that the short stay will not permit the arranging for several other trips around Los Angeles. The trip from the Tehachapi to Santa Barbara and return, and the trip to San Diego and Coronada Beach, would both be fine, and a half day to make the trip to San Gabriel Mission and back would be very interesting to a great many of the members and their families. Other trips are Baldwin's Ranch, Laurel Canyon, Mt. Washington, etc., but as Mr. P. W. Drew suggested, I do not want to propose a marathon endurance test for the ladies in the afternoon; on the afternoon if you will consider the Mt. Lowe, Balloon Route, Kite and Catalina Island trips.

"My idea for the arrangement of the program is as follows: On the 16th, the day the gathering convenes, an automobile trip around the city for the ladies in the afternoon; on the afternoon of the 17th the Balloon Route trip; on the afternoon of the 18th, the Mt. Lowe trip; on the 19th, the Kite trip; the 20th to be arranged for; on the 21st the Avalon trip. This will give the members a whole day for work on the 16th, one half day on the 17th and 18th, and a whole day on the 20th."

In connection with the convention, it was voted, that the secretary write the chairman of the eastern and western division transportation committees, advising that at this meeting members of the western division and members of their families, numbering about thirty-five persons, indicated a preference to use the Santa Fé route, going to the convention, leaving Kansas City in a body at 11:30 a. m., Thursday, May 12, on Santa Fé train No. 1, arriving at Los Angeles at 8:30 a. m., the following Monday, returning via such route as they may desire.

Among those present were the following: Wm. Bennett, John L. Davis, F. F. Fowle, J. G. Jennings, G. M. Jones, V. T. Kissenger, M. E. Launbranch, W. W. Ryder, F. H. Van Etten, F. T. Wilbur, Archibald Wray, Chicago; G. C. Kinsman, Decatur, Ill.; J. J. Ross, Detroit, Mich.; C. S. Rhoads, Indianapolis; R. L. Logan and Val B. Mintun, Kansas City; W. W. Ashald, Montreal; E. P. Griffith, New York; G. A. Cellar and L. A. Lee, Pittsburg; F. E. Bentley, E. A. Chenery and H. D. Teed, St. Louis; George Boyce, E. E. Dildine and E. J. Little, St. Paul; H. O. Rugh, Sandwich, Ill.

Train Despatching by Telephone.*

BY C. H. GAUNT.

Assistant General Manager and Superintendent of Telegraph
Santa Fe System.

We have not yet reached the stage of progress where one might ask, "Is the telegraph doomed?" Certainly it is not doomed when its application to the transmission of intelligence to great distances is taken into consideration nor when we reflect upon the great wireless projects of the future. But there is one direct use of telegraphy that is seriously disturbed, and that is its application to the necessities of modern train despatching.

The important invention of Morse had scarcely been offered for general use before it was seen that it could be availed of in the movement of trains upon railroads. The recognition of the assistance of the telegraph service in threading trains through the sidings, straight stretches and curved sections of a single-track railroad is practically coincident with the adoption of that service for sending messages of a social and business nature.

The year 1851 saw the first systematic attempt to telegraph "orders" from a central point to the engineers and conductors of trains, and, from that time down to the present, train despatching and the telegraph have been inseparable. Thousands of our youths who have looked with longing eyes and stimulated imaginations to the railroad as the goal of their ambitions, have started their careers by learning the art of telegraphy, because that seemed to be the most certain means by which they might sit in the chair of the train dispatcher, a most coveted place—a place from which great railroad generals are drawn, a position of responsibility well worth the metal of any man, and by far the most important single occupation connected directly with the movement of trains.

The trainmaster must be virtually a mistakeless man. He is the commanding general of train movements and the engineers and conductors are his field marshals. The great single-track railroads of the West have developed a body of serious-minded men for this work whose mental equipment is of a high order. The game that they play with the trains under their control is one that does not permit them to take a single chance. It must be played to perfection. The train dispatcher is the chess master of railway train movement, and he must win every game. Where a mistake means death or the great destruction of property, or both, then the absolute elimination of mistakes is the one great effort; and in no branch of railway operation has that effort been more fruitful of results than in the development of experienced men and first-class machinery to handle an indefinite number of trains in all kinds of intricate manoeuvres without accident and with the least delay.

*A reprint of an article published in the Santa Fe Employees' Magazine.

The telephone has been in general use just about thirty years. At the very start the question was asked: "Why cannot this improved means of transmitting words be used in the despatching of trains?" The grave and earnest men whose mental machinery seemed to work to perfection through the instrumentality of the telegraph said "No." The high officials of the railroads did not feel that the well working system was susceptible of change without risk, and risk is always to be avoided when there is no immediate and good reason for assuming it.

Hardly a man of large influence in the field of train operation advocated the supplanting of the telegraph by the telephone during the first twenty-five years of the latter's successful use. Even after the clear long-distance transmitter had been generally established the railroad managers hesitated to interfere with the long wedded union of the telegraph with train movement. But the fine, practical minds of our great railroad managers have to be suddenly changed sometimes when a combination of circumstances brings about a result that has not been foreseen. Some may claim that the use of the telephone in despatching trains has long been advocated. Possibly so, but only during the last few years have trials been made of sufficient importance, and upon a large enough scale, to prove anything. When proof is demanded by a practical-headed train dispatcher, it must be capable of but one construction—absolute.

The Santa Fe established its original telephone train-despatching circuit in June, 1908, in the dry climate of Colorado. It was not fitted with the improved apparatus now available, but there could be only one construction placed upon the reports received upon its operation—it was a success. As soon as this was realized immediate steps were taken to extend the introduction of the system to widely separated sections of the lines so as to test it in all conditions of climate. During the early part of 1909, 1,962 miles of telephonic train-despatching circuits were in operation upon the Santa Fe Railway in the states of Missouri, Kansas, Illinois, Colorado, New Mexico and California. The longest circuit reaches from Fresno, Cal., to San Francisco, 203.1 miles, contains thirty-two stations and is successfully operated through the "fog-belt" adjacent to San Francisco, where the telegraph is used only with great difficulty. The operating circuit upon all of these lines is a pair of 210-pound-per-mile copper wires carefully strung and costing in the neighborhood of \$100 per mile. There is at present under construction 1,520 miles more, which will give a total length of about 3,482 miles of telephone circuits.

The results of this extensive trial, while really astonishing, should hardly be so considered, for they are but the natural consequences of human tendency, and an analysis of the telephone method will convince anyone that it will almost completely displace the use of the telegraph in

moving trains, notwithstanding the expense of installation and the difficulty in overcoming the force exerted by the widespread use of the telegraph method.

The telegraph is used by the train despatcher in the intricate operation of his trains for one purpose only, that of communicating with the operators scattered along the stretch of railroad. Long use has developed a certainty of action in telegraph manipulation that commands the respect of all. But how often has a half frantic despatcher, loaded down with the complicated problems before him, wished he could use his voice to the men with whom he must communicate and thus avail himself of the rapidity of action, the definiteness and security that would follow?

To the despatcher time is the one thing that must receive the greatest consideration. It may be assumed that a man can utter words with a speed equal to the operation of his mind. But the train despatcher, in using the telegraph, has always been obliged to transmit his words at a speed but one-tenth his capacity to express himself, and also to receive a reply at the same rate. That being the case, of course a train-despatching system had to be adopted that would deal with a very small number of expressed ideas, and eternally and always the despatcher must come down to the limitations of the telegraph. In other words, the whole operation is inharmonious and does not tend to a result along the most natural channel. True, in the issuance of "orders" themselves, the speed, in telephonic manipulation, is limited to that required to write the words in longhand. But all directions of a collateral character, the receipt of important information and the instantaneous descriptions of situations that a despatcher must understand can be given and received at a speed limited only by that of human utterance.

And what does that mean? It means that the despatcher has been permitted to multiply the time within which he may form his plans of train operation fully three times. This, of itself, further means that his mental calculations are vastly improved in accuracy and general value. The despatcher is permitted to issue his orders at the times he originally outlined, and there is a coherence, a consistency and a union in his methods not possible where less time is available. This condition largely reduces the liability of error of action and, conversely, allows additional time for the discovery of error, important or unimportant.

By the use of the telephone the despatcher is relieved of that long continued and aggravating operation of calling an office by repeating over and over the telegraphic letter or letters used for that purpose. There is established at each office along the road, in the same circuit with the telephones, a small and compact instrument called a selector. Connected with the selector at each office is also an electric bell operated

by a couple of cells of dry battery. The despatcher has within easy reach a number of buttons upon a board, each button being designated by the name of the station that it is designed to call. By merely pressing such a button the selector in that particular station is operated, to the exclusion of all others, and in a few seconds the bell is ringing loudly. And, to show the completeness of this calling arrangement, the despatcher also hears in his telephone receiver the flutter of the bell and therefore knows that it is ringing. The despatcher can stop the call when he likes, and a short ring generally arouses an immediate response. But, if not, the call may be continued until the answer is received, something that does not often occur, because an excuse for not answering does not have the same weight where a bell rings loudly that it does where an instrument may be feebly ticking off the call. And if it were not enough that the time used in calling offices should be practically eliminated, there is the further advantage that these calls may be made upon the line at the same time telephonic conversation is being carried on, one operation not interfering with the other.

If the operator at the station wishes to communicate with the despatcher, he simply removes the telephone from the hook, places it to his ear, and if there is an opening for him he states the name of his station and the despatcher instantly replies by saying "despatcher." The "reporting" of trains—that is, the stating of the time of passing or of the arrival and departure of trains at stations—is made to the despatcher much more quickly than is possible by telegraph, and, where messages are necessary, they may be transmitted by telephone with the speed at which the operator and despatcher may be able to write longhand, and with equal accuracy to the telegraph. Information regarding derailments or other trouble is conveyed to the despatcher by verbal and complete narrative, either by the station operator or the conductor of the train involved, so that the despatcher is in immediate touch with the situation, while in using the telegraph for this purpose message after message is required before there is a complete understanding of details."

In transmitting "orders" by telephone, the despatcher spells out in full the names of stations, numbers of engines and trains, the times and the proper names involved. This, however, is done with speed and precision, and the despatcher writes the order in the record before him as he gives it, not waiting to make the record when it shall be "repeated" to him by the operator, as is done in the telegraph operation. This change in making the record of the order from a subsequent to an initial one is very important from the standpoint of absolute accuracy.

Unquestionably there are doubters still of the complete success of the telephone in train despatching and the allied services. The change—if it shall come—from the use of the telegraph to

the telephone in moving and making up trains, in the handling of the thousand and one details connected with the immediate motion of traffic and in giving to all the employes concerned in the work the benefit of the interchange of judgment through direct conversation, is revolutionary.

But it brings quick action where formerly it was slow. It takes from the despatcher the necessity for operating his trains through the medium of a large number of telegraph operators of varying ability. It brings to bear upon this most important of services direct conversational contact between all the interested parties, something of greater value to this particular work than can be fully described. There is harmony of action, harmony of temper, human understanding and personal relations of the most satisfactory character. There is the certainty that more movements will be better planned and executed, and that the art of direction of operation of trains will be greatly advanced and the work more safely rendered.

The Robert W. Martin Fund.

In remitting \$1.00 to be added to the fund for the support of the well-known old time telegrapher, Robert W. Martin, Mr. E. H. Hogshead, of Meridian, Miss., says: "I knew 'Bob' personally. He worked at Jackson and Vicksburg, Miss., in 1865 and he was my guest at Meridian for a day. Speaking of his ability as a receiver, the late J. C. Hueston, at one time general manager of the New York Associated Press, and a former well-known old time telegrapher, remarked that 'Bob Martin was one of the few men who can write with a pen faster than the Morse alphabet can be manipulated.' Mr. Hueston and myself were listening to him and John Galbreath, he at Vicksburg and Galbreath at Jackson seemingly trying to 'rush' each other. Neither could do it. Galbreath was as good an operator as ever touched a key. Bob's writing on the wire besides being perfect Morse, was so clear cut and firm that it always seemed to me that my local battery was stronger when he was sending, the strokes were so much like hammer and anvil. I had lost sight of him until Walter P. Phillips wrote him up as 'Cap Da Costa,' which Mr. Phillips informed me was a sketch of Mr. Martin."

The committee in charge of the fund consists of J. B. Taltavall, of Telegraph and Telephone Age; Charles W. Price, of the Electrical Review; T. Comerford Martin, secretary of the National Electric Light Association, and T. A. McCammon and Fred Catlin, of the Western Union Telegraph Company, New York. All contributions should be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

The amount received to date is: Previously acknowledged \$616.25; E. H. Hogshead, Meridian, Miss., \$1.00; Martin J. Kain, Washington, D. C., through W. H. Allen \$1.00; Total \$618.25.

Obituary.

Thomas W. Dewitt, operator for the Great North Western Telegraph Company, Montreal, died February 12, aged forty-two years.

George Newman Abbott, a telegraph operator of Lynchburg, Va., died at that place February 7, aged thirty-five years.

Gilbert McIntyre, who had been an operator for the Western Union Telegraph Company in Detroit for twenty years, died in that city February 5, aged forty-five years.

Professor A. E. Dolbear, the well-known scientist, author and inventor of telegraph and telephone appliances, died at his home in Medford, Mass., February 23, aged seventy-two years.

John Walker Richards, chief accountant of the American Telephone and Telegraph Company, died February 23, at Newton, Mass., aged forty-seven years.

Mrs. Katharine King Miller, wife of Dr. V. T. Miller, the well-known old timer of Pittsburgh, died recently. Mrs. Miller was a frequent attendant at reunions of the Old Time Telegraphers' and Historical Association and was well known by many of those in the profession.

John Perley Munroe, a well-known old time telegrapher and former state senator of Massachusetts, died February 7, aged fifty-nine years. Mr. Munroe's telegraph career has been referred to by Walter P. Phillips in his series of articles which have been running in our columns for some time past. He entered the service in 1865, at the age of fifteen, in Concord, N. H. Mr. Munroe soon became one of the most expert operators of that time being also noted for his fine penmanship. In 1872, after having taken the Associated Press reports for three years for the Worcester Spy, he became city editor of that publication and was connected with it in various capacities until 1898 when he retired to engage in the insurance business. Since then he has served two terms as representative in the Legislature of Massachusetts and three terms as state senator. Because of his great familiarity with public affairs acquired during his long newspaper experience he took a leading part in legislative proceedings.

What Our Friends Say Regarding this Publication.

Mr. A. H. Stewart, manager of the Western Union Telegraph Company at Nashville, Tenn., writes us: "No one can keep up with the telegraph procession nowadays without your paper."

Mr. R. V. Thomas, Illinois Central Railroad Company, Trimble, Tenn., writes: "I find your publication very valuable to me as an operator as it keeps me in touch with what is going on in the line of my profession."

Mr. S. H. Mudge, superintendent of the Postal Telegraph-Cable Company at St. Louis, Mo., in renewing his subscription says: "I cannot keep house without Telegraph and Telephone Age."

The Miniature Sounder at the Carnegie "73" Dinner.

The miniature telegraph sounder presented to each of the guests at the "73" dinner tendered in the fall of 1908 by telegraphers to Mr. Carnegie, in New York, in honor of his seventy-third birthday, aroused much enthusiasm. The device was regarded as an eminently fitting souvenir of an occasion which drew together in the spirit of *auld lang syne* so many distinguished members of the craft, past and present, especially so as it was a perfect piece of mechanism and fully capable of performing the work required of a like instrument of normal size. The little affair, which is beautifully finished, was highly prized by the recipients at the dinner as being emblematic of the profession.

In recognition of the sentiment that has prompted these inquiries, the utility of the device itself, and its appropriateness as a valuable gift to and by a telegrapher, Telegraph and Telephone Age has made arrangements by which it can fill orders for the same. The key alone, the smallest ever manufactured and which is the same as the one presented at the memorial reunion of the Old Time and Military Telegraphers in New York in 1905, will be sent in a box to any address, carrying charges prepaid, on receipt of \$1.50; the sounder at \$2.50, or both at \$4.00. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Phillips Code.

The popularity of Phillips Code, by Walter P. Phillips, was never more apparent than at the present time. Its acceptance by the telegraphic fraternity, as a standard work of the kind, dates from its first publication, and the constantly increasing demand for this unique and thoroughly tested method of shorthand arranged for telegraphic purposes, has necessitated from time to time the issuance of several editions. The present edition was carefully gone over by the A. P. Velie, an expert press and code operator, for many years identified with the Associated Press, New York, a few revisions made, and a number of contractions added, until now this "staunch friend of the telegrapher" is strictly up-to-date in every particular. It has been declared that an essential qualification of a "first-class operator" was a thorough understanding of Phillips Code.

The use of this system promotes rapid transmission and for press reports especially was long since declared to be the best ever devised. By common consent it is recognized as a standard and everywhere is regarded in the profession as indispensable in contributing to the operator's fund of practical knowledge. In fact, not to understand Phillips Code acts as a distinct embarrassment to the operator.

The price of the book is \$1 per copy. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

OTHER NEW YORK NEWS.

Assessments, Numbers 504 and 505, have been levied by the Telegraphers' Mutual Benefit Association to meet claims arising from the deaths of William S. Evans, at Orrville, O.; Edward M. Bliss, at Spencer, Mass.; Andrew S. Barber, at Rochester, Wis.; Simon Robertson, at Jersey City; John H. Ryan, at Denver, Col.; James F. Cunningham, at Saranac Lake, N. Y.; Lovejoy S. Landon, at Erie, Pa.; James P. McLorraine, at Philadelphia; Christian C. Frey, at Seymour, Ind.; Alvin T. Allen, at Bunkie, La., and Harry Bell, at Philadelphia.

Trade Note.

From the sales of the Western Electric Company for December and January, it is estimated that the gross business for the fiscal year ending November 31 will amount to \$61,000,000 an increase of \$15,000,000 over the preceding year.

G. W. HICKEY, INSURANCE, All kinds, Cool for Family use. The best kind. 30 Church St., New York; 209 Jefferson Ave., Brooklyn.

Advertising will be accepted to appear in this column at the rate of fifty cents a line, estimating eight words to the line.

The Serial Building Loan and Savings Institution of 195 Broadway, New York, will pay you five per cent. on your savings or will assist you in buying a home, which should be the ambition of every telegrapher. More than a thousand operators have secured homes through the assistance of this worthy institution. Why not you? Write for particulars.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Leg. Pattern \$2.50
Legless Pattern 4.00
F.O.B. Columbia, Pa.

THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,
Columbia, Pa. R. F. D. No. 1



Telegraph and Telephone Age

No. 6.

NEW YORK, MARCH 16, 1910.

Twenty-seventh Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Layman's Perplexity Concerning the Windings of Magnets and Neutralization of Induction.

We are in receipt of the following communication:

"Will you kindly give a layman a few points on one or two things that perplex me somewhat although I think I understand the situation in a general way.

"For instance, what is the actual reason for using fifty ohm sounders and high voltage on some local circuits and four ohm with lower pressure on others when the latter method appears to be the most economical?

"Also, what is the real cause of our inability to successfully neutralize the inductive effects of high power electric systems?"

These questions have already been answered by the writer in this column at different times but the information is so valuable to many readers that the explanation will bear being referred to again.

The fifty ohm sounder is used for the following reasons: necessity, economy, and preference. It is necessary and also more economical to use the higher wound instruments where the only available electromotive force is high, such as that taken from an electric light system, in order to be able to use a minimum amount of current, the fifty ohm coil itself thus helping to reduce the volume.

It is also both necessary and preferable to use the fifty ohm sounders in circuits which have underground cable conductors in order to minimize the volume of current flowing and thus avoid overheating the cable.

It should always be borne in mind that fifty ohm sounders require but about one third the volume of current a four ohm sounder demands. In fact it may be stated generally that for nearly all similar apparatus the higher the winding the less current they require for operation. Furthermore, where artificial resistance is required to reduce what would otherwise be too great a volume of current, smaller gauges of conductors may be used, the resistance of the latter in such cases being helpful instead of harmful. For the same reason fifty ohm instruments offer the opportunity of using smaller cables for an equal number of wires placed in the ducts underneath the floors of operating rooms at the same time minimize the heat evolved. Hence for repeating sounders on multiplex apparatus and those for single line relays which are not subjected to any alterations in the ohmic resistance of their respective circuits it is customary, at least with the Western Union Telegraph Company, to employ fifty ohm sounders.

It is also obvious that where storage batteries supply the energy smaller capacity cells may be used for the reason that the hourly drain of current will be much less with fifty than with four ohm instruments.

Another reason why the higher winding is preferred is that the comparatively high electromotive force required for their operation more readily surmounts small accidental alterations in the resistance of the local circuit than lower pressures could overcome.

Practically the same factors regulate the use of four ohm sounders, viz., necessity and economy.

They are absolutely necessary in branch office multiplex circuits when placed in series with others in systems where all loops are built up to a uniform value of resistance by artificial means, such for example as the one hundred ohm loop system in vogue in the New York Western Union office.

The object is to have as little resistance in the sounder coil as possible in order that when such an instrument is removed or inserted temporarily by a branch office the resulting alteration in the total volume of resistance of the circuit will be so small that it will not cause any harmful change in the volume of current previously existing.

Thus the removal of a four ohm sounder from a 100 ohm loop circuit would only alter the strength of the current four per cent., whereas

the withdrawal of a fifty ohm sounder in such a circuit would make an alteration of fifty per cent., a difference which would tend to throw the other apparatus in the circuit out of adjustment.

While the layman may naturally conclude that the employment of so much artificial resistance in a built up loop system is a useless waste of energy in the circuits, when by reducing both such resistance and the electromotive force the same combination could be obtained, he should understand that the high resistance is placed therein not by choice, but from necessity. The value of the resistance and electromotive force used for built-up systems is governed as a rule by the resistance of the longest loop in the group and the electromotive force required to give such loop a proper volume of current. The shorter loops must then be artificially built up to the same value of resistance. The so-called wasted energy due to artificial resistance is merely the price paid for the advantages derived by the system.

The inquiry as to why the disturbing effects of high power inductance cannot be neutralized can be answered in almost one sentence.

It is because such external effects are of an inconstant value owing to constant variations in the load such systems carry. Hence no one tension or adjustment given to a mechanical device can follow the irregularities of the disturbing elements.

While transformers and other electrical devices have been helpful in a measure they are not altogether successful because many complications arise from unexpected sources.

Recent Telegraph and Telephone Patents.

A patent, No. 949,012, for a telephone system, has been granted to H. G. Webster, of Chicago, Ill.

A patent, No. 949,187, for a telephone transmission system, has been taken out by O. T. Lademan, of Milwaukee, Wis.

A patent, No. 949,235, for a telephone selecting system, has been awarded to D. W. Jones, of Dora, Tex.

A patent, No. 949,530, for a multiple station telephone line, has been issued to A. J. Farmer, of Detroit.

A patent, No. 949,593, for an automatic circuit closer, has been secured by T. W. McKenzie, of Hammond, B. C., Canada. For automatically completing a telegraph circuit if the operator should neglect to close the circuit at the key, by means of a movable contact co-operating with a projection on the key.

A patent, No. 949,690, for means for attaching telegraphic control mechanism to telephones, has been granted to W. H. Thompson, of Wheeling, W. Va. For making a record of ordinary telephone conversation by means of a switching device connected to a telegraph, whereby the re-

ceiver may be used for ordinary telephone communication or for listening to a record of the telephonic conversation.

A patent, No. 949,814, for a support for telephone receivers, has been awarded to Robert Zinsmayer, of Sandusky, O.

A patent, No. 949,821, for a telephone receiver, has been taken out by Claude D. Enochs, of La Crosse, Wis.

A patent, No. 949,836, for a selector, has been secured by James L. McQuarrie and Edward B. Craft, of New York.

A patent, No. 949,881, for an alarm and current-saving apparatus for automatic telephone exchanges, has been granted to Albert M. Bullard, of New York.

A patent, No. 950,047, for repeating mechanism for telegraphic circuits, has been issued to J. G. Kerr, of London, Ontario, Canada. Provides an extra local magnet in series with the battery and regular local magnet of the sounder and arranged to operate on the opposite end of the sounder bar from that upon which the regular sounder magnet operates.

A patent, No. 950,168, for a combined jack and drop for telephone switchboards, has been taken out by Claude D. Enochs, of La Crosse, Wis.

A patent, No. 950,220, for a telephone pay-station, has been secured by Francis X. Bee, of Philadelphia, Pa.

A patent, No. 950,229, for a telephone transmitter, has been granted to Felix Gottschalk, of New York.

The following patents have expired:

Patent No. 492,467, for long-distance electric telephony, held by Chas. M. Haynes, of Omaha, Neb.

Patent No. 492,471, for a system of combined telephony and telegraphy, held by Frank A. Pickernell, of Newark, N. J.

Patent No. 492,482, for signaling apparatus and circuit, held by Edward J. Hall, Morris and Frank A. Pickernell of Newark, N. J.

Patent No. 492,483, for a busy signal for telephone circuits, held by Edward J. Hall, Morris and Frank A. Pickernell, of Newark, N. J.

Patent No. 492,484, for a telephone central station circuit, held by Jas. J. McQuarrie, Boston, Mass.

Inauguration of Night Letter Plan by Western Union and Postal Telegraph Companies.

Final arrangements for the cut-rate "night letters" have been made by the Western Union Telegraph Company, and on March 7, the new system of sending a fifty-word telegram at night for the same price as a ten-word telegram in the day-time went into operation. This plan, in addition to the combined telephone and telegraph system which the company recently inaugurated through an arrangement with the American Telephone and Telegraph Company, is expected to greatly increase the company's busi-

ness throughout the country and afford a means of keeping the wires almost as busy at night as they are in the day.

Mr. Belvidere Brooks, general manager of the Western Union, thus explained the working of the "night letter" plan.

"The new plan will be a special inducement for sending letters at night by wire rather than by mail. These letters are to be filed before midnight. They can be filed any time in the day up to midnight, however, and they will be sent out during the night and delivered to their destination in the early morning. The night rate for letters will be one-fifth of the day schedule. In this way business men will save much time in conducting their correspondence, especially in cases where two days would be required to deliver a letter sent by mail. A letter of fifty words can be sent to Chicago for fifty cents. Now, under the day rate, only ten words can be sent to Chicago for that sum. And the cost for sending a letter-telegram to San Francisco would be about twice that amount."

Mr. Brooks in speaking of the great improvement in the system of handling messages which has been brought about by the combined telephone and telegraph plan said:

"Co-operation between the American Telephone and Telegraph Company and the Western Union, which has been the dream of Theodore N. Vail for so many years, has brought about added efficiency to the telegraph service, and it will be our aim to further work together so that the telephone shall be a strong auxiliary to the telegraph. In this general plan of co-operation between the two services, the very first step whereby telephone subscribers are given charge accounts with the Western Union has proved a great success. The public thought well of it from the start and the results have been even more encouraging than were anticipated. Of course, the volume of the service will grow with time, because in any new service it takes a little while for the general public to learn that a new facility has been afforded them. Under the new co-operative system, a telephone subscriber can dictate a telephone message to the office of the Western Union and the cost of the message is charged against the telephone."

Mr. Brooks said that striving to satisfy the public always brought good financial results to a company. "The good-will of the public is a most valuable asset to any concern," he said. "It is a strong safeguard against business failure. And realizing this we are simply going ahead with innovations that will prove beneficial to our patrons and ourselves."

The Postal Telegraph-Cable Company also put into operation at the same time a similar service between all offices on its own telegraph lines and the lines of its direct connections in the United States.

Investigation of Telephone and Telegraph Companies in New York State.

The Legislative Committee of New York State, which is inquiring into the advisability of placing the telephone and telegraph companies in this State under the supervision of the Public Service Commission, has held several sessions in New York recently spending most of their time in examining witnesses from the telephone companies. They will probably hold two or three more hearings and then prepare their report, which will be presented to the Legislature before its adjournment.

The principal witnesses examined were Edward M. Moister, assistant controller of the American Telephone and Telegraph Company, Union N. Bethell, president and Walter Brown, auditor of the New York Telephone Company.

President Bethell stated that the assets of the New York Telephone Company and the subsidiary companies recently merged with it, amounted to \$196,592,950, of which the plants represented \$175,711,296. The total capitalization of the merged companies was \$123,000,000, and that of the New York Telephone Company was \$85,000,000.

"If the company should take advantage of all its legal rights," said Mr. Bethell, "such as capitalization of all of its tangible property, good will, patents and similar things, New York City would have to pay higher telephone rates. The capitalization of our companies represents clean assets, and does not include anything else."

President Bethell said he did not believe in placing telephone and telegraph lines under the Public Service Commission, but that he favored supervision by the Legislature, and thought broad inquiries like the present one were the best kind of supervision.

Personal.

Mr. R. L. Dean of Chicago, inventor of the Dean Rapid Telegraph System was a recent New York visitor.

Mr. Paul Sise, general manager of the Northern Electric and Manufacturing Company, Montreal, Que., was in New York recently, coming here in the interest of his company.

Mr. W. A. Houghtaling, formerly identified with the telegraph service, now a member of the engineering staff of the Rowland Telegraphic Company, Baltimore, Md., was a recent New York visitor.

Colonel W. R. Plum of Lombard, Ills., historian of the Society of the United States Military Telegraph Corps, is spending the winter in the south, visiting various cities including; Selma, Meridian, Natchez, Vicksburg and other places. During the Civil War, Colonel Plum was a military operator in that section of the country.

Subscribe for Telegraph and Telephone Age, \$2.00 per year.

Postal Telegraph-Cable Company.**EXECUTIVE OFFICES.**

Reports relative to the illness of Mr. E. J. Nally, vice-president and general manager, have been exaggerated in the daily papers. Mr. Nally was not feeling well while in Chicago on an inspection trip, and was advised by his physicians to take absolute rest and quiet for a week or two. He has not been seriously ill and is improving daily, and is expected to be about again within a few days.

Mr. M. M. Davis, electrical engineer and Mr. F. E. d'Humy, assistant electrical engineer have returned from Chicago, where they have been in the interest of the service.

Mr. S. B. Haig, superintendent of traffic, is away from his office on an extended trip of inspection which will take him as far as the Pacific coast.

The handsomely equipped new office at Atlantic City has been completed and the business at that point is now being transacted in the new quarters. Mr. W. M. Phillips is the manager at that point.

A rectifier plant has been installed in the Malone, N. Y., office displacing 200 cells of battery.

Space has been leased at Scranton, Pa., in the recently constructed Miller block on Spruce Street for a new main office which will be equipped with modern apparatus and will be up-to-date in every particular.

Manager A. W. Rinehart of Pittsburg, winner of the first president's prize of \$250 awarded to managers of the eastern division, celebrated that event by giving a dinner at the Fort Pitt Hotel to fifty of his subordinates.

RESIGNATIONS AND APPOINTMENTS.

Mr. William E. Mathews, of the Boston office, has been appointed acting manager at Pittsfield, Mass., vice P. J. Mackin.

Mr. O. B. Plumly, manager of the office at El Paso, Tex., has been appointed assistant manager of the Chicago office. Mr. Plumly was awarded one of the second prizes which President Clarence H. Mackay offered last year for the best kept offices.

Western Union Telegraph Company.**EXECUTIVE OFFICES.**

Mr. Belvidere Brooks, the recently appointed general manager occupies a suite of offices on the fifth floor.

Mr. Frank D. Giles, assistant chief operator, has been attached to the office of General Superintendent A. G. Saylor.

Mr. H. E. Roberts, superintendent of supplies, has returned from a business trip to the Pacific coast.

Mr. W. N. Fashbaugh, electrician of the eastern division, has been attached to the office of the general manager. Mr. W. T. Rogers has been attached to the office of the general superintendent of the eastern division.

Mr. Robert E. Chetwood, of the American Telephone and Telegraph Company has been appointed engineer of construction of this company with headquarters in New York.

Mr. Chetwood was born at Elizabeth, N. J., February 15, 1873. He entered the service of the American Telephone and Telegraph Company July 1, 1895, and since that time has been engaged in engineering work on outside construction for that company.

Two conferences of the Superintendents of the eastern division for the benefit of the service, have been held in New York recently in the office of General Superintendent A. G. Saylor. Among those present were E. M. Mulford, New York; E. P. Griffith, Jersey City; N. E. Church, Pittsburg; W. A. Sawyer, Philadelphia; C. F. Ames, Boston; F. E. Clary, New Haven and D. C. Dawson, St. Johns, N. B.

Mr. I. N. Miller, Jr., assistant general superintendent at San Francisco, has returned to his office after a year's leave of absence, during which, accompanied by his wife, he has made a trip around the world for the benefit of his health. Mr. and Mrs. Miller visited Japan, China and all important European points and arrived in New York about the middle of February en route home. Mr. Miller is again in excellent physical condition.

Mr. William Finn, of the office of the engineer of equipment, returned March 12, from England where he has been for the past six weeks on business connected with the service.

Mr. J. T. Elliott, general foreman of construction at New Haven, Conn., has been transferred to Providence, R. I., in the same capacity, with supervision over territory east of the Connecticut River, including Vermont. Mr. S. L. Hays, foreman at New Haven, has been advanced to the position of general foreman of the territory west of the Connecticut River, with headquarters at New Haven. The two territories mentioned comprise the seventh district, eastern division.

New storage batteries have been placed in the Key West office. Mr. S. R. Crowder, electrician of the southern division, Atlanta, Ga., supervised the installation of the new equipment.

At the quarterly meeting of the Board of Directors held March 9 a quarterly dividend of three-quarters of one per cent. was declared, payable April 15, to stockholders of record March 19.

The following statement shows the condition of the company at the close of the quarter ended December 31, 1909:

Surplus October 1, 1909.....	\$18,017,998.86
Net revenues, quarter ended December 31, 1909	1,747,199.77
	\$19,765,198.63
Dividend of $\frac{3}{4}$ per cent., paid January 15, 1910.....	\$747,639.00
Interest on bonded debt.....	433,062.50
	1,180,701.50
Surplus December 31, 1909	\$18,584,497.13

The following shows the estimated condition of the company at the close of the quarter ending March 31, 1910:

Surplus December, 1909.....	\$18,584,497.13
The net revenues of the quarter ending March 31, based upon nearly completed returns for January, partial returns for February and estimating the business for March, will be about.....	\$1,750,000.00
Less interest on bonded debt	433,062.50

Leaves estimated net earnings for the quarter, less interest on bonded debt..

1,316,937.50

\$19,901,434.63

RESIGNATIONS AND APPOINTMENTS.

Mr. Frank Orchard has been appointed manager of the New London, Conn., office, vice Mr. C. B. Smith, resigned.

Mr. John F. Fleming, all night chief at Nashville, Tenn., has been appointed day chief operator in that office. Mr. Fleming was born in Nashville, May 27, 1862, and entered the service at that place as messenger May 13, 1879. He soon became an operator and was employed in that capacity until November, 1897, when he was appointed night traffic chief. He was later made all night chief, which position he held until his present promotion.

Mr. H. C. Worthen, night chief operator of the New York main office, has been advanced to the position of assistant chief operator, days, to succeed Mr. F. D. Giles, promoted. Mr. Worthen was born at Shelby, N. C., July 22, 1877, and entered the telegraph service with the Seaboard Air Line Railway December 5, 1890, at Clay, N. C. He remained in this employ until 1898, the last two years of that time serving as relief train despatcher. In the latter year he entered the service of this company first at Washington, and later at New York, where he has been employed most of the time since with the exception of about a year spent with the Laffan News Bureau of the New York Sun and a few months with the Atlantic Coast Line at Richmond, Va., in the train despatcher's office. While in New York he has been in charge of the company's interests at the Tribune office and has held the positions of traffic chief of the southern and eastern divisions, wire chief of the southern switch and that of southwestern wire chief. Early in 1907 he went to Buffalo as chief operator in that city but returned to New York January 1, 1908, as night chief operator which position he occupied until his present promotion.

Mr. James F. McGuire, assistant wire chief, has succeeded to the night chief operatorship vice H. C. Worthen. Mr. McGuire was born at Providence, R. I., in 1863 and began his telegraph career as messenger for this company in that city. He became an operator in 1879. He next joined the forces of the American Rapid

Telegraph Company and was transferred to the New York office of that company, where he remained until 1889 when he returned to the employ of this company. He has served in the operating room at 195 Broadway in various official capacities since that time.

Mr. A. J. Heldman, traffic chief, has been appointed assistant wire chief vice J. F. McGuire. Mr. Heldman was born in New York, November 23, 1863. He entered the telegraph service as messenger in 1879. He became a member of the operating force at the New York main office in 1884 and has been employed there since that time serving in various capacities.

Western Union Secures Control of American District Telegraph Company.

President Robert C. Clowry of the Western Union Telegraph Company on March 8 announced that his company had purchased what amounts to a controlling interest in the stock of the American District Telegraph Company of New Jersey, which is the holding company for about forty American District Telegraph organizations covering with messenger and signal telegraph service practically every city in the country outside of New York.

Colonel Clowry said that the interest acquired together with the shares already held by the Western Union constituted considerably more than one-third of the total capitalization of \$9,963,351 outstanding. This purchase of more than one-third of the American District Telegraph stock assures the purchasing company working control, in fact the stock holdings of the company now are practically identical with the shares previously held by the company's officers and large stockholders individually by which the Western Union had previously dominated the American District Telegraph Company.

Colonel Clowry also said that the purchase of the stock had no other significance than the carrying out of the Western Union's new policy of making certain its control of affiliated companies, which have hitherto been dependent upon the affiliation of their principal stockholders with the controlling interest in Western Union.

The American District Telegraph Company, upon its organization in 1901, made a twenty-five-year contract with the Western Union for the collection and delivery of messages. It does, besides, an independent business in the delivery of parcels, and maintains in a number of cities a burglar and fire alarm service. For the first three years of its existence the company paid five per cent. dividends, but reduced that rate to four per cent., which has since been maintained.

Earnings for the year 1909, with the month of December estimated, were \$3,600,000, against \$3,192,000 the previous year. Expenses of \$2,700,000 reduced net earnings to approximately \$900,000, an increase of \$115,000 over those of the previous year. The payment of dividends of \$389,088 left a surplus of \$501,504, estimated.

E. Y. Gallaher, Auditor of Western Union Telegraph Company.

Ernest Yale Gallaher was born in New York City in 1876 and has always lived there. He was educated in private schools and entered Columbia College, School of Arts, in 1891 but did not proceed with the course, electing to take a position with the First National Bank of New York. While there he obtained the degree of LL.M. and was admitted to the New York Bar in 1898, but has never practiced that profession.

In 1899 he passed an examination as a Certified Public Accountant in New York State and turned his entire attention toward that profession. He then entered the office of Smith, Reckitt, Clark and Company, certified public accountants, where he was employed for about one and one-half years. After that he was, for a while, in the office of Edward W. Sheldon, attorney at law, and now president of the United States Trust Company. Following



E. Y. GALLAHER.

Auditor of the Western Union Telegraph Company, New York.

this position he went with Price Waterhouse and Company, chartered accountants, where he traveled considerably and obtained a wide accounting experience. After leaving Price Waterhouse and Company, Mr. Gallaher was appointed Commissioner of Accounts of New York City by Mayor McClellan and retained that office for about two years leaving that position to go with the American Telephone and Telegraph Company, where he was employed in a special capacity for the eight months preceding his recent appointment as Auditor of the Western Union Telegraph Company.

Frank D. Giles Promoted.

Mr. F. D. Giles, assistant chief operator has been attached to the office of General Superintendent A. G. Saylor of the Western Union Telegraph Company, New York. Mr. Giles was born near Ovid, N. Y., July 28, 1849. He entered the telegraph service in the west in 1864 and held positions in various sections of the country including Pacific coast cities until 1885, when he entered the service of the Western Union in New York and has

been employed here since that time in various official capacities in the operating room. In 1901, he became assistant night manager and in 1903 was appointed assistant chief operator. Mr. Giles



FRANK D. GILES.

Western Union Telegraph Company, New York.

is well liked by all with whom he comes in contact and his associates in the operating room while regretting to have him sever his direct relations with them are pleased to see him advanced to a more responsible position.

W. T. Rogers Attached to the General Superintendent's Office.

Mr. William T. Rogers, formerly general wire chief of the Western Union Telegraph Company, New York, who has been attached to the office



WILLIAM T. ROGERS.

Western Union Telegraph Company, New York.

of General Superintendent A. G. Saylor was born at Cold Spring Harbor, Long Island, January 13, 1869. He first entered the telegraph ser-

vice in March, 1884, as operator on the Long Island Railroad. After two years spent with this system he entered the employ of the Baltimore and Ohio Telegraph Company in New York. In 1888 he transferred his services to the Western Union Telegraph Company in Brooklyn. January 1, 1891, he entered the operating room at 195 Broadway and has been employed there since that time. In June 1903, he was made a quad chief and two years later was again promoted this time to the position of wire chief. March 25, 1906, he was made assistant to R. H. Morris, electrician of the operating department, and on January 30, 1907, was further advanced to the position of assistant general wire chief. On January 10, 1908, he was appointed general wire chief, which position he held until the time of his present promotion.

Municipal Electricians.

The fire alarm system of Minneapolis, Minn., will be extended at a cost of \$8,728.

The 1910 convention of the International Association of Fire Engineers will be held at Syracuse, N. Y., August 23.

A new fire alarm telegraph system has been installed recently at Savannah, Ga. by the Gamewell Fire Alarm Telegraph Company.

A central office system of transmitting fire alarms to the different fire companies has been recommended by Superintendent of Fire Alarm Telegraphs Speicher, of Jersey City. By the present method of transmitting fire alarms whenever an alarm is sent in it rings simultaneously in every fire house in the city and also at fire headquarters.

A patent No. 949,970, for an electrically operated non-interfering alarm call box, has been granted to P. A. Brown of Denver, Col. The box has a door controlled by a spring and a latch therefor having a transparent and breakable seal, together with an alarm mechanism controlled by the door when the seal is broken.

A patent No. 949,699, for a signal box, has been awarded to H. W. Doughty and C. E. Beach of Binghamton, N. Y. The transmitting mechanism is manually released for sending impulses, particularly for fire alarm and police telegraph systems. Improvements in the motor-driving train, the contact devices and various parts of the system.

City Electrician, A. C. Farrand of Atlantic City in his annual report has recommended that the city council take steps to get the Legislature to pass a bill requiring all corporations to put their wires underground; that signs be placed on corners where there are no fire alarm boxes indicating the nearest box; that an ordinance be passed fixing a fine of \$50 for turning in false fire alarms, and that the Boardwalk illumination scheme be made permanent at a cost of \$15,000.

The municipal authorities of Rochester, New York, have begun the installation of a red light police signal system. At the first test made recently by Superintendent of Police Telegraph J. B. Smith it was found that the light was visible at a distance of 1,000 feet on all of the intersecting streets at which it was placed.

The Cable.

The annual meeting of the Commercial Cable Company was held at the main office New York, March 7. All of the old officers and directors were re-elected.

Mr. John Fraser, assistant superintendent of the Rye Beach, N. H., station of the Direct United States Cable Company, has been appointed superintendent at Halifax vice Mr. S. Penn appointed manager at London as mentioned in our March 1 issue. Mr. Fraser has been at Rye Beach for thirty-six years coming there from England on the cable steamship "Ambassador," assisting as electrician in the laying of the Torbey-Rye Beach cable and after the cable was laid remaining on the station staff.

It is reported that the governments of the Commonwealth of Australia and of New Zealand, and the Pacific Cable Board, have extended to press messages by the Pacific cable between Australasia and Canada the benefit of the reduction in rates that was conceded in August last to press messages between the United Kingdom and Australasia. At the same time the Canadian Pacific Railway has lowered its rate for the transmission of such messages and, as a result of these changes, the rate on press messages between Australasia and Vancouver has been reduced to three and one-quarter pence per word.

It is said that the Norwegian Storting has appropriated about \$300,000 for the purchase of the Great Northern Telegraph Company's cables between Egersund and Peterhead, and Arendal and Hirtshals, and for the construction of a new cable between Arendal and Newcastle-on-Tyne.

Trade Notes.

Although The Rock Island Battery Company have only been located in their new Winton Place, Cincinnati factory since early in the year, they are already looking about for more ground for a needed addition.

At the annual meeting of the J. H. Bunnell and Company, Incorporated, held in New York, March 8, Mr. J. J. Ghagan was re-elected president and secretary and Mr. Charles E. Graham of New Haven, Conn., vice-president and treasurer.

Mr. Charles Blizzard, third vice-president and general sales manager of The Electric Storage Battery Company of Philadelphia has just returned to that city after an extended business trip through the west, during which he visited all the western offices of the company.

Reinforced Concrete Poles.

At the Cement show held in Chicago, February 19 to 26, Mr. P. H. Wilson gave an interesting illustrated talk on "Concrete Poles." Mr. Wilson said that until recently, wooden poles have been so cheap that the use even of preservatives has not been widely or seriously considered, since the expense of treatment exceeded the benefit obtained. But the increasing demands of the telegraph, telephone and electric light and power companies, which purchase about 4,000,000 poles a year, has compelled engineers to look elsewhere for suitable substitutes possessing the desirable qualities of wooden poles.

For long, heavy poles, or when safety and permanence are prime requisites of the construction, reinforced concrete poles, even though expensive, will frequently prove economical. The life of these reinforced monoliths is indefinite, while their strength can be made equal to that of any other construction. As in the case of steel poles, they can be placed at greater distances than wood, and have superior fire-resisting qualities. By the insertion of pipes or internal passages during the construction of the poles, provision may be made for carrying wires from the pole tops to the ground, affording enclosed and well-protected runs. The natural taper of timber frequently results in putting its weakest section above the ground, the excess material in the butt being wasted except as it is useful in resisting decay. On the other hand, the concrete pole may be given any desired taper and need not have any excess of improperly placed material.

A pole carrying wires acts not as a column, but as a cantilever, deflecting to adjust itself to stresses due to the loading. Concrete poles have not the elasticity of timber, but will stand considerable bending, and even when severely strained do not break off, but are held by the reinforcement from falling to the ground. If proper unit stresses are employed, and care is taken to obtain a dense mixture and a good surface finish, there need be little fear of injury due to cracks, as has been shown by many successful installations in this country and abroad. The greater weight of concrete poles often renders advisable their manufacture at some favorably located point near the line where they are to be used. In many instances, concrete poles have been erected at a first cost below that of wood or steel.

The earliest concrete poles of which there is any record were built by an American engineer in Panama, in 1856. They were twelve feet in length, and reinforced by wooden cores. The latter swelled, however, cracking the concrete, and the type had to be abandoned. A French pole, originated in 1896 for the Le Mans, France tramway, is still in use. This was a solid pole of circular section, reinforced with small round rods and transverse wires.

A solid concrete pole, thirty-five feet long, and square in cross-section, seven inches at the top and fifteen inches at the bottom, reinforced with

round smooth rods, was another French design, and when tested to 4,000 pounds gave a maximum deflection of two feet, six inches returning to within three inches of its original position. This pole broke at 4,700 pounds, but was held by its reinforcement from falling.

A German process of manufacturing poles utilizes the centrifugal force of a revolving form. To a wet mixture of rich concrete, ground asbestos fiber is added, the mass being placed in a tubular form and revolved at high speed for a few minutes in a warm room. The asbestos fiber is said to increase the strength in tension.

An Italian company has constructed a novel pole made up with large round-bar reinforcement at the three corners, and tapered toward the top. These are asserted to be cheaper than iron poles.

A remarkable and successful form of a pole has been devised by Siegwart, a German. By means of a conveyor belt, the concrete is fed to and wrapped, under pressure, about a revolving steel core on which the reinforcement is fastened. The finished form is thus completely wrapped with concrete and canvas, which is allowed to cure in a horizontal position for 15 hours, after which the core is collapsed and withdrawn. These poles can be made in any size, shape or strength and have been successfully used in places where wooden poles soon succumbed.

Ocean Newspapers.

Travelers on the ocean can now have the world's news each day, says an exchange, as well as though on land, and the circulation of some of the daily papers published on shipboard is as large as that of some land dailies.

The circulation of the Cunard Daily Bulletin on the steamship *Lusitania* is over 2,000 a day and has reached 2,500. This journal has thirty-two pages, ten inches by six. It is excellently printed on fine, glazed paper and sells at five cents per copy. It goes to press at 1 a. m. and is ready for the breakfast table like the newspapers ashore. Many passengers have it delivered to their berths and read the day's news before they get up.

Practically everything of news value in the whole world appears in the ocean daily as soon as it is printed in the dailies on land. For instance, on the voyage during the English general election full returns were printed every morning of the results announced down to the previous night.

From Reuter's London wireless service the ocean daily editor gets plenty of material. Stock exchange quotations are given very fully. All notable events and the movements of famous people are recorded.

Moreover, the ocean daily often gets news that the land dailies cannot get. For the liners are in touch with one another as well as in touch with land all the way across the ocean and each vessel supplies items of news about itself and its passengers.

A very artistic production is the *Journal de l'Atlantique*, published on board the steamship *La Provence* of the French line. It has larger pages than the *Cunard Bulletin*, and each number is well illustrated, and the news is published in both French and English. During an ordinary voyage this steamer is in touch with thirty-two other liners and eleven shore stations in addition to the two regular long distance stations at Clifden and Cape Cod.

The daily of the steamship *Kaiser Wilhelm II* has twenty-four pages, and it has so many advertisements it can be given free to the passengers and still leave a profit for the steamship company. Humorous illustrations are a feature and a puzzle page gives much amusement on the voyage. Much use is made of the paper to keep passengers in touch with the land from a business point of view.

One of the simplest of the ocean dailies is the *Transatlantic American* issued on the steamers of the American Line. It is only a four-page news sheet, but it has editing reduced to a science. On one day during a recent voyage the steamship *St. Louis* had news from the Cape Race land station, the English warship *Inflexible*, the yacht *Iolanda*, the cableship *Cambria* and the liner *Kronprinzessin Cecile*.

The *Atlantisches Tageblatt* of the Hamburg-American Line is a sixteen page sheet and makes no pretension to elegance. It is printed partly in German, partly in English and has a story by some popular writer. It makes advertisements of hotels its strong feature.

On the other hand, the *Express Mail* published on board the Canadian Pacific Atlantic liner *Empress of Ireland* is a most elegant affair. It has twelve pages and is enclosed in a handsome wrapper stamped in gold with an emblematic design printed in the richest colors. It is delivered to the passengers free and has no advertising, unless one may consider as such the beautiful pictures given of Canada.

From all of this it may be inferred that the telegraph office on board an ocean liner is one of the busiest places on the ship and on some vessels three operators are employed. Needless to say the office is open at all hours of the day or night.

The Late Professor Dolbear.

The death of Professor Amos Emerson Dolbear on February 23, which has already been recorded in these columns, removes from the electrical field one of the most interesting figures ever associated therewith. He did not decide to go to college until he was twenty-eight years of age. At this time after he had worked as a machinist for several years his health failed him and he decided to secure a better education and become a teacher. He accordingly entered the Ohio Wesleyan University and completed the full course there in two years. After holding positions as teacher in several colleges he became

professor of physics and astronomy in Tufts College in 1874 and held that position until his retirement on account of ill health in 1906. Professor Dolbear was an early investigator of the possibility of telephony and contested the claims of Professor Bell to the invention of the telephone, claiming that the latter had obtained from him the idea of using a permanent magnet in the receiver. The courts, however, decided the case in favor of Professor Bell. He is said also to have anticipated by many years the invention of wireless telegraphy, as a patent issued to him in 1886 contained the basic principles of the wireless system of the present day. For financial reasons, however, no use was ever made of this patent. He was a pioneer in the investigation of electric waves in space anticipating Hertz's discoveries in that line, it is claimed, by at least six years. He also discovered the X-ray four years before Roentgen. It would appear from a list of his inventions that he initiated a greater number of electrical discoveries than any other man except Edison, but from none of these did he receive any great reward or even honor. He was also a frequent contributor to the scientific press and was the author of several standard scientific works.

An Appreciation.

Mr. Charles Bright, F. R. S. E., of London, England, the well known author and authority on submarine cables and the son of Sir Charles Tilston Bright of Atlantic cable fame in writing to us recently says:

"I want to write to express my appreciation of these little paragraphs which you frequently insert at the bottom of your pages. I can well believe that little homilies like the enclosed may often serve a very useful purpose to the young—aye and to those of us who can no longer claim to be young and it is nice to find at any rate one more or less technical journal a live journal."

The paragraph inclosed by Mr. Bright was the following:

"If it is worth while to do a kindness at all, it is also worth while to do it gracefully and cheerfully. If you are going to grumble while you do it, you rob it of more than half its worth and all its beauty. This rule is as good in the home, among the brothers and sisters, and between husband and wife, as it is anywhere else."

The Winnipeg, Can., Board of Trade is endeavoring to obtain from the telegraph companies a reduction in the tolls on commercial business. As the companies have declined to make any reduction the matter has been appealed to the Railway Commission.

A district messenger company which has been organized recently in a southern city will make a business of renting umbrellas. Another feature which they will introduce will be the delivery of mail on Sunday to those desiring such service and who do not wish to have to go to the post-office for it themselves.

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POSTAL OFFICIAL DIAGRAM.

The diagrams appearing in "Official Diagrams of the Postal Telegraph-Cable Company's Apparatus and Rules Governing the Construction and Repair of Lines" were made from the company's blueprints and are absolutely correct. This volume, which is published by TELEGRAPH AND TELEPHONE AGE, under official sanction and supervision, is of especial value to operators and linemen. It will be sent to anyone, postpaid, on receipt of fifty cents. Address J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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MARCH 16, 1910.

The Book Department of *Telegraph and Telephone Age* has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Opportunities in the Telegraph Business.

The complaint is often heard among the younger members of the telegraph profession that there are no opportunities for a young man to advance himself in that field. That the reason so many do fall into a rut and serve at the key all of their lives lies with the men themselves rather than their occupation is proven by the many persons who now hold prominent positions in all walks of life who have graduated from the telegraph. As a matter of fact it is doubtful whether there was ever a time when the opportunities in the service were greater than at the present. What practically amounts to a revolution in the methods of handling the rapid transmission of communication in this country is now about to take place. The telegraph and telephone, which have heretofore been conducted as entirely separate propositions will now be combined in many ways and as a result a multitude of difficulties will arise which have not before confronted the telegraph or telephone managers. Some one will have to solve these many problems and the ambitious and

studious young operator will have ample opportunity to show his superior officials that he is capable of discharging higher duties than those attendant upon the manipulation of the key. Unfortunately there is a tendency among employees of telegraph companies to fall into a largely mechanical way of doing their work with little interest in the system beyond that particular part with which their duties are connected. This is a great mistake. If they would spend their spare time in studying the construction and operation of the apparatus they could soon acquire a thorough knowledge of the same and when the opportunity for promotion came they would be prepared. Often the managers have to promote men from the ranks who have not thus fitted themselves and as a result when they are required to perform the more important duties they are found deficient. The telegraph and telephone at the present time offer a field of endeavor of exceptional value, at least as a training school for the mind if for no other reason. The man who earnestly grapples with and masters the problems arising in these professions is developing his mind and fitting himself for better things. There is always need of men who have the initiative to look ahead of their present occupation at the same time fulfilling all the duties they are called upon to perform in the best possible manner. The telegraph service requires men of ability now as it never did before. If the man in the ranks who is capable of better things fails to be discovered and promoted by his superior officials there are ample opportunities for him in other vocations.

As we have often contended, no man's environment is narrow unless he himself makes it so, notwithstanding the pessimistic and essentially false reasoning sometimes heard to the contrary. An alert broad minded self respecting and intelligent man of capacity in whatever field he may be placed is bound to rise. The telegraph has use for such men to fill present and prospective places as there is no question but that the management of the telegraph from chief executives down will in the future as it always has in the past be recruited from the ranks of those filling minor positions. These remarks apply particularly to the young men now entering or who have recently entered the service. No one can be really successful in life unless he has a good foundation to work upon. If the foundations are not properly laid the superstructure is liable to fall. The gaining of a proper foundation for future success should be the first concern of every young man. If that foundation is not built upon faithfulness to employing interests as well as himself it will have little lasting value.

As we have often said before, the telegraph provides one of the most excellent schools in which to fit oneself for better things. Abundant proof of this may be had by examples of men who have risen to the top in the telegraph itself as well as by others in nearly every walk of life

who have quit the service of the key and found large success in other occupations. All of these bear testimony to the value and helpfulness to them in late years of their early telegraph experience. It is generally admitted that the college student remembers, after he has left the walls of his alma mater, but a small percentage of the specific information which he is supposed to have absorbed therein, the chief advantage to him of his long years of study being the development and broadening of his mind. Similarly, if the young man entering the telegraph service will take advantage of his opportunities, studying and mastering all of the intricacies of the system, he will be fitting himself for greater usefulness in many other fields as well as in the telegraph just as though he were enrolled in a regular institution of learning. Unlike other schools, however, there is no one behind him to push him ahead but he must depend upon his own efforts and his ambition to carry him forward to success. The policy of the present telegraph management, however, is to encourage the employes, particularly the younger members of the force, to prepare for advancement and it is to be hoped that all will take advantage of every opportunity to fit themselves for better things.

Letter-Telegrams.

The fifty word letter-telegram rate of the Western Union and Postal Telegraph Companies went into effect March 7. The new departure gives every promise of proving a success, as we predicted editorially in our March 1 issue it would. Under the new order of things, both telegraph companies will, at any time up to midnight, receive for transmission to any part of the United States and delivery early the next morning, either by mail or messenger, as is most convenient, messages of fifty words or less at the regular day rate for ten words. The new service is expected to prove a boon especially to business men, and it is believed that it will keep busy a large percentage of the wires of both telegraph companies, which are now idle from four o'clock in the afternoon until about eight o'clock the next morning.

Consideration of Wireless Legislation at Washington.

The necessity for immediate legislation that will prevent the interference by amateurs and others with Government wireless messages and also with messages affecting the safety of passengers at sea, was urged upon the House Committee on Merchant Marine and Fisheries by E. T. Chamberlain, commissioner of navigation, and Lieutenant John O. Walton of the United States Revenue Cutter Service, at a hearing held in Washington, March 7.

Agreeing that all regulations governing the use of wireless must invade an entirely new field, Mr. Chamberlain declared that Congress at this session should provide against two things, name-

ly, interference with Government business, and with messages of distress. The subject of commercial wireless business and inter-state messages, he said, could be settled later.

Lieutenant Walton said that a law requiring all ships to become equipped with wireless is not nearly so important as one to regulate the traffic of the air. Ships are voluntarily equipping themselves with wireless apparatus, he said, and the number of wireless stations is increasing far more rapidly than the perfection of the art itself. He suggested that all amateur operators shall be required to stand an examination and obtain licenses before they are permitted to indulge in wireless telegraphic experiments. This, he declared, will not discourage the ambitious amateur and will do away with the "practical joker" in wireless telegraphy.

Mr. Cloyd Marshall, of New York, secretary of the United Wireless Telegraph Company, told the committee of the inability of his company to obtain licenses in Canada and European countries on account of the policy of Governmental monopoly, which is enforced there.

This caused Representative Humphrey, of the committee, to suggest that any bill framed should include a proviso that no foreign company should receive a license to engage in wireless telegraphy in the United States. Mr. Marshall also protested against the proposed plan of issuing licenses to any and all applicants saying that this would result in the springing up of thousands of wireless stations and a consequent confusion of call signals and messages.

Other experts on the subject will be heard by the committee before any specific legislation is suggested upon the subject.

Sale of Mackay Companies' Holdings of American Telephone and Telegraph Stock.

Announcement has been made of the purchase by the American Telephone and Telegraph Company of the 82,000 shares of its own stock, recently sold by the Mackay Companies.

President Theodore N. Vail, of the former company stated that the stock was secured at a price of between \$11,000,000 and \$12,000,000.

It is the plan of the American Telephone and Telegraph Company, according to President Vail, to utilize the Mackay stock in exchange for the stock of several of the subsidiary companies which are being refinanced and reorganized in order to confine the physical property of the operating companies to established State lines.

President Vail denied that there was any basis for the assertions that a rate war between the Western Union and Postal Companies is impending.

On the other hand, in carrying out the plan for the increased use of the telegraph, he stated that the telephone company is prepared and expects to afford to the Postal the same advantages in handling telegraph messages over telephone wires as is extended to the Western Union, and at the same rate.

The Military Telegrapher in the Civil War.

PART XXXV.

Mr. Christopher Dougherty, who is at present living in St. Louis, entered the military telegraph service when a lad of sixteen. While connected with it he had many interesting and amusing experiences of which he wrote in part in 1878 to Colonel William R. Plum, historian of the United States Military Telegraph Corps, as follows:

"About the middle of May, 1862, I received notice to report to Captain Samuel Bruch at Nashville, Tenn. A few days later I was working at Columbia, Tenn., with Mr. G. M. D. Gregory, an old acquaintance, as manager. I had barely been there a week before I was called out of bed about two o'clock one morning by Mr. Gregory with the information that the town was about to be attacked by a band of guerrillas and the probabilities were that we would all be either captured or killed, all of which was to say the least, very dismal news to a youngster of sixteen. However, the sun rose at the appointed hour in the morning, the guerrillas failed to do more than fire on the pickets and my courage returned. After being called up in the middle of the night a few times more, I became used to the situation. The manager concluding that his road to happiness led toward Indiana, resigned and I was left alone. On the Fourth of July, while celebrating or rather racing in the suburbs, my horse fell, rolled me about forty feet over a macadamized road, disagreeing with me to such an extent that ten days in bed was the result. While I was disabled, Mr. E. W. Atwater took charge of the office.

"Soon after I resumed duty, I was ordered to Huntsville, Ala., and when I boarded the train I found Captain Bruch en route for the same place. We had only gone a few miles south of Columbia when bump—bump—bang! bang! we were bushwacked and the train was in the ditch. Our nervous system was considerably disarranged by the occurrence, in fact I am inclined to think we were pretty badly scared. Mr. Bruch and myself crawled out of the car as quick as we could and just in time to hear some yells and see the disappearing forms of our assailants. After doing all we could we started for Columbia afoot.

"Mr. Bruch returned to Nashville as soon as the road was cleared and I went south to Moorsville, Ala., at that time a repeating station near Huntsville in charge of Mr. Hamilton and guarded by a squad of soldiers. Life at Moorsville was rather dull, work was very light and we had a hard time amusing ourselves. One day while looking through my effects I found three or four old copper pennies. For lack of something else to do, I went to the battery room and amalgamated them. They resembled silver half dollars so much that they were in great demand by the natives who furnished us with watermelons and vegetables. As they had always charged us exorbitant prices for these things we had no scruples in resuming specie payment. When Gen-

eral Bragg and General Buell started on their grand foot race for the Ohio River, all of that southern country had to be abandoned and the telegraphers went with the army.

"Three trains traveling closely together containing the last of the Union soldiers left Huntsville one morning for the north picking up on the way all detachments of guards strung along the line of the railroad. At Moorsville we had one flat car for our squad and on it was myself and about half a dozen soldiers with our equipment. This consisted of a small amount of baggage and about a dozen barrels of mess pork of which we made a barricade that undoubtedly saved the lives of some of our party. Our train was next to the last and the flat car upon which I had the honor to ride was at the extreme rear end.

"We proceeded very slowly, numerous halts being made. Nothing serious happened, however, until we had got north of Pulaski, Tenn. It was about three o'clock in the afternoon, the one hundred soldiers aboard were trying to get a little sleep in the uncomfortable box and flat cars of which the train was composed, the train running along at a fair rate of speed about half way between Pulaski and Columbia, Tenn., when we were all roughly shaken up by the train coming to a sudden stop and thoroughly awakened by the cracking of shot guns and the shower of buckshot rained upon us from the woods we had just entered. My car being a flat one, was peppered pretty badly, but the barricade of pork barrels saved our lives.

"The attack came from the south side, and we all piled off the train on the north side and used the cars for breastworks. The fighting was very lively for about ten minutes, but the bushwackers soon retreated. A lieutenant calling for volunteers to reconnoiter, a half dozen of us went into the woods to see what had become of the enemy. While we were darting from one tree to another, we were again fired upon and one of our party killed. We then returned to the train carrying the body of our dead comrade, one wounded prisoner and several shot guns. While we were out we found that a bridge ahead of us had been burned and that the bridge we had shortly before passed over was burning. In addition we were off the track. The commanding officers threw out a line of pickets and after about two hours of hard work got the train and engine on the track. The pickets were called in and the train backed down to the burning bridge where the country was more open and where we were able to defend ourselves until help came to build the bridge.

"In the morning the train behind us with about a thousand soldiers reached the opposite side of the creek and proceedings at once commenced towards rebuilding the bridge. In their train were several cars of cotton bales belonging to some speculators. The General commanding seized the cotton bales, dumped them into the ravine where the bridge had been burned and be-

fore noon he had passed his train over the break and we moved to where the bridge ahead was burned. This was a more serious affair, cotton bales wouldn't reach this time, but on the other side was General Negley with trains to transport us northward. We were all transferred safely over the break and moved on to Columbia, where I joined General Negley's command in place of the operator then with him, who was in more of a hurry to get north than I was.

"Rail transportation not being sufficient, General Negley's forces had to march over the pike to Nashville. I overhauled my trunk, picked out my worst clothes for the march, shipped my trunk over the railroad to Nashville and never saw it or its contents again. I was provided with a horse and had a very pleasant march to Nashville, arriving there about five o'clock one evening. The next day I reported to the Nashville telegraph office for instructions. Negley's command being ordered to remain at that point, there was nothing for me to do, so I joined the squad of idle operators then at that place waiting for something to turn up.

"Communication with the outer world had ceased. Nashville was in a state of siege. We were in total ignorance of what was passing outside of the few square miles over which the stars and stripes still waved. General Negley was in command. Stringent orders were issued. All citizens and dwellers, telegraphers included, had to be off the streets and at home by nine o'clock or else pass a night in the guard house. Having a personal acquaintance with the General's staff, I had no trouble in obtaining a permit to remain out as long as I pleased and though I did not use it much myself it was a great convenience to the rest of the boys.

"One morning I was provided with an office outfit and sent out to one of the chain of forts that girdled the city to establish an office. As the fort was not finished, I merely located my office and placed all my things in one corner of the room and returned to the city to pass the night. I returned to the fort about ten o'clock the next morning. My instruments, clothes, pistol and office outfit had all disappeared and the only trace I ever got of any of them was one of the battery jars, which an enterprising soldier had filled with sand and was using as a cuspidor. There was no use complaining, however, so I concluded I was not needed at that particular fort and returned to the city office. As telegraph instruments and outfits were scarce, the proposed office was not opened.

"Mr. Con Dwyer was the manager at Nashville and for lack of higher authority we all looked to him for orders, likewise for sufficient money to supply our daily wants. As money was hard to get, he concluded it would be a fine scheme to ship a half dozen of us north. We were all willing, even anxious to go, provided transportation was furnished. This was no easy matter. Nashville was surrounded by the enemy, the railroads were de-

stroyed and more or less in the hands of the Confederates. The only way we could go was over the turnpike. Horses were accordingly furnished us and, to avoid being captured, Mr. Dwyer wrote a letter to Superintendent Bruch for us to take along with us. In this he stated that we were discharged from the service; that we were disgusted with the war and only anxious to reach our peaceful homes in the north. Of course, we expected that under such circumstances no one would molest us. Perhaps the Confederates might know Mr. Dwyer and such being the case we would be doubly protected. They might, owing to such a strong letter, furnish us with an escort, especially if they should read it all, for at the end of the letter was a paragraph saying that this story was written only to mislead the Confederates in case we were captured.

"Provided with this talisman we started. Our party consisted of Claude Knox, W. H. Kelsey, F. B. Tyler, S. P. Peabody, C. H. Pond and myself. Our mounts consisted of six of the worst plugs to be found in the quarter-master's department. They were evidently chosen with the idea that if our animals were so poor there would be no temptation for the enemy to take them away from us. If good ones were furnished they would be sure to be taken.

"We started bright and early one pleasant morning in October. It fell to C. H. Pond and myself to have the two worst horses in the lot and we were soon left in the rear. We jogged along smoothly until about three o'clock in the afternoon when we met and passed a native well armed and riding a horse that looked for all the world like the one we had seen F. B. Tyler mount earlier in the morning. However, we did not consider it any of our business to question him as to how he had got that animal or what had become of its former owner. In about an hour we overtook Tyler tramping wearily along afoot. We three then took turns walking and riding and hurried on to Springfield, Tenn., where we hoped to overtake the others and, if possible, travel all together, as it certainly would be much safer than straggling along as we had been doing.

"Night overtook us before we reached Springfield, still we poked along and had just arrived in sight of the town when we heard an ominous click, click, and a command to halt. We halted, dismounted, bade farewell to our horses and walked into Springfield just ahead of four or five shotguns. Our captors, taking us to a hotel, we were confined in a small room and searched. Everything that we had that was worth having was confiscated. The letter on Pond's person was seized and opened and one of the captors who secured it commenced to slowly spell out its contents.

"Pond was looking over his shoulder and quickly saw the damaging clause at the end, of which we were all in ignorance. Pond was, however, equal to the emergency and saying he was familiar with the handwriting, volunteered to read it

for them. Luckily for us, his services were accepted. It is hardly necessary to say he omitted the line that, if read out, would in all probability have settled our freedom for some time and when we were alone he destroyed the letter.

"In the morning we were paroled and allowed to go. Kelsey, Knox and Peabody had been paroled and started for Louisville the afternoon previous. Nothing remained for us to do but to follow suit or turn back to Nashville. We quickly decided to push ahead.

"All our available wealth consisted of about sixty or seventy cents in shin-plasters which we had managed to save during the march and a Smith and Wesson revolver that Pond had concealed in his inside vest pocket and which had also been overlooked. We marched very slowly the first day, F. B. Tyler having provided himself with a new pair of shoes just before starting from Nashville, was in constant misery. Pond and I were in good trim and could have walked a long distance had we been alone, but we decided to stick together. Four or five miles was all we made the first day.

"After a week of hardship with little to eat, we arrived at Bowling Green where we found soldiers and the next day got transportation as far as Green River. At Green River we found a man who, for the revolver which Pond still had in his possession, agreed to furnish us with three meals apiece and take us in his wagon to Lebanon Junction from which point the railroad was running to Louisville. We finally arrived at Louisville, ragged and dirty and without a cent in our pockets.

"Having been paroled, Uncle Sam had no use for us nor was he prepared to square accounts with us financially. We found kind friends, however, who helped us along until situations were obtained. Six or seven months afterwards, while I was working in the West, at Fort Laramie, I received notice that I had been exchanged, but I never entered the service again."

Banquet of Postal Telegraph Club of Atlanta.

The first annual banquet of the Postal Telegraph Club of Atlanta, Ga., was held in that city February 26, and was a most enjoyable and successful affair. Much credit is due the Publicity Committee of the Club of which Mr. A. M. Beatty is chairman and which made the arrangements, for the admirable way in which all of the details of the occasion were taken care of. Fifty members and guests were present. After the dinner had been served President W. C. Daviet called the assemblage to order and in a few well-chosen remarks told of the organization of the club and its purposes, saying that every employe of the Postal in the city of Atlanta and a few from towns in close proximity thereto had gladly joined the organization and had given it their hearty co-operation. He then introduced the following speakers in the order named:

Hon. R. F. Maddox, mayor of Atlanta, spoke

of "The Atlanta Spirit and Our Future"; Colonel Fred J. Paxon, president of the Chamber of Commerce, spoke of "Greater Atlanta"; Colonel W. B. Kenny of the Associated Press, took as his subject, "Operators I have Known"; S. W. Wilkes, commercial agent of the Georgia Railroad told of the "Progress of Inventions"; Mr. George H. Usher, general superintendent of the company discussed "Generalities"; Mr. Guy E. Paine, assistant general superintendent spoke on "An After Dinner Thought"; Mr. J. P. Edwards, division electrical engineer, spoke of "Good Signals." The menu and toast list were of an attractive and unique design, the speakers being given circuit assignments. According to the program, Mayor Maddox, Colonel Paxon and Captain Kenny were assigned to the quadruplex, Colonel Wilkes to the duplex and Messrs. Usher, Paine and Edwards to the bonus circuits.

As Mayor Maddox and Colonel Paxon both spoke upon subjects pertaining to Atlanta, their speeches were heartily appreciated and enjoyed by everyone. Colonel Wilkes and Captain Kenny enlivened the evening with anecdotes and their tales were listened to with great pleasure. The bonus circuit speakers spoke words of encouragement and appreciation of the hearty co-operation and good work of all departments of the service and predicted great success for the Club. Their remarks were received with great interest and enthusiasm by all present.

A feature of the evening was an automatic telegraph set, which was used to illustrate Mr. Edwards' speech on "Good Signals." Telegrams were received and read by Toastmaster Daviet from Mr. E. J. Nally, vice-president and general manager of the company; Mr. C. C. Adams, second vice-president and Mr. C. P. Bruch, third vice-president, New York; Mr. Jesse Hargrave, superintendent, Birmingham, Ala.; Mr. G. W. Ribble, superintendent, Richmond, Va., and Mr. C. A. Rhodes, traveling auditor of the company.

The following members and friends were present:

Hon. R. F. Maddox, F. J. Paxon, W. B. Kenny, Colonel S. W. Wilkes, G. H. Usher, G. E. Paine, W. C. Daviet, S. J. Poundstone, W. E. Sitton, H. W. Pearce, L. A. Minor, J. P. Edwards, F. H. Robinson, C. W. Dunlop, C. C. Knapp, F. F. Pursley, C. E. Harrison, H. A. McKinnon, G. W. McGaughey, W. W. Irwin, J. F. Heard, A. M. Beatty, G. W. Oliver, A. D. Holcomb, A. S. Holcomb, T. B. Sherman, A. L. Lee, J. C. Moore, Robt. Armour, R. S. Pope, Jr., D. C. Delaney, W. W. Delaney, E. S. Reeves, J. E. Arnold, P. A. McMullin, J. C. Ewing, J. W. Manning, L. L. Shivers, B. S. Price, E. J. Wallis, F. Spalding, and J. M. Plowden, of Atlanta; C. B. Arrington, of Nashville; O. T. Moore of Macon, Ga., and W. M. Milam, of Cartersville, Ga.

Telegraph and Telephone Age is headquarters for electrical, telephone and telegraph books. Write for catalogue.

Lightning Protection.*

BY OTTO HOLSTEIN, LIMA, PERU.

Chief Train Dispatcher, Central Railway of Peru.

Having had a number of years experience in the Southern States and Western States and Territories in the United States, in the Philippine Islands, on the Isthmus of Panama, in Peru, and on ships at sea, my knowledge of electrical storms and the protections of wires and apparatus from their effects may be of interest.

From my observation in these widely-separated parts of the world, I can say that nowhere have I encountered electrical storms of such magnitude as those of the higher altitudes of the cordillera of the Andes. It is very probable that in the Rocky Mountains as well as in many other parts of the world, where altitude, temperature, latitude or geological formation, or whatever it is, that bears the most important relation to the phenomena in question, are as favorable as here, electrical storms of equal proportions will be encountered.

Inasmuch as the Peruvian Andes comprise the territory directly in question, some little description of this great range of mountains may not be out of place. The description of the Sierra in Peru will hold good for the whole west coast of South America, as the general character of the country is the same. The country on the western or Pacific Slope of the mountains is dry and barren, very much like the Mojave Desert in California and Arizona. There is little or no rain along the coast, but up above the foothills we get rains for six or seven months of the year. About the altitude of 10,000 feet, rain, snow and electrical storms are frequent and very violent, although usually of short duration during the summer. On the high peaks and in the passes and through the higher altitudes the storms, generally, both rain, snow and electrical, are of the greatest violence.

On the Cerro de Pasco Company's line, upon which I was formerly employed, the entire length of which lies above an altitude of 12,000 feet, the road follows the canyon of a river for the first thirty kilometers from Oroya and then opens out on a level plain, or, as it is known here, "pampa." The road crosses the entire length of this pampa, some 70 kilometers and then enters the barren mountains in which it continues for another 30 kilometers until Cerro de Pasco is reached. This is on the eastern or Atlantic water-shed of the Andes, and here, as well as other places of the same altitude (over 14,000 at Cerro de Pasco), the electrical storms are very violent.

These storms come with almost no warning. I found the telegraphone gave the best indication of the approach of a storm, the "howler"

would give notice of the presence of static electricity long before any sign was visible to the eye. To those who are familiar with wireless telegraphy and have sat for hours trying to read faint signals from a distant station or ship, I could best describe the noises made by the "howler" as very much like "bad static"—or, better, a sound like water spilled on a hot stove. The clouds seem to collect from nowhere, around some peak, and in a very few minutes the vicinity of the peak is ablaze in a terrific electrical storm.

Although these storms frequently come alone, they more often accompany heavy snow storms, frequently coming after it has been snowing quietly for a half hour or so, and, after from fifteen minutes to half an hour of blinding flashes and pealing thunder, disappearing as suddenly as they come.

Many horses, cattle, sheep, and llamas, and people as well, are killed each year by lightning. The lightning seems to find more victims on the pampa than in the more rugged country. The peaks are rich in mineral and probably offer a better conductor than frozen pampa covered with comparatively dry snow. I have noticed among the peaks static appears to be disposed of with greater facility than on the pampa where it plays more pranks before finally disappearing.

A lightning arrester, known as the "Argus," is used on the Cerro de Pasco line, for the protection of telegraph and telephone apparatus and also for the protection of the train staff machines, which are in use there. In the case of the telegraph, these arresters have done excellent work. During one storm at Carhuamayo, a station on the Cerro de Pasco Railway, the lightning arrester was completely destroyed by a heavy discharge while the telegraph relay was not damaged. During another storm at La Fundicion, on the same road, the helix of the arrester was fused, but no damage was suffered by the telegraph apparatus.

The results obtained in the case of the telegraphones were not so gratifying as in the case of the telegraph apparatus, for, although the current that got through the arrester before it reached an intensity sufficient to break down the resistance of the air gap between the helix and the ground plate, was not sufficient to cause any damage to the telegraph relays, it was sufficient to puncture the comparatively delicate oiled-paper tinfoil condensers used to bridge telegraph instruments in intermediate offices and in telegraphone circuits where these instruments were installed. I have spoken of the excitement of the "howler" on the approach of an electrical storm, and the "howlers" as well as condensers were destroyed almost every time we had a storm. The howlers, when not destroyed, seemed to become less sensitive after a storm and a large number of howlers and condensers had to be ordered to replace those damaged by the frequent electrical storms. The con-

*Abstract of paper read March 14 at a meeting of the Railway Signal Association at Chicago.

densers in way stations gave us a great deal of trouble and after a storm if a telegraph station did not answer after some hours of calling, it was almost certain that the office had been cut out by a short-circuited condenser. We finally put two-pole single-throw cut-out switches in all telegraph circuits as well as in condenser circuits at intermediate offices, with instructions to open switches on the first appearance of a storm. Naturally this put the telegraph out of commission during such storms, but it was just as well so, for things were usually so interesting in the offices upon these occasions that I never heard anyone express a desire to use the telephone during an electrical storm.

In the case of the train staff, the Argus arrester was also used, and, in addition, cut-out switches as in the case of the telegraphones. I never found out whether the staff machines were more susceptible to the action of lightning than the telegraph relays or not, as the machines were comparatively expensive, and as we had no spare ones to replace a damaged machine, we did not deem it wise to take a lesson from that all-wise teacher, "experience." During storms the telegraph was used to notify operators to close switches, to give or take a staff.

As stated in the case of the telephone, the Argus arrester gave excellent results, and I have in my possession at the present time, three arresters that have been all but completely destroyed by lightning discharges.

While the Cerro de Pasco line lies throughout its length in a country where the same conditions obtain, all imaginable weather as well as other conditions are found on the Central Railway of Peru. In Callao and in Lima, and for some distance from the coast, it seldom or never rains, and home-staying people of the coast know nothing of rains or electrical storms. Higher up in the cordillera of the Andes rain and snow and electrical storms are encountered the same as in the Cerro de Pasco Country.

I cannot do better than take three stations on the Central where electrical storms are very destructive: Ticlio at the entrance of Galera Tunnel, the highest point on the line at an altitude of 15,665 feet and on the continental divide. Casapalca, 18 kilometers west of Ticlio and on the Pacific slope of the mountains at an altitude of 13,606 feet, and Yauli, 22 kilometers east of Ticlio and on the Atlantic slope of the Andes at an altitude of over 14,000 feet. During the summer months, which are December, January, February and March, snow and electrical storms are of daily occurrence at these stations. The worst months for such storms are January and February and any person wishing to study electrical phenomena could not find a better field than the one outlined.

Here on the Central I found a type of lightning arrester that was entirely new to me. The arrester in question embodies so many good

features, and its performance has been so satisfactory on this road, where very trying conditions are to be met, that I consider it worthy of some further description.

The principal parts of this device are of cast iron, the arrester is the two-line type.

The ground plate measures 7 3/4 inches by 6 5/16 inches and stands on four legs cast with the plate. The whole upper surface of this plate is furrowed and sharply ridged. The line plates are likewise furrowed. The arrester, when assembled has these sharp ridges at right angles, making every point of intersection (of which there are thousands) a spark-gap with an air space of but one thirty-second of an inch to break down. As can be seen, thousands of small spark-gaps in multiple with but one thirty-second of an inch of air resistance to break down, impose but a negligible resistance to a static discharge of any intensity.

The line plates and ground plate are separated by hard-rubber or ebonite washers one thirty-second of an inch in thickness and the line plates are held in position by sentinels of the same material which are secured to the ground plate and which clamp the washers in position. On the line plates brass lugs are secured which also serve to hold the line plates in position; these lugs are insulated from the ground plate by a strip of ebonite that extends along the sides of this plate.

The plates to which the line is connected can be lifted from the ground plate for inspection or for cleaning without interfering with the working of the wires. The only fault that can be found with these arresters is that they are rather heavy, the weight of the two-line type being about fifteen pounds.

The records of this road show excellent performance for this type of lightning arrester. There are records of some violent storms where office and ground leads have been fused by static electricity but none of the instruments have been lost.

The original manner of arranging the arresters was to connect them in series with the line and instruments and, inasmuch as they appear to have done their work so connected, it might seem best to let well enough alone, but I have put choke coils in series with the line plates of the arresters and the instruments with a view of still further retarding the passage of the high frequency discharge causing it to bank up and break down the resistance of the arrester sooner than it would otherwise, thereby offering greater protection to the instruments. Good ground leads have also been sought and both binding posts of the ground plate have been connected with separate grounds. A flat copper ribbon being used for the ground conductor, this form appears to embody qualities not possessed by round conductors.

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Composite Systems.

The chapter on "composite systems" in the new book "Telephonology" contains much information which is especially valuable to every telephone or telegraph man at the present time when the question of getting the maximum use out of a wire or pair of wire, is such an important one and is receiving such widespread attention. In this work many different methods employed to obtain composite simplex and phantom circuits are considered. A few extracts from this chapter will serve to show its value. After presenting illustrations of several different methods of applying telephone apparatus to a grounded line telegraph system the author says in part:

"From these illustrations it will be noted that on the composited portion of a line there may be three kinds of telephone stations: terminal stations, located at each end of that part of the telegraph line used for telephonic purposes; intermediate stations, located between the terminal stations; and portable stations, intended to be carried on a train for emergency use between the terminal stations while the train is at a standstill.

"To adapt a telegraph system to telephone operation requires no change in the telegraphic apparatus or in its operation. All that is necessary is to bridge the apparatus at each telegraph station with a condenser and a resistance, and at the telephone stations to connect the telephone apparatus between the line and ground. A condenser in each telephone set prevents the telegraphic current from passing through the apparatus to the ground."

Speaking of the limitations of the composite the author says; "the length of the telegraph line and the number of stations with which this composite system can be successfully employed, depend largely upon the character of the telegraph line. On a short line, service will be better and more stations can be operated than on a long line; the length, gauge, material of the line wire, and the amount of wire in cable are the more important features which govern the perfect operation of the system."

These paragraphs are but an indication of the comprehensive way in which the important subjects treated in this one chapter on composite systems are discussed. Every combination mentioned is also illustrated by a circuit diagram which shows just how the desired results are accomplished.

At the annual dinner of the American Institute of Electrical Engineers held at the Hotel Astor, February 24, Professor Elihu Thompson, the first recipient of the Edison medal for meritorious achievement in electrical engineering was the guest of honor. Mr. T. Commerford Martin acted as toastmaster. Over five hundred members of the Institute and friends were in attendance. Among the telegraph people present were: George G. Ward, Minor M. Davis, John F. Skirrow, F. E. d'Humy and D. McNicol.

The Manufacture of Lead Covered Telephone Cable.

Notwithstanding the large amount of lead covered telephone cable in use, only a few people, even among those connected with telegraph and telephone companies, are familiar with the process of manufacture, or even remotely acquainted with the manufacturing equipment to produce the cable used for this purpose.

Bare copper wires of No. 19 and No. 22 B. and S. gauges are most commonly used although considerable cable is manufactured using other sizes of wire. The coils of bare copper wire are put on spindles on the machines shown in Figure 1 and insulated with paper of various thicknesses according to the specifications.

All the insulating paper is manufactured expressly for this purpose and is subjected to a rigid test, which insures only the very best quality being used.



Figure 1.--INSULATING AND TWISTING MACHINES.

During the process of insulating, the wire is wound on spools and prepared for the next operation of twisting into pairs. The machines used for the twisting operation are also shown in Figure 1. All of the machine equipment is electrically driven by individual motors.

After the conductors have been twisted into pairs and rewound again on small reels or spools, they are ready to be mounted on the drum of the stranding machine, which is shown in Figure 2. The stranding machines are built of various sizes, capable of forming into a core cable having from two to six hundred pairs of No. 22 B and S. gauge conductors. The stranding operation consists of forming the several pairs of conductors into a compact core, over which is placed a wrapping of firm dry paper. In the foreground of Figure 2 on a portable reel, is shown a cable, which has just been stranded.

The core of the cable, after it has been stranded, is tested, then placed in the drying ovens and subjected to a temperature of not less than 212 degrees Fahrenheit for twenty-four hours or more. This drying operation insures all of the moisture being taken out of the cable before it is lead covered. After it has been

put into the drying ovens, the core of the cable does not again become exposed to the air until after it has been encased in the lead sheath, but is drawn from the drying ovens directly through the lead presses, which are shown in Figure 3.



Figure 2.—STRANDING MACHINES AND CABLES IN PROCESS OF BEING FORMED INTO CORE.

The sheath, or outside covering of the cable, is generally made up with ninety-seven per cent. lead and three per cent. tin. The sheath is forced on the core of the cable by the presses which are operated by hydraulic pumps, also shown in Figure 3, which have a pressure of 6,000 pounds per square inch. During the process of lead covering, the cable is automatically wound on



Figure 3.—LEAD PRESSES AND HYDRAULIC PUMPS FOR SHEATHING CABLE.

wooden reels which are placed directly in front of the lead presses. After the complete cable is wound on the reels, the ends are hermetically sealed with paraffine for a length of two feet. The cable is then ready for inspection and test in order to determine whether or not it meets, in every respect, the requirements of the specifications.

An armored submarine cable is made up with a core covered with the lead sheath, which is usually five-thirty-seconds of an inch thick. It is then covered with three layers of jute and tar, one layer of armor wire varying in size for different cables from No. 11 B. W. gauge to

No. 4 B. W. gauge, and then two more layers of jute and pitch and a dipping of whitewash.

[We are indebted to the courtesy of the Western Electric Company for the cuts to illustrate this article, the process of manufacture described being the one employed at their factory at Hawthorne, Ill.]

A Composite System for Railway Purposes.

Patent No. 949,188, for a composite system, granted recently to Mr. O. T. Lademan of Milwaukee, is an interesting application of the general principles of composite telephony and telegraphy to the requirements of a railroad desiring telephones at all stations and telegraph facilities at the more important points only. The invention contemplates the provision of a plurality of telephone circuits placed end to end electrically speaking, and having telegraphic devices interposed between these various circuits. Impedance coils which offer a high resistance to the telephonic currents are bridged across the ends of each telephone circuit which circuits may have bridged across them at the ends or at any intermediate points any number of telephone stations desired. A telegraph key, short circuiting switch and relay are interposed between the central points of the impedance coils of the two sections ending at a telegraph station. A telegraph circuit is thus formed using the two telephone line wires in parallel for one side and leaving the ends grounded to form a return circuit. With this arrangement only we would have a telegraph line equal in length to the total length of the separate sections with a way station at each dividing point. Communication by telephone, however, would be confined to each separate section. To overcome this difficulty the inventor inserts a repeating coil, switch and condensers to connect the telephone in case this is desired. The repeating coil may be omitted if the sections are short and the lines connected together by a switch and condensers. The telegraph current will have to pass through the telegraphic apparatus at that station.

The director of telegraph of Venezuela has been instructed to communicate with the Government of Peru with a view of extending the international service recently established between Colombia, Ecuador, Peru and Venezuela, to Bolivia, Chile, and thence to the Argentine Republic.

In a recent speech in Congress upon the postal situation, Representative W. C. Adamson of Georgia spoke in highly complimentary terms of the effective way in which the rural free delivery branch of the service is managed. He gave a large part of the credit for this to Mr. P. V. De Graw, fourth assistant postmaster general and a well known old time telegrapher, who has supervision over this feature of the post office administration.

TALKING AND TELEGRAPHING SIMULTANEOUSLY OVER THE SAME LINE.*

The Repeating Coil and the Simplex Circuit.

BY N. C. KISSELL.

To-day a person can talk over a long distance telephone line from New York to Chicago while four telegraph messages are being transmitted over the same wires, and under normal conditions there will be not the slightest annoyance from interference between any of these messages. The apparatus used to make this possible, while nearly perfect in action after having gone through a carefully directed process of evolution, is worked on such simple principles that the making up of "extra circuits" from existing telephone lines may be clearly explained without the use of mathematics.

A simplex circuit is an arrangement of a single pair of wires to form one metallic circuit telephone line and one grounded telegraph line. The basis

in the iron ring. This flux will have a definite direction, depending upon the direction of the electric current in the coils surrounding the iron. This magnetic flux, of course, forms a closed magnetic circuit through the entire circumference of the iron core, and consequently passes through the windings, *c, d*.

Under these conditions any change in the strength of the original current passing through windings *a* and *b* will vary the intensity of the flux passing through coils *c* and *d*, and, if they are in a portion of a closed metallic circuit, will set up in them an induced current. When an alternating current circulates in coils *a, b*, a corresponding alternating current is set up in *c, d*. The ratio of the strength of current induced in *c, d* to that of the original current depends approximately on the ratio of the numbers of turns in the two windings to each other. If the windings *a, b* each have fifty turns and *c, d* ten

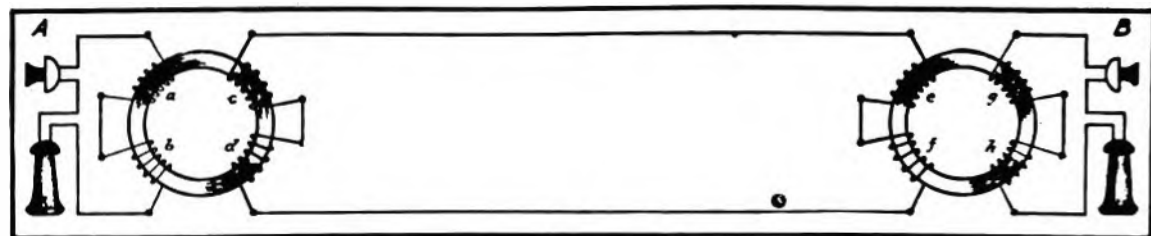


Figure 1.—TELEPHONE LINE WITH REPEATING COILS CONNECTED IN CIRCUIT.

of this arrangement is ordinarily a repeating coil, and the efficiency of a circuit depends to a considerable extent upon the design and construction of this piece of apparatus. The coil used by the largest company engaged in this class of business, which has been developed by a series of careful experiments, and has been for some time in successful use in its present form, consists of an iron core, toroidal in shape, made up of a bundle of small iron wires, around which are wound coils of insulated wire. There are four groups of windings (*a, b, c, d*, Fig. 1) the resistance of windings *a* and *b* being thirty ohms each, while coils *c* and *d* are wound to thirty-five ohms each. In practice terminals of each set of windings are brought out to lugs on the wooden base, upon which the coil is mounted. When connected into a simplex circuit the windings *a* and *b* are connected together as shown, *c* and *d* also having their inner ends joined.

By tracing the effect of certain electrical currents in the repeating coil itself an understanding of many principles which determine the operation of a simplex circuit may be obtained. If an electric current is suddenly caused to circulate through windings *a* and *b* in series it will create a magnetic flux

turns each, then the E. M. F. induced in *c, d* will be one-fifth of the E. M. F. impressed on *a, b* for any change in the intensity of the lines of force. If the windings *a, b* had ten turns each and *c, d* fifty turns the E. M. F. induced would be five times that impressed on *a, b*. If *a, b* had fifty turns each, and *c, d* fifty, the E. M. F. induced in *c, d* would be equal to that impressed on *a, b*.

This is true providing there are no losses in the repeater itself. It would be the ideal equation, but is not strictly true on account of certain losses in the coil which are encountered. The losses in a repeating coil (or transformer) are (a) losses of E. M. F. in overcoming the resistance of the coils; (b) losses of power in the coils and (c) loss of power in the iron core due to hysteresis and eddy currents. From this it follows that the coils must be of as low resistance as possible to keep down the loss of power due to the current passing through the coils so that practically all of the E. M. F. induced in the secondary coil will be available at the terminals of that coil.

The primary and secondary coils must be wound very close together, so that no perceptible portion of the magnetic flux that is forced through the core by the magnetizing current may flow out of the core between the coils, instead of passing through

*Article reprinted from the American Telephone Journal.

the secondary as well as through the primary coil.

It will be seen that when an alternating current is passed through the coils the core is being constantly magnetized in one direction—then demagnetized and remagnetized in the opposite direction, this operation being repeated over and over again at a very rapid rate. This gives rise to what is called a "hysteresis" loss. When a piece of iron is subjected to an alternating increasing and decreasing magnetizing force, the magnetism for equal magnetizing forces will not be the same, and it is found that the magnetism lags behind the magnetizing force, or in other words, the metal has a tendency to maintain any magnetic state which it has once acquired. This property of iron is called "hysteresis" from the Greek word, meaning to "lag behind."

frequency, in order to reproduce a sound of the same pitch as was spoken into the transmitter. Sounds are distinguished in three ways; by loudness, depending on the energy of the vibrations of the air particles adjacent to the ear drum; by pitch, depending on the frequency of the vibration, and by character, the quality which distinguishes between human voices and musical instruments, or between one voice and another. The alternating current passing through the primary winding induces in the secondary an alternating current of a higher or lower tension (depending on the ratio of the two coils), but these alternations must be in perfect harmony with the original sound vibrations. As the current for talking is of very high frequency, it follows that if the iron in the core of the repeating

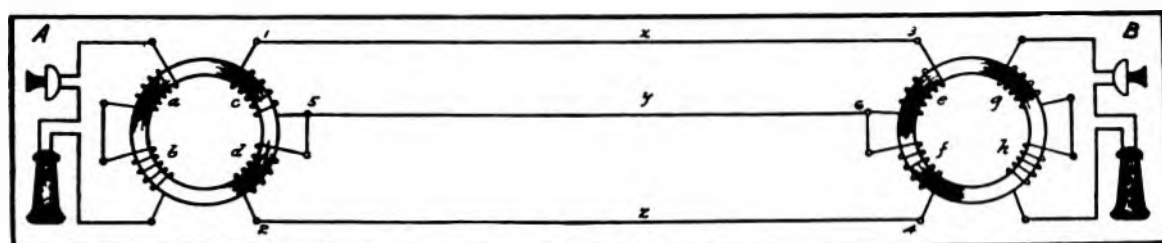


Figure 2.—THEORETICAL ARRANGEMENT OF REPEATING COILS IN TELEPHONE LINES WITH THE NEUTRAL POINTS CONNECTED BY A THIRD WIRE.

The actual change in the magnetic condition of the iron lags behind the state of variation in the magnetizing force, as if there were a certain molecular friction of the iron which had to be overcome. There is, therefore, a certain loss in energy due to hysteresis which is dissipated in the form of heat. The harder the iron the greater the hysteresis loss. This loss varies as the magnetic induction raised to the 1.6 power, and is also proportional to the rate at which the reversals of magnetism take place and, of course, the greater the amount of metal in which the reversals occur, the greater the total hysteresis loss. This loss, due to hysteresis, cannot be accurately determined. For very soft iron the loss of energy during a complete reversal of magnetism is slight; with hard iron the amount of energy wasted per cycle is greater.

In a telephone circuit the frequency of the alternating talking currents is enormously high, being from 300 to 600 vibrations or periods per second. When an alternating current of such high frequency is passed through the primary of the repeating coil it will be seen that the magnetic flux set up in the core by this rapidly varying E. M. F. must be in exact step with it, and induce an E. M. F. in the secondary of exactly the same frequency as that of the inducing current. Suppose we connect a telephone instrument to the primary of the coil and a receiver to the secondary. When speaking in the transmitter the high frequency talking currents passing through the primary must induce an alternating current in the secondary of exactly the same

coil is at all sluggish in its action, due to hysteresis, the transmission will be distorted so that speech will not be heard plainly. The core of a coil with a closed magnetic circuit is more sluggish than one with an open magnetic circuit, and the core composed of a large amount of iron more sluggish than one with a small amount, but a core with an open magnetic circuit would be subject to a large magnetic leakage. Obviously, then, the core to be used in a repeating coil to be adapted for the transmission of speech should have a closed magnetic circuit, and be as small in mass as possible, and made of very soft iron, in order to reduce the magnetic leakage and magnetic lagging of the core flux to prevent any distortion of the sound waves. Such a one is obtained by making the core of small annealed iron wires, and of such volume as will enable it to carry the greatest flux which it will be called upon to carry, without reaching its saturation point.

Figure 1 shows a telephone circuit with two repeating coils introduced. When station A is transmitting speech to B, an alternating current will be set up in a, b and in consequence, as has been indicated, an alternating current of the same frequency will be induced in the windings c, d. This induced current passes over two line wires and then through windings e, f, inducing in turn a current in windings g, h, which passes through B's instrument reproducing sound. When B is talking the action is reversed. It will be seen that the current which passes through B's instrument is not the same one that was set up by A, but an induced current, one

which has undergone two transformations, and it must be exactly the same as the one set up by *A* in frequency and other characteristics in order to reproduce the same sound as that imparted to *A*. In a simple telephone circuit, that is one where the two instruments are connected together only by the two line wires, the currents that are set up by *A* pass over the line wires through *B*, and suffer a loss due to the resistance and reactance of the line wires. When the repeating coils are introduced into the circuit the current still suffers the loss due to the line wires, and also the losses due to the repeating coils on account of the transformation of energy within them. From this then, a telephone circuit with repeaters in it is not as efficient for speaking as one without, and their effect is more pronounced on long lines than short.

There is another consideration to be taken up, and that is signalling on this circuit. This, of course, will have to be done with alternating current on account of the transformations to be undergone in the repeaters. The ordinary ringing generators used in exchanges of to-day are of low frequency, usually from 20 to 30 cycles per second. The hysteresis and eddy current losses in the iron cores of the coils depend a great deal on the frequency of the circuit, as also the magnetic flux. Here, then, the coils are called upon to operate several different frequencies. If they have an efficiency of 95 per cent. for talking, they will not be so high on low frequency and may be only 35 or 40 per cent. efficiency. This is offset to a certain extent, by the strength of the ringing generator current which is very powerful when compared to the talking currents. As transmission of speech is our most important consideration, it has been settled that the coil to be used is one which will transmit the high frequencies very efficiently, a generator of comparatively high voltage being used to ring. The writer has described the action of the repeating coil at some length, as in his experience he has seen several coils placed on a line through which speech could be carried on very well, but it was impossible to ring through the coils. This action could not be accounted for by those concerned. Also, what has been said concerning the coils will be frequently referred to later when taking up phantom circuits and superimposed currents.

If one connects up the repeating coils at their centers with a third wire, as shown in Figure 2, this arrangement will have a certain effect on the talking current. Assuming that *a*, *b*, *g* and *h* each have 1,000 turns of wire, and *c*, *d*, *e*, *f* each have 2,000 turns, if an alternating E. M. F. of 100 volts is impressed on *a* and *b* there will be an E. M. F. of 100 volts induced in each winding of *c*, *d*. As these are connected together in series and both windings wound in the same direction, a total voltage of 200 volts will be induced across points 1 and 2. At a given instant then, this current starting at point 1, will pass over wire *x*, to point 3, through coils *e*, *f*, to point 4 over wire *z*, back to point 2. This current, passing through windings *e*, *f*, induces a current in *g*, *h*. Assuming for the sake of

simplicity that there is no line loss the E. M. F. of the current passing through *e*, *f*, will be 200 volts. As *e*, *f* each have 2,000 turns and *g*, *h* each have 1,000, the E. M. F. induced in *g*, *h* will be 100 volts or the same as that impressed on *a*, *b*. Here then we have transformed the E. M. F. from 100 to 200 volts and again from 200 to 100 volts.

In the first case we have stepped up and in the second stepped down the voltage. This is done to give a higher pressure on the line wires to transmit the current without such a great loss in power. Point 5 will therefore be at positive-negative potential, minus for the 100 volts induced in winding *c*, and plus for the 100 volts induced in winding *d*. In other words, point 5 will be at neutral potential as will likewise point 6, consequently there can be no difference of potential between points 5 and 6, and no current will flow over wire *y*, but will flow over wires *x* and *z* as indicated by the arrows. The current would tend to flow in both directions in wire *y*, and as the two divisions are equal they neutralize each other. Therefore, it makes no difference whether the repeating coils are connected together at their centers by a third wire or not as far as the telephone circuit is concerned.

(To be continued.)

A Timely Study of Wireless Telegraphy.

There has been a steady demand for operators in the wireless telegraph service, as that system has extended its operations, until to-day hundreds who were formerly employed as Morse operators are now occupying lucrative positions in the wireless field, at seaside, or on steamer, stations. The rapid increase in the number of wireless stations both on land and sea makes it evident that a very much larger field of employment, and at good pay, in the immediate future is opening up to the telegraph operator who will adapt himself to the newer method of radio-telegraphing. Operators everywhere are earnestly investigating this branch of the telegraph, since as its vast opportunities to benefit the individual become more apparent with the development of the system now progressing so rapidly.

A good text book on wireless telegraphy is the first need of any who contemplate the study of that system. The sale of such works has increased enormously of late, clearly indicating the development of a widespread desire for knowledge on the subject.

For the convenience of our readers we have prepared and published in our catalogue, together with prices, a carefully selected list of standard books treating on wireless telegraphy. These volumes, which include the most up-to-date works upon the subject, furnish the best information obtainable, the kind giving the most efficient aid and direction to the student. Orders for the books enumerated, or indeed for any others that may be required, which must be accompanied by the cash, will be filled on the day of their receipt, and sent with all the carrying charges prepaid. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Annual Report of American Telephone and Telegraph Company.

The annual report of the American Telephone and Telegraph Company for the year ended December 31, made public March 12, shows gross earnings of \$137,112,700 for all of the associated operating companies in the United States, not including the American Telephone and Telegraph Company, an increase of \$9,995,000 over the previous year, and net earnings, after the payment of expenses of operation, maintenance, and depreciation and taxes of \$37,952,800, against \$35,655,600 in the previous year. The balance available for dividends was \$30,898,900, an increase of \$2,217,000, and dividends paid totaled \$22,609,900, leaving undivided profits of \$8,289,000. The earnings and expense account of the American Telephone and Telegraph Company itself, the holding company of the Bell system, shows an income of \$32,761,341, against \$27,898,970 in 1908. Of this the principal contributory item was the dividends received from its stock holdings, amounting to \$15,949,213.

Next in importance was the item of interest and other revenue from the associated companies, which amounted to \$10,661,431. Telephone traffic netted \$4,360,104.

The payment of expenses of \$2,570,575 left net earnings of \$30,190,765, against \$25,895,013 last year. Interest payment left a balance of \$23,095,388, out of which dividends totaling \$17,036,275 were paid. Of the balance after the payment of dividends, \$3,000,000 was carried to reserves and \$3,050,112 carried to surplus. In his annual report President Vail says that the gross revenue collected from the public for telephone service by the Bell system, not including the connected independent companies, was \$150,000,000, an increase of nearly \$12,000,000, and \$45,000,000, or nearly one-third of the whole, was appropriated for current repairs, maintenance, and depreciation. The surplus available for charges and so forth was \$48,400,000, of which \$24,000,000 was paid in dividends. The net obligations in the hands of the public were \$524,000,000, while the companies' property amounted to \$612,600,000, an excess of \$88,600,000, or seventeen per cent., of property above liabilities, without any account being taken of franchises, contracts, patents, rights of way of great value, and which would now be difficult to obtain at any price.

The report shows that the number of telephone stations in the Bell system was increased to more than 5,000,000, including 1,500,000 operated by connecting companies; the wire mileage increased to more than 10,000,000 miles, the traffic to over 20,000,000 connections a day, or 6,500,000,000 connections a year.

The acquisition of about twenty-eight per cent. of the stock of the Western Union Telegraph Company, which President Vail calls "a substantial interest," is indicated in the statement of assets which on December 31 were \$494,089,806, against \$440,932,821 in 1908.

President Vail devotes considerable space in

the report to an explanation of the company's policy in buying into the Western Union Company. His statement put briefly is that the two services are supplemental or auxiliary to one another rather than competitive. His argument on this point is that telegraphy is incomplete because the methods of collection and delivery are slow and primitive, and that telephony, while instantaneous in its connection of the sender and receiver, is too expensive for correspondence. On the combination of the two services he says:

"Line construction and maintenance are common to both the telephone and the telegraph, and can be combined or performed jointly with economy. The same wires may be used for both telephone and telegraph circuits and at the same time. The differentiation between telephone and telegraph construction and operation begins with the stringing of the wires.

"Where there is density of message traffic sufficient to keep busy an expert telegraph operator, the telephone cannot be used in competition with the telegraph in the handling of message traffic, but at some point of less density of traffic the telephone will gradually supersede the telegraph in handling message traffic.

"The elementary difference in the scope and operation of the telephone and the telegraph in the handling of telegraph traffic indicate that each will occupy a distinct and well-defined field.

"The Western Union telegraph lines reach over 22,000 smaller cities and towns and villages, at most of which the commercial telegraph traffic would not of itself support a telegraph office. This business is now being performed necessarily under some joint arrangement, for the greater part with the railroad companies. While these arrangements will be continued, a greatly extended and improved service will be given in connection with the Bell system with over 5,000,000 stations located in 50,000 cities and towns."

Other advantages to the public will follow the recent night letter rates, President Vail believes, but he indicates that it will not be manifest in any immediate reduction of rates. He says on this point:

"Before any change can be made in the existing rates for existing service it will be necessary to await the result of studies now being made, as it is claimed that the irreducible cost of handling is so near the revenue received for each commercial message that no reduction in rates would be justified by any probable increase in business.

"Improvement and extension of existing service and introduction of new classes of service will be the first effort of all interested. The first of these will be the introduction of the 'Night Letter,' and others will follow.

"The benefits and advantages from this complementary operation will come, but not all at once. Careful study and consideration are being given to all questions for all interested. The necessary safeguards for the protection of the company and the public will have to be worked out."



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The Railroad.

It is reported that plans are being made to equip several sections of the Lake Erie and Western Railway with telephone train despatching circuits, in the near future.

Mr. Lewis W. Landman who was recently appointed general passenger agent for the Lake Erie and Western Railway, began his railroad career in 1886 at Danville, Ill. as telegraph operator and station agent.

The eighth meeting of the International Railway Congress will be held at Berne, Switzerland, July 3 to 16. It is expected that about seventy-five American railway officials will be in attendance.

A patent No. 950,004 for railway telephone signaling apparatus has been granted to August A. Monson of North St. Paul, Minn. A selector is provided having two relays, one of high impedance and one of low impedance, and connections are made so that the action of a second local circuit is not completed until the line relay has permanently closed at the end of an interval.

The Pennsylvania Railroad has undertaken forestry work upon the most comprehensive scale of any railroad corporation. Since they first began this work in 1902, they have planted 3,482,186 trees, 1,054,010 being planted in 1909. They have also, during the past year established a large pressure timber treating plant at Mount Union, Pa., and a smaller experimental non-pressure plant at Greenwich Point, Philadelphia.

Mr. Charles T. Day, whose appointment as assistant superintendent of telegraph of the Sonora Railway and Southern Pacific Lines in Mexico with headquarters at Empalme, Sonora, Mexico was announced in our March 1 issue, was born in New York and first entered the telegraph service with the United States Telegraph Company in that city in 1865. He later served as division chief operator in the Chicago office of the Western Union Telegraph Company. For several years past he has been chief electrician in the telegraph department of the Southern Pacific Railway at San Francisco.

Arrangements are now well under way for the twenty-ninth annual meeting of the Association of Railway Telegraph Superintendents which will occur at Los Angeles, May 16 to 20. The plans already arranged give the assurance that the visiting ladies will be well entertained. As now outlined the arrangements call for two full days and two half days of the time to be given over to business sessions. This ought to provide ample time in which to discuss the many important questions which will come before the convention. The headquarters of the gathering will be at the Hotel Alexandria. The entertainment committee of the Association and a committee from the recently formed Railway Telegraph and Telephone Appliance Association which is composed of associate members of the former organization met in Chicago, March 12 to outline the program for the convention.

William S. Wood, assistant superintendent of telegraph of the Rock Island Railroad, died at Chicago, March 3, aged thirty-seven years.

S. B. Grimshaw, formerly superintendent of telegraph of the Denver and Rio Grande Railroad and later connected with the Santa Fé Central Railway, died at Santa Fé, N. M., February 27.

Mr. W. H. Hall, assistant superintendent of telegraph, of the Missouri, Kansas and Texas Railroad, has been advanced to the position of superintendent of telegraph with headquarters at Denison, Tex., vice Mr. S. K. Bullard, who has resigned on account of ill health.

At a meeting of the Omaha Railway Club held March 9, Mr. J. B. Sheldon, superintendent of telegraph of the Union Pacific, read a paper on "Despatching Trains by Telephone." He was followed by Dr. Frederick H. Milliner, experimental electrician of the Union Pacific, who spoke of the "Possibilities of Handling Railway Trains by Wireless Telegraphy." This is a subject to which Dr. Milliner has been giving his attention for some time.

The Santa Fé System has extended the use of the telephone for train despatching over its road from Denver to Pueblo, Colorado. There are about forty telephone stations along the 120 miles of single track between Denver and Pueblo. There are in the neighborhood of twenty-five to thirty trains a day over this division, and in the handling of these trains there are approximately seventy-five regular meeting points. It is estimated that the installation of telephones on this division will enable the dispatchers to handle the same amount of work as previously in about sixty per cent of the time.

The following telephone despatching circuits have been authorized to be installed at once on the Canadian Pacific Railway: Chalk River to Cartier, Ont., 2432 miles; Sudbury to Muskoka, Ont., 129 miles; Sudbury to Sault-Ste-Marie, Ont., 183 miles; Cartier to White River, Ont., 269 miles; Brandon, Man. to Broadview, Sask., 132 miles; Broadview to Moosejaw, Sask., 135 miles; Moosejaw to Swift Current, Sask., 111 miles.

The following circuits have already been installed and are in good working order: Montreal, Que. to Newport, Vt., 114 miles; White River to Fort William, Ont., 251 miles; Winnipeg to Brandon, Man., 133 miles; Swift Current Sask. to Medicine Hat, Alta., 147 miles. This will make a total of 1,836 miles of telephone despatching circuits on single track road which will be in operation in a few months. The circuits authorized will complete the equipment of the main line from Chalk River, Ont. to Medicine Hat, Alta., a distance of 1,829 miles with the exception of 419 miles between Fort William and Winnipeg which is double track; besides this the equipment of the branches to Muskoka and Sault-Ste-Marie is provided for in addition to the branch from Montreal to Newport already equipped.

Stock Quotation Telegraph Company in New Quarters.

The new home of the Stock Quotation Telegraph Company, at 26 Beaver Street, New York, has been completed and that company is now installed in its new quarters. The building is nineteen stories high and of the most modern fire proof construction. Each floor has an area of over 2,200 square feet. The executive offices are located on the seventh floor, the electrical equipment on the fourth floor and the telegraph

for negative pulses. The third dynamo is held in reserve and is so arranged that it may be thrown in to replace one of the others at a moment's notice. The motor generator sets are all controlled from the switchboard shown in the left of Figure 1. This switchboard is made of black enameled slate finely finished and it contains the most up-to-date apparatus for the safe and convenient control and operation of the power plant.

The tape ticker switchboard is shown on the



Figure 1.—POWER EQUIPMENT STOCK QUOTATION TELEGRAPH COMPANY, NEW YORK.

department shares the third floor with the New York News Bureau. The machine shop in which all the instruments used in the stock quotation telegraph system are made, occupies the nineteenth floor, probably the most lofty location of any machine shop in the world, at least of any so extensive as this one.

The electrical equipment is all new and of the latest improved type. The dynamos used for operating the stock tickers and page printing machines are all motor driven, the current supply for the motors being obtained from the New York Edison Company. Three of the dynamos operate normally at 150 volts and the other three at 220 volts. For running the tickers and page printers, one dynamo at each voltage is used for supplying positive pulses and one

right of Figure 2 and has sixty-five circuits in operation. The page printer switchboard shown on the left of the picture has forty-two circuits working at present. The maximum number of instruments which can be operated on a circuit is about twenty-five. The transmitting machines are shown mounted on the table in the center of Figure 2 and these are installed in duplicate.

The wire system comprises five one-hundred wire cables entering the building and ending at the terminal frame seen in the center of the illustration directly behind the power equipment in Figure 1. The wires are all fused at this point and carried from there in ducts provided in the floor to the switchboards shown in Figure 2. These ducts, it will be noted have removeable covers so that all wiring while it is concealed

and out of the way is still convenient of access for inspection.

The plant was designed and its installation was supervised by Mr. George S. Hiltz, electrician of the Stock Quotation Telegraph Company. It is safe to say that it is the largest and most up-to-date installation in the world, of apparatus for distributing stock quotations and general news by wire to hundreds of points at the same instant.

which will be continued on to Vancouver through a new three-core cable. This new cable is now under course of manufacture and will be laid about June next between Vancouver and Nanaimo. This provides an alternate cable connecting the main land with Vancouver Island, and was found necessary on account of the increased traffic on the Island. New wires may also be strung between Amherst and Truro, N. S.; Montreal, Que. and Ottawa, Ont.; Stanbridge and



Figure 2.—TAPE TICKER AND PAGE PRINTER SWITCHBOARDS.
STOCK QUOTATION TELEGRAPH COMPANY, NEW YORK.

Canadian Pacific Notes.

Mr. E. A. Patterson, cashier of the Vancouver, B. C., office of the Canadian Pacific Railway's Telegraph, who has been acting as manager since the death of M. T. Quigley last October has been appointed manager of the office.

In addition to the new telephone train despatching circuits to be installed this year, a 210 pound copper wire will be strung from Montreal to Vancouver. This wire will be used entirely for the trans-American traffic of the British Pacific Cable. It will be operated with the Wheatstone Automatic system duplexed. It is expected that only one relay office will be necessary between Montreal and the Pacific cable.

An additional copper wire will be strung between Cranbrook and Sirdar, B. C.; also two iron wires between Nanaimo and Victoria, B. C.

St. Guillaume, Que.; and Farnham and Drummondville, Que. In addition to the new construction there will be a large amount of rebuilding and general repairs requiring the employment of about 400 men during the summer.

No money was found in the pockets of a man frozen to death recently in Illinois. Consequently it was decided that he was a telegrapher.

Only a few years ago a large number of telegraph registers were in service on the Philadelphia and Reading Railroad and the great majority of the operators used them in recording all messages sent over the wires. It is stated that there are now but three such devices in operation. These are located at St. Peters, Keffer's and Centreville, Pa.

The Telephone.

The Commercial Union Telephone Company of Troy, N. Y., has absorbed four other independent telephone companies operating at Rensselaer, Saratoga Springs, Troy and Watervliet.

Mr. H. E. Milton, superintendent of the Paris, France, telephone system and Mr. Albert Thomas, chief engineer, arrived in New York, March 6, coming here for the purpose of making a study of the telephone equipment in this country.

According to the report of the telephone commissioners of the province of Manitoba for the year ending December 31, 1909, the telephone system in that province which is owned by the government now has 25,300 subscribers; an increase of 5,000 during the past year. Of the total number about 7,000 are farmers. Over 12,000 of the subscribers are in the city of Winnipeg and the additions contemplated in that city will provide for over 40,000 lines.

At the annual meeting of the stockholders of the New York Telephone Company February 25, Mr. Union N. Bethell was elected president and Mr. Theodore N. Vail was made chairman of the board of directors. Seven new directors were elected to replace those who formerly represented the stock holdings of the Western Union Telegraph Company which were sold by that company last fall. The new members of the directorate are: W. D. Sargent, Brooklyn; ex-Governor Griggs, Paterson, N. J.; James H. Manning, Albany, N. Y.; John F. Maynard, Utica, N. Y.; Benjamin L. Chase, Rochester, N. Y., and Henry M. Watson, Buffalo, N. Y.

At a recent meeting of the French Academy of Science it was suggested that it would be advantageous to employ the principles of wireless telephony to long distance transmission over wires. The chief difficulty at the present time in long distance telephony is due to the distortion of the higher harmonics composing the current wave. If regularly maintained waves of a single well-defined frequency such as are produced by a singing arc or a high frequency alternator, were sent over the wire, there being only one frequency the voice would no longer be distorted. This proposition is only theoretical however, and so far as is known no attempt has been made to put it in practice.

A German inventor is conducting extensive experiments and believes he has discovered a practical system of duplex telephony. The current is supplied by a high frequency alternator and the telephone sets are so arranged that one-half wave goes through one set and the other half wave through the other set. This is accomplished by means of an electrolytic or other form of rectifier placed in series with the instruments and thus acting as an electric valve. The telephone current of one set is superimposed upon one-half wave and that of the other set upon the other half wave. The inventor believes that the same principle can be applied to multiplex telegraphy.

Mr. W. T. Gentry, a well known old time telegrapher, but who has been connected with the Southern Bell Telephone Company for the past twenty-seven years, the past two years as president, has been re-elected to that position.

Mr. F. L. Gilman, of New York, has been elected general manager of the Missouri and Kansas Telephone Company, with headquarters at Kansas City. Mr. Sherman R. Hall, formerly general manager of that company has been made vice-president.

It is said that three Danish engineers have invented a device whereby telegraphic apparatus is used in connection with a telephone so that a subscriber, if he does not find the person called at home, can transmit his message written in ordinary letters by a typewriter transmitter.

The independent telephone plant at Rome, N. Y., was sold, March 10, by the Cleveland Trust Company on a mortgage foreclosure to the Utica Home Telephone Company for \$40,000. Control of the latter company was secured recently by the Continental Telephone and Telegraph Company.

The Chicago Telephone Company is making preparations to erect a new fifteen or sixteen story building, covering an area of eighty by ninety feet. Provisions will be made for increasing the height to twenty-two stories later. The cost of the new building will be about \$1,000,000. This company is now erecting a new seven story exchange building in which will be installed switchboards having a capacity of 30,000 lines.

Several bills have been introduced in the Ohio Legislature affecting the telephone companies. One of these, the Billingslea measure, would, if adopted, compel competing telephone companies to connect their lines in order to afford through service without actually merging the business. This is opposed by independent interests as they claim it would destroy competition. Another measure, known as the Elson bill would give competing companies the right to merge and suspends the operation of the anti-trust law so far as they are concerned.

Mr. Frank A. Davis, president of the United States Telephone Company, Cleveland, which was acquired last fall by J. P. Morgan and Company, has been authorized to reduce or adjust the toll rates of his company as he deems best. It is thought in some quarters that this will result in a telephone rate war in Ohio between the Morgan companies and the American Telephone and Telegraph Company. As the rates of the United States Company are higher in many cases than those of the latter company it is considered probable that the only action taken at present, at least by Mr. Davis, will be to lower the rates of his company so as to put them on a par with those of the American Telephone and Telegraph Company.

From the follies of youth usually spring many of life's after sorrows.

Radio-Telegraphy.

The United Wireless Telegraph Company has recently equipped several vessels on the Great Lakes with wireless apparatus.

A wireless station having a range of five hundred kilometers has been installed by the Austrian government at Pola.

The Chilean government is considering the establishment of a school of instruction in wireless telegraphy in order to train operators for wireless service in their navy.

A course of instruction in wireless telegraphy is being given at the Massachusetts Institute of Technology. The object of the course is to give students a practical knowledge of the workings of wireless telegraphy in all its branches.

The Chinese government has opened a wireless telegraph station at Shanghai which is restricted to messages in the English language. As this is contrary to the radio-telegraphic convention it will be possible to handle only local business.

It is stated that the Venezuelan government has decided, in conjunction with a coastwise navigation company, to establish wireless stations at three points along the coast and on board one of the vessels of the company.

Representative O'Connell of Massachusetts has introduced a bill in Congress requiring all government vessels which go out of sight of land; including tugs, barges, colliers, revenue cutters and similar craft to be equipped with wireless telegraph apparatus.

A patent, No. 949,518, for space telegraphy, has been granted to S. Cabot of Brookline, Mass. An open magnetic circuit transformer has its primary connected with a source of alternating-current and a secondary connected with a condenser circuit of the transmitting aerial.

The ordinary secondary voltage used in most wireless systems averages from 25,000 to 30,000 volts. In the Marconi system it may run up to 40,000 or 50,000 volts though 30,000 is more common. The new Telefunken "singing spark" system uses only 3,000 to 4,000 volts. Paper condensers are used in this system.

It is claimed that a new record for long distance overland transmission of a wireless message was made February 28 when the New York World sent a message to the Milwaukee Sentinel a distance of over 1,000 miles. The message was sent from a new station recently opened by the De Forest Radio Company in the tower of the Metropolitan building.

The United Wireless Telegraph Company has issued a descriptive folder, giving a list of the stations which have been established by them both on land and on shipboard. The folder contains a map showing the location of the shore stations. They now have 102 offices and land stations, and 262 stations on shipboard.

A patent, No. 950,258, for an electric connection for multiple wireless telegraphy has been

secured by S. Eisenstein of Kiew, Russia. An aerial conductor with a number of branches each connected at certain times to the anodal point of the vibration tension of the vibration circuit.

The North Atlantic Wireless Telegraph and Telephone Company has been incorporated at Portland, Me., with a capital stock of \$500,000 by H. M. Fairbanks and H. T. Waterhouse of that city, and N. Clifford, of Cape Elizabeth, Maine. The company proposes to operate a wireless telephone system.

The British Post Office Department now has thirteen wireless stations in Great Britain open for commercial use. Most of these are open both day and night and exchange messages regularly with ships from fifty to two hundred and fifty miles at sea, though this range is greatly increased at times when conditions of operation are favorable.

In an article by Mr. Paul Schwarzhaupt in a recent number of a German publication which has been digested by the Electrical World the author gives the results of extensive observations which he has made, from which, like other investigators upon this subject, he concludes that the ether has not always the same conductivity for electric waves, but that the conductivity changes at different hours of the day. The greater the radiation from the sun, the less the conductivity of the ether for electric waves. The fact that most atmospheric disturbances occur during the night is due to the greater conductivity of the ether, which conveys to us the oscillations from distant thunderstorms which would not be heard during the day. For the same reason wireless telegrams are transmitted during the night over a greater distance than during the day. It is really impossible to speak of the maximum limit to which a wireless telegraph station of a given design can transmit messages. A station of one and the same design may transmit messages very well in the Northern climate and be much less effective in tropical countries on account of the higher radiation from the sun in those regions.

At the regular monthly meeting of the Wireless Institute of New York, held March 2, Mr. Harold Veamans read a paper upon "Wireless Legislation and the Status of the Individual Operator," in which he contended that no legislation by Congress could be enforced in such a way as to affect the amateur wireless operator, who is not regularly engaged in transmitting messages from one state to another. In his opinion only state laws can affect such amateurs and he believed that the best results could be attained by the appointment of a commission to deal with wireless communication having powers similar to those of the Public Service Commission. Mr. L. R. Gleason spoke of the regulations imposed upon amateur operators in England, whereby interference is reduced to a minimum and said that these restrictions are not considered burdensome in that country.

Obituary.

Frank M. Jackson, manager of the Saranac Lake, N. Y., office of the Postal Telegraph-Cable Company, died February 20, aged fifty-three years.

Andrew O. Heydlauff, manager for the Western Union Telegraph Company at Lowell, Mich, for the past twenty-one years, died February 20, aged fifty-five years.

L. W. Caldwell, for thirty years editor and owner of a Warrenton, Va., publication, died February 27. Mr. Caldwell was one of the two original operators who despatched the first message over the Western Union Telegraph, then the Morse Telegraph Company's line between Warrenton and Richmond.

Smith Robertson, an old time telegrapher died at Minneapolis, March 2, aged ninety-five years. Mr. Robertson was born at Ithaca, N. Y. in 1815 and was associated with Ezra Cornell, Orrin S. Wood and other pioneers in the development of the telegraph in its earliest days. He was agent for the Cornell University land and had charge of its distribution. Mr. Robertson was one of the oldest members of the Telegraphers' Mutual Benefit Association, holding certificate No. 201 issued on December 23, 1867.

Charles H. Schermerhorn, an old time telegrapher, died March 1st at his home in Plainfield, N. J. aged seventy-seven years. Mr. Schermerhorn at the age of seventeen became an operator at New Hope, Penn. He was afterward the operator at the Barnum Museum, New York, and was next made manager of the Brooklyn office. He later served as manager for the Western Union Telegraph Company and the Central Railroad of New Jersey at Plainfield, serving in that capacity for forty years until his retirement from active service on a pension about two years ago.

Reason for Scarcity of Operators in Canada.

The principal reason for the present scarcity of operators in Canada, is the extraordinary development of the country. The Canadian Pacific Railway Company is operating through Canada from coast to coast with a net-work of branch lines, which are being increased and extended by hundreds of miles each year, particularly in Western Canada, and the Grand Trunk Pacific and Canadian Northern Railways, each building transcontinental lines with branches, creates extraordinary demands for the service of telegraphers both for railway and commercial work. Western Canada is simply being gridironed with railways, and only a commencement has been made in developing the various resources of this vast territory. There appears to be a general feeling in the United States that the climate in Western Canada is very severe and the conditions of living otherwise hard, yet there are many American operators who are employed in Western Canada and are satisfied and are doing well. There are also thousands of farmers

from the United States who come into the country year after year and who find the conditions satisfactory, so much so that there is an annual increase in immigration from the United States. This can only be due to the favorable reports sent by Americans who have been in Canada for some time. The climate is undoubtedly superior to that of many parts of the United States and the conditions of living are not otherwise more severe, while in a new and developing country there are many opportunities offered to thrifty operators to make more money. The Canadian West is certainly the young man's country, and the right place for men in good health who are willing to struggle along.

The Telepost.

The Telepost Company now has offices in active operation in the west at the following places: Sedalia, Mo., St. Louis, Terre Haute, Ind., Indianapolis, Springfield, Il. and Chicago.

These cities are connected by lines partly leased from independent telephone companies and partly built by the Telepost. Extensions, it is said, will be made to other large cities in the west.

This company sends a fifty word message for twenty-five cents between any two offices connected by its wires, provided the message may be delivered through the post office. This form of service is rendered at any time of the day or night.

An ordinance was recently granted by the Aldermen of Boston giving the Telepost the right to lay conduits in certain streets of that city. The passing of this ordinance was the last act of the Board of Aldermen of the Hibbard administration, and its signing was the last official act of Mayor Hibbard. With the passing of that administration all control of streets and wires was taken from the Aldermen and transferred to a Commission.

Every Telegrapher should have a savings account.

It is his best friend in time of sickness or necessity. If continued it is the highway to independence or the stepping stone, through opportunity, to success. The Serial Building Loan and Savings Institution, 195 Broadway, New York was organized for the especial purpose of assisting telegraphers to save money systematically and has always been conducted with that aim in view. Let them tell you how you can start a savings account.

Leg Pattern \$2.50
Legless Pattern 4.00
F.O.B. Columbia, Pa.



THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,
Columbia, Pa. R. F. D. No. 1

Telegraph and Telephone Age

No. 7.

NEW YORK, APRIL 1, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Practical Part of One's Electrical Education Given Along with Theory and Technique.

Now that official instructions in the art of telegraphy for beginners has proved so satisfactory in New York and elsewhere, there is at present strong indication that the next step will be the inauguration of a similar school wherein practical experience may also be added to that of the technical part of the students' electrical education.

Such knowledge would obviously be alike advantageous to both student and the telegraph company as it would eliminate to a great extent many possible delays due to the faltering and uncertain manner of handling working circuits on the part of those lacking practical experience although otherwise well informed.

The practical experience could be obtained in the Instruction Department, wherein idle or specially assigned multiplex and other apparatus would be available for experimental purposes. In this apparatus the different "troubles" to which it is subjected may be artificially created and explained for the benefit of the student. The experience he would thus gain in hunting for such troubles, as well as in being able to learn the actual location of each fuse, lamp resistance, and other parts of the apparatus would enable a new appointee to take hold with confidence of a working circuit in actual use.

A graduate from a school of this kind should be able to measure the current in multiplex apparatus, test lopsided and crossed relays, and adjust pole-changers and other apparatus in a satisfactory manner and by the most approved methods. Furthermore, such a school will not only stimulate ambition, but it will create a much needed supply of available material from which the company could draw when in need of new recruits.

As an illustration of what might happen through lack of actual practical experience to a new appointee who may otherwise be well informed let us take a simple case which is liable to occur almost any day in every large office.

Assume that an operator on the neutral or "B" side of a quadruplex circuit in the telegraph office where the system requires two differently wound sounders, reports that his receiving sounder fails to respond to the relay armature manipulations. The newly fledged chief with the technical education only may smile confidently and remark to himself, "Oh, that's easily remedied; merely a fuse burned out." He then gropes blindly about the table for the fuse and finally removes the first one he stumbles upon, but, strange to say, he only succeeds in opening a couple of other local circuits. Finding that fuse evidently all right upon examination he replaces it, and, with a little less confidence, begins to suspect that perhaps the fuse on the polar or "A" side of the table supplies both receiving instruments. The removal of that fuse, of course, results in stopping business on the "A" side also. He then returns to the "B" side of the circuit and after a somewhat prolonged search succeeds in finding a third fuse in a remote corner of the woodwork. Hopefully he removes this last find, only to discover that it also has no connection with the trouble, and still the offending sounder refuses to work. Nevertheless, to be doubly sure he inserts a new fuse, with, of course, no beneficial results. After further futile efforts he finally gives up in despair and sends for the expert. In the meantime business has been suspended all around. The expert, noticing that the receiving sounder remains constantly closed, while the lever of the neutral relay is active, knows instantly that the local circuit, containing the coils of the repeating sounder, is open, and immediately proceeds to the adjoining table and removes the defective fuse and replaces it with a good one, when instantly the receiving sounder begins to operate.

Now, the lesson to be learned from this is that in the absence of official blueprints or practical instructions showing the exact location and assignment of each fuse, there is no reason why a new chief operator should even suspect that the local battery arrangement for repeating sounders

is different from that of the other quadruplex local apparatus, as is true in certain systems, hence he cannot know until considerable delay follows his investigation, that the highly wound repeating sounders are arranged in multiple and fed by the same current that supplies the sounders for relays on single line circuits, and consequently require two fuses each—one for each polarity of the battery. Neither can he, without a proper guide, or prior experience, determine, except by trial, the normal location of the particular fuse belonging to a given set of instruments.

This illustration, of course, represents a very elementary, but nevertheless numerous, class of troubles which arise daily. The great benefit that all concerned would derive by a systematic method of instruction would be in the saving of time through the promptness with which chief operators would be able to locate and eliminate the many perplexing causes of multiplex interruptions without calling for expert assistance.

One object lesson of this kind, thoroughly explained at leisure in this school, would be more instructive and convincing than a dozen hasty experiments on a regular circuit where the source of a temporary interruption cannot always be verified, possibly for want of co-operation at the distant end, and the conclusion arrived at is frequently a matter of doubt.

Recent Telegraph and Telephone Patents.

A patent, No. 950,473, for a telegraph bulletin printer, has been secured by George L. Campbell and Harry G. Davis, of Williamsport, Pa. The selector contacts are electrically connected with the contacts of a sunflower controller, etc.

A patent, No. 950,799, for telephone apparatus, has been taken out by David H. Wilson, of Chicago, Ill.

A patent, No. 950,809, for a telephone desk-set, has been issued to Burton W. Sweet, of Cleveland, Ohio.

A patent, No. 950,896, for a telephone system, has been granted to William W. Dean, of Chicago, Ill.

A patent, No. 951,190, for a telegraph arm, has been awarded to Maurice Lachman, of New York. Pins are electrically welded to the internal face of one flange of a channel iron and project through holes in the other flange.

A patent, No. 951,319, for an adjustable telephone support, has been secured by Robert Krum and Henry Weingartner, of Lawrence, Kans.

A patent, No. 951,527, for telephony has been taken out by Reuben C. M. Hastings and Thurston Matheny, of Athens, Ohio.

A patent, No. 951,558, for a telephone system, has been awarded to Samuel H. Couch of Boston, Mass.

A patent, No. 951,623, for a relay for telephone lines has been secured by A. E. Stevens of Fall River, Mass.

A patent, No. 951,695, for telephonic apparatus, has been granted to Pedro M. Oliver of Barcelona, Spain.

A patent, No. 951,864, for a telephone transmitter, has been taken out by W. Whitten of Schenectady, N. Y.

A patent, No. 951,918 for a cordless jack box, has been issued to H. O. Rugh of Sandwich, Ill.

A patent, No. 952,104, for apparatus for telephone lines has been granted to C. D. Enochs of La Crosse, Wis.

A patent, No. 952,267, for a telephone exchange system has been secured by R. H. Manson of Elyria, Ohio.

The following patents have expired:

Patent No. 492,789, for a speaking telegraph, held by Thomas A. Edison of Menlo Park, N. J.

Patent No. 493,253, for a signaling telegraph, held by Wm. E. Decrow of Boston, Mass.

Patent No. 493,620, for a telegraph relay, held by Samuel P. Freir of East Orange, N. J.

For State Control of Telegraph and Telephone Companies.

The legislative committee in New York State, which has been investigating the conduct of the telegraph and telephone companies for the past four months, with the idea of deciding whether these interests should be placed under the jurisdiction of the Public Service Commission, has completed its labors and presented its report to the Legislature. In the opinion of all of the members of the committee the authority of the Public Service Commission should be extended to cover these two public utilities. The committee reports in part as follows:

"The State is already committed to the policy of controlling and regulating public service corporations. If the power of supervision is extended to the entire system and finances of a corporation operating in this State and throughout the United States, the commission would be required to have a system of inspection extending beyond the boundaries of New York State. Without such power a commission representing this State cannot pass upon issues of capital stock securities, the proceeds from the sale of which are to be used in the development of properties beyond the borders of this State. The committee believes that the commission should have power to regulate rates and services, and the merger of telephone and telegraph companies within this State, and the issue of capital stock securities, the proceeds from the sale of which are to be used in extensions and betterments to property in this State.

"The general tangible property operated by telephone and telegraph companies, and of the devices employed by them in carrying on their business, the relation of the business to the principal business centres, the necessity for complete systems of intercommunication between the various places of importance renders impracticable the division of the State into districts so far as concerns the regulation of these corporations. The division of responsibility for such regulation between two commissions, as is properly done in regard to other public service corporations, seems as to these corporations impracticable and unwise.

"Your committee recommends the passing of a law which will give to one of the existing Public Service Commissions of this State jurisdiction over and supervision of telegraph and telephone companies, and telephone and telegraph lines,

rates, service, and finances; and in view of the fact that the location of the office of the Public Service Commission of the Second District is in Albany, the State capital, and in view of the fact that this point is nearer the geographic and commercial centre of the State, your committee recommends that such jurisdiction and supervision be given to the Public Service Commission of the Second District. A further reason for giving such control to the Public Service Commission of the Second District is that it will be more economical in that there will be needed in that office only one bureau of telegraphs and telephones, and only one corps of inspectors, engineers, and statisticians looking after the detail of this work.

The committee recommends also that the law provide that the Second District Commission receive authority to hold public hearings in any part of the State, and that it be authorized, in its discretion, to maintain a branch office in any city of the first or second class.

It is further recommended by the committee that "there be exempted from the jurisdiction of the committee of all companies, associations, joint stock companies, partnerships and individuals which are not conducted or organized for the purpose of conducting the business for profit, and that the commission shall be given power in its discretion to exempt any other company, partnership, or individual engaged in the telephone or telegraph business from the necessity of reporting to the commission."

Speaking of the opposition telephone business, the committee says that several companies have sprung up throughout the State, held together by a contract which prohibits the interchange of business with the Bell Company without the consent of the other parties to the contract. These companies are called independent corporations, and claim to be doing business in opposition to a monopoly, but the committee declares it is clear that the parties back of these companies are seeking to build up one monopoly to take the place of another.

The members of the committee are Senators George A. Davis, John Kissel, and James J. Frawley, and Assemblymen E. A. Merritt, Jr., John R. Yale, Thomas B. Coughlin, J. Henry Walters, and Artemas Ward, Jr.

Personal.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company will sail for Europe during the latter part of April.

Senor Don Bernardo Sagasta has been appointed Director-General of the Spanish Posts and Telegraphs.

Mr. B. E. Sunny, president of the Chicago Telephone Company, in addition to his many other activities has recently been elected a director of the Chicago City Railway Company.

Captain Daniel J. Carr of the United States Signal Service, in command at Fort Wood, New York Harbor, has successfully passed the examination and has been advanced to the position of Major. Major Carr is well known in telegraph circles throughout the country.

Mr. Charles Bright, F.R.S.E., of London, Eng., has been appointed consulting electrical engineer to the Australian Commonwealth Government. Mr. Bright has for some time acted as electrical adviser to the Commonwealth upon wireless telegraphy and other matters.

Mr. George L. Lang, of Chattanooga, Tenn., formerly and for many years superintendent of telegraph of the Queen and Crescent Route, who retired from active railroad service three years ago is superintendent of exhibits of the Chattanooga Manufacturers Association, which maintains a permanent exhibit, consisting of about seven hundred articles made by three hundred manufacturers of Chattanooga.

On the eve of his leave-taking of the Postal Telegraph-Cable Company at Detroit, to accept a position with the American Telephone and Telegraph Company at the same place, Mr. W. C. Griffin was made the recipient of a very handsome gift at the hands of his former office associates in the shape of a gold and crystal parlor clock. Mr. Griffin's resignation terminates a record of twenty years continuous service with the Postal, during the last ten of which he has held the position of all night chief at Detroit.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, has recovered from his recent illness in Chicago, and accompanied by Mr. W. I. Capen, general superintendent of plant, has resumed his trip of inspection which will take him to St. Louis, Memphis, New Orleans, Atlanta and other important telegraph centres.

Mr. J. H. Wilson, cashier at Philadelphia and G. H. Mills, manager at Providence, were recent executive office visitors.

The New England Telegraph Company has been authorized by the Supreme Court of New York to change its name to the Postal Telegraph-Cable Company.

The circulating library established for the use of employes of the company in New York is now open on the tenth floor. It already contains over six hundred volumes. Miss E. M. Allen, of the executive offices, is librarian.

Through the efforts of Mr. E. P. Tully, manager of the messenger service in New York City, a circulating library has been established in the delivery department at the main office for the free use of the messengers. The books selected are of an educational character, suited to the tastes of the boys, and the privilege is greatly appreciated by them. The books are donated by different friends of the boys and the library already contains upward of 200 volumes.

The office of the company at Portsmouth, N. H., has been moved to new quarters.

Miss Camille Sheppard, daughter of W. A. Sheppard, manager of the Company at Montgomery, Ala., was one of the successful candi-

dates in a voting contest which was recently carried on by the Montgomery Journal. The prize which Miss Sheppard secured was a year's scholarship at Judson Institute, Marion, Ala. Miss Sheppard was known as the "Postal Telegraph" contestant and was very materially assisted in her efforts by telegraph people throughout the country and Mr. Sheppard wishes to express his thanks to all of his friends in the service who helped his daughter win the valuable prize which she obtained.

RESIGNATIONS AND APPOINTMENTS.

Mr. W. W. Wagoner, manager of the Terre Haute, Ind., office has been appointed to the managership of the Fort Wayne office, vice E. J. Ehrman, resigned.

Mr. J. H. Lillie, chief operator at Grand Rapids, Mich., has been transferred to Butte, Montana, where he will assume the duties of night chief operator. He is succeeded at Grand Rapids by Mr. Charles C. Maxson, who is promoted from night chief at the same place.

Mr. E. W. Schieberl, manager of the Rock Island, Ill., office has been appointed manager at Moline, Ill., vice Miss Cora A. Piper, resigned. Mr. C. H. Hume of the Davenport, Iowa, office has been appointed manager at Rock Island to succeed Mr. Schieberl.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee, Mr. Belvidere Brooks, general manager, Mr. F. A. Pickernell, of the American Telephone and Telegraph Company and Mr. S. L. Williams, special agent, accompanied by William C. Merley of the executive offices who acts as secretary to the officials, are on an extended trip of inspection through the southern and western states which will include visits to Washington, Richmond, Atlanta, New Orleans, Galveston, Houston, Dallas, Oklahoma, Kansas City, St. Louis, Indianapolis and Pittsburg. The general superintendent and many of the district superintendents of the divisions visited are accompanying the party through their respective territories. Mr. W. T. Gentry, president of the Southern Bell Telephone Company, Atlanta, Ga., accompanied the others through the states in which his company operates. Mr. A. G. Saylor, general superintendent at New York, accompanied the officials as far as Washington.

Mr. Samuel L. Williams has been appointed a special agent of the company with headquarters at New York.

Mr. B. F. Dillon, superintendent at Jacksonville, Fla., has been advanced to the general superintendency of the southern division with headquarters at Atlanta vice Mr. Jacob Levin, resigned.

Mr. L. J. Maxwell, superintendent at Rich-

mond, Va., has been transferred to the Jacksonville, Fla., district.

Mr. J. S. Calvert, assistant superintendent at Atlanta, Ga., has been promoted to the superintendency at Richmond, Va., relieving Mr. Maxwell, transferred.

Mr. A. B. Cowan, chief operator at Chicago, has been appointed assistant superintendent at that point to succeed Mr. W. J. Lloyd who was last June promoted to the superintendency.

Among the recent executive office visitors was Mr. H. J. Pettengill, of Dallas, Tex., president of the Southwestern Telegraph and Telephone Company.

Mr. J. E. Jenkins, electrician of the company at New Haven, Conn., was a recent New York visitor.

Mr. L. McKisick, assistant general superintendent of the western division at Chicago; S. R. Crowder, electrician of the southern division at Atlanta and R. W. Gillette, electrician of the Pacific division at San Francisco are in New York this week, and together with Mr. W. T. Rogers, electrician of the eastern division, are in conference with Mr. W. E. Athearn, engineer of equipment.

A lease has been made at Richmond, Va., for the two upper stories, part of the ground floor and part of the basement of a fourteen-story building which is to be erected in that city. It is expected that the new structure will be ready for occupancy by January 1, 1911.

Mr. Belvidere Brooks, general manager of the company, in the Journal of the Telegraph, has issued the following statement to all employees in regard to the future policies of the company and the possibilities of promotion which will be open to efficient workers:

"One of the disadvantages of a great organization lies in the inability of the heads to get in personal touch with the rank and file, particularly when separated by great distances, as in this country. No one can feel this more than I do, and I have been very glad to avail myself of the opportunity to say a few words on the subject of the status of employees, the policies of the company and the important part which employees play therein.

"We all know, and are proud of the fact, that ours is the largest telegraph system in the world, and we must now impress upon the public mind that it is also the most progressive and efficient—and maintain it so. We must popularize the telegraph and, by good service, encourage the habit of its use.

"The management of the property have gone far in this direction, in establishing the new Night Letter service at greatly reduced rates and by providing unequalled facilities for the unrestricted filing and delivery of messages by telephone and the projection of numerous other conveniences in the use of the telegraph. But these will avail little unless supplemented by the actual co-operation and zealous efforts of employees in all branches of the service.

"There has, I believe, been more or less apprehension that recent developments in the affairs of the company have presaged the subordination of the telegraph to the telephone, and that the future of employes trained in the telegraph business would be injuriously affected thereby. Nothing could be further from the truth.

"The new interests in the company have already made it clear that we are to have the benefit of their valuable active assistance in building up the telegraph business of this company to the greatest possible extent. The broad and progressive policies which they have inaugurated offer every encouragement to zealous and efficient workers, but leave no room for incompetents or shirks

"Let us, therefore, study the interests of patrons and seek new ways for serving them, being convinced that in so doing we are best serving the company and ourselves. Never before in the history of the telegraph have conditions been so favorable, not only for the up-building of the company, but for the recognition of individual effort and worth, and full advantage should be taken of the opportunity. One long, strong pull, all together, makes success."

RESIGNATIONS AND APPOINTMENTS.

Mr. Charles H. Finley, assistant chief operator, has been appointed chief operator of the Chicago office, vice Mr. A. B. Cowan promoted to the assistant superintendency. Mr. John W. Konigsmark, general wire chief succeeds Mr. Finley as assistant chief operator. Mr. Charles S. Shell, assistant traffic chief has been appointed general wire chief, vice Mr. Konigsmark.

Mr. W. J. Dermody has been appointed manager of the Ogden, Utah office to succeed T. McGuinness who resigned to go to San Francisco.

Mr. George A. Keet, has been appointed manager at Kalamazoo, Mich., vice W. I. Thompson, resigned. Mr. Keet was formerly manager of the Battle Creek office but went west for the benefit of his health which he has now regained.

Mr. A. T. Cooke, of the Clarksville, Tenn., office has been appointed manager at Decatur, Ala., vice Mrs. M. N. Abernathy, who has resigned to accept a position in the office of Superintendent J. R. Terhune at Nashville.

Mr. E. N. Williams, chief operator at Asheville, N. C., has been appointed manager at that point vice Mr. George R. Calvert, resigned. Mr. Herbert Howell, night chief operator, has been advanced to the position of chief operator to succeed Mr. Williams and Mr. Morris Clayton has been made night chief operator, vice Mr. Howell.

Mr. B. F. Dillon Becomes General Superintendent of the Southern Division of the Western Union Telegraph Company.

Mr. Benjamin Franklin Dillon, superintendent of the Western Union Telegraph Company at Jacksonville, Fla., was on March 23, appointed general superintendent of the southern division

vice Mr. Jacob Levin resigned. Mr. Dillon's headquarters will be at Atlanta, Ga.

Mr. Dillon was born in Screven County, Georgia, April 21, 1849. In 1870 he went west and accepted his first position as operator for the Western Union Telegraph Company at Kansas City, Mo. He soon returned to the south, however, and located at Lake City, Fla. From



B. F. DILLON.
General Superintendent, Western Union Telegraph Company,
Atlanta, Ga.

there he went to Augusta, Ga., where he remained until 1873 when he married and went to Savannah as chief operator. He was later promoted to the managership of the Savannah office and in 1887 was made superintendent at Jacksonville where he has been located since that time. Mr. Dillon has taken an active part in public affairs in that city having served as president of the city council and having held numerous other public offices. He has been recognized as one of the most progressive and wide awake citizens of Jacksonville and during his long residence has made a host of friends who will be sorry to have him leave but who will rejoice at his promotion to a higher position in the service of his company.

John S. Calvert, Superintendent, Western Union Telegraph Company, Richmond, Va.

Mr. John Strother Calvert, who has been appointed superintendent of the Western Union Telegraph Company at Richmond, Va., to succeed Mr. L. J. Maxwell, transferred to Jacksonville, is one of the younger men in the telegraph industry, who, by reason of ability, coupled with perseverance and hard study, has rapidly forced his way to the front ranks. His first position of responsibility in the telegraph service was accepted by him in 1891, when he became the manager, at Newmarket, Va., of the Rosenberger and

Shirley telegraph line, which was only one hundred and fifty miles long and had fifteen offices. The following year he took charge of the offices of the Western Union Telegraph Company, first at Newmarket and then at Natural Bridge Hotel. In November, 1892, he became clerk in the office of J. B. Tree, who was at that time superintendent



J. S. CALVERT.

Superintendent Western Union Telegraph Company, Richmond, Va. at Richmond. In 1895 he became auditor and error clerk under Mr. Tree, and in 1897 was again promoted, this time to the position of traveling auditor of the first district, southern division. In 1902 he received further promotion, this time to the position of inspector of officers and accounts of the first and second districts of the southern division. January 1, 1903, he became assistant superintendent at Richmond, where he remained until December 1, 1905, when he was transferred to a similar position at Atlanta. He has been located in that city from then until the present time.

L. J. Maxwell, Superintendent, Western Union Telegraph Company at Richmond, Transferred to Jacksonville.

Mr. Lewis J. Maxwell, who has been transferred from the superintendency of the Western Union Telegraph Company at Richmond to a similar position at Jacksonville to succeed Mr. B. F. Dillon, promoted to the general superintendency of the Southern division, is one of the best known figures in telegraph circles in the south. Mr. Maxwell was born at Griffin, Ga., May 27, 1865, and entered the service in 1878 as messenger. At the age of fourteen he became an operator. After two years' work at the key he spent two years in the University of the South at Suwannee, Tenn. In 1883 he returned to the service and soon acquired a reputation as a first-class operator. In 1885 he was appointed manager of the Southern Telegraph Company at Augusta, Ga., which position he held until 1888,

when that Company was consolidated with the Western Union Telegraph Company. Six months later he was appointed manager of the Savannah, Ga., office, where he remained until November 1,



L. J. MAXWELL.

Superintendent Western Union Telegraph Company, Jacksonville, Fla.

1902, when he was made assistant superintendent at Jacksonville. September 1, 1904, he was promoted to the superintendency at Richmond, where he has since been located.

The Cable.

Sir George Reid, high commissioner for Australia, has been appointed to fill a vacancy in the commonwealth representation on the Pacific Cable Board.

The Commercial Cable Company has made application for a license to lay and maintain another cable between Waterville, Ireland, and Weston-super-Mare, England.

The Telegraph Construction and Maintenance Company's cable steamer "Colonia" left London, March 12, to lay the cable of the Western Telegraph Company between Ascension Island and Buenos Ayres. This will be laid under a concession secured from the Argentine Government last year. The new cable has a conductor weighing 700 pounds per mile. The cable steamer "Cambria" left London, March 10, for Buenos Ayres to lay the river section of the cable.

The German South American Cable Company announces the successful laying and the opening for public business of its cable from Teneriffe, Canary Islands, to Monrovia, Liberia. This is the first telegraph cable or line to Liberia. It will be worked in connection with the German Company's cable laid last year from Emden, Germany, to Teneriffe. The route to Monrovia is via Azores, Emden and Teneriffe, and the rate is one dollar and twenty-one cents per word from New York. From Monrovia the cable will be extended to Pernambuco, South America and Togoland and the Cameroons in Africa.

The Indian Government has agreed to a reduction of the rate of press telegrams between Great Britain and Penang, Singapore and Labuan from one shilling, four pence to nine pence a word.

The steamship "Manilye" has been purchased by the Philippine Government, overhauled and refitted for use as a cable ship among the islands. The new vessel has a tonnage of 2,250 and an estimated value of \$175,000.

At a recent meeting of the Nova Scotia Society of Engineers, Mr. S. Fenn, superintendent of the Direct United States Cable Company, at Halifax, who has recently been appointed manager of the company at London was presented with a handsome brass and cut glass smoking set as a token of esteem, by the members of the society, of which he was president. A paper on "Submarine Telegraph Cables" was read by Mr. McKavannagh, chief electrician of the cable steamer "Minia" and Mr. Hamilton, chief electrician of the Mackay-Bennett spoke of the history of the Atlantic cables. Mr. Fenn is now in Newfoundland in the interest of the service. Before going to his new post he will visit the stations of the company at Rye Beach, N. H., Boston and New York, and will sail for London from this city. He has been stationed in Nova Scotia for the past thirty-six years.

Mr. John Fraser, assistant superintendent of the Direct United States Cable Company at Rye Beach, N. H., who has been promoted to the superintendency of the same interests at Halifax, was tendered a farewell reception by his friends before leaving for his new position. Mr. Fraser was presented with a traveling bag and Mrs. Fraser with a purse by the employees at the cable station.

Municipal Electricians.

A fire-alarm system will be installed at Texarkana, Ark., at a cost of \$8,900.

The Nebraska Telephone Company is installing an up-to-date fire-alarm system in Omaha.

W. C. Matthias, superintendent of fire alarm and police telegraph of Reading, Pa., is engaged in installing a flashlight police patrol system in that city. When completed there will be four circuits with a total of forty-two boxes.

Patents have been applied for by L. W. Miller, of Rochester, for an automatic police patrol and fire-alarm system, which it is claimed embodies several new and important features. The system comprises a central office switchboard, connected by telephone with every patrol box in the field, and so equipped that when the commander of a precinct wishes to talk with an officer on his beat he can summon him by gong or by colored lights, or both, by the pressure of a button. The response by an officer is automatically registered, whether he talks or not, by a specially constructed time clock. This record and all records of reports by officers are in constant view for twelve hours, and are instantly available by the commanding officer.

Providence, R. I., is considering spending \$40,000 in the near future in placing the wires of their fire alarm telegraph system underground.

The fifteenth annual convention of the International Association of Municipal Electricians will be held at Rochester, N. Y., September 6, 7, 8 and 9 in Convention Hall in that city. Secretary Frank P. Foster of Corning, N. Y. is already actively engaged in making preparations for the event.

A new fire alarm telegraph system is being installed at Springfield, Mass., at a cost of \$30,000, and the fire commissioners have now asked for an appropriation of \$50,000 to construct a fireproof building for fire headquarters in which to house the apparatus of the new system.

Mr. James Zeluff, superintendent of fire alarms of Paterson, N. J., has installed fire-alarm gongs at several street corners in that city where there is a congestion of traffic. These gongs are part of the regular fire-alarm system and are for the purpose of giving the traffic officers warning in case of a fire, in order that they may clear the streets for the apparatus.

Annual Reunion of Old Time and Military Telegraphers.

The twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps will be held in Chicago, September 8, 9 and 10. The headquarters of the gathering will be at the Hotel La Salle. Mr. William J. Lloyd, superintendent of the Western Union Telegraph Company, Chicago, is president and Mr. F. J. Scherrer, assistant secretary of the Western Union Telegraph Company, New York, is secretary of the Old Time Telegraphers and Colonel William Bender Wilson, Holmsburg, Philadelphia, Pa., is president and David Homer Bates, 658 Broadway, New York, is secretary of the Military Telegraphers.

Legal.

According to an opinion rendered at St. Louis recently by Judge McPherson of the United States Court of Appeals, a telegraph company is not responsible for the delivery of messages which are interfered with on the wire while a strike is in progress. A similar decision has recently been handed down by a Massachusetts court.

In the case of the State of Texas against the Western Union Telegraph Company the Supreme Court of that state has granted a writ of error to the telegraph company, based upon the recent decision of the United States Supreme Court, in the case of the State of Kansas against the Western Union, which was rendered in favor of the defendant. The State of Texas has been endeavoring to compel the Western Union to pay \$100,040 for a permit to do business in that state, this amount being based on the total paid up capital of the company.

The Telephone.

The Mexican Telephone and Telegraph Company recently sold in New York \$200,000 of five per cent. twenty-year bonds to provide funds for development.

Plans are being made by the Southwestern Telegraph and Telephone Company to spend over half a million dollars during the present year in improvements to their system at San Antonio, Texas.

The annual report of the Colorado Telephone Company for 1909 shows that at the end of the year that concern had 75,046 subscribers, an increase of 6,079 during the year.

According to the report of the Wisconsin Railroad Commission for the year ending June 30, 1909, there were at that time 569 telephone companies operating in that state.

Mr. H. L. Reber, general manager of the Kinloch Long Distance Telephone Company, St. Louis, has been elected vice-president and general manager of the same interests.

Mr. R. W. Dodge, traffic chief of the Lewiston, Me., district of the New England Telephone and Telegraph Company, has been appointed district superintendent, with headquarters at Portland.

The Pacific Telephone and Telegraph Company has sold recently \$3,000,000 of five per cent. bonds and \$7,000,000 of four and one-half per cent. two-year notes, payable at maturity, either in cash or bonds.

Mr. J. T. Quinlan, manager of the Green Bay district of the Wisconsin Telephone Company, has resigned to accept a position with the Pacific Telephone and Telegraph Company. Mr. F. M. McEniry has succeeded Mr. Quinlan.

A meeting of the directors of the National Independent Telephone Association, was held in Chicago, March 15. The evidence secured at the hearings held in New York, in regard to the sale of the Ohio telephone properties to J. P. Morgan and Company was carefully gone over and it was decided to present the facts to the attorney-general of the United States with a view of having him institute a suit to set aside the sale on the ground of its being a violation of the Sherman anti-trust law.

Many of the main test offices of the American Telephone and Telegraph Company are located outside of the city limits. In all such cases the legs or loops into the main city offices, on account of their length, are equipped with standard 150-ohm relays with local sounders. The Western Union main offices being located in the center of the city, in most cases their branch office and other loops usually contain merely a four-ohm sounder. Since the joining of interests of the two companies it has been found desirable in many cases to repeat from the circuits of one company to those of the other. Mr. E. Waldron, chief operator of the Western Union Telegraph Company, at Atlanta, Ga., has devised an arrangement which can be used successfully to meet this condition.

The Elson Telephone Merger Bill, allowing the

consolidation of competing telephone companies, has been passed by the Ohio House of Representatives after an amendment, requiring that all mergers be approved by the State Railroad Commission, had been added to the original measure.

At the annual meeting of the Central Union Telephone Company, held recently in Chicago, a plan was adopted to organize new companies in Ohio and Indiana and sell to them the property of the Central Union in those states leaving to that company only their properties in Illinois. On December 31, there were 591,228 stations connected to the Central Union lines, a gain of 139,271 during the year.

Professor Dugald C. Jackson and William B. Jackson have made an exhaustive study of the telephone situation in Boston and vicinity for the Massachusetts state highway commission. In their report which they have handed in recently they find that the present rates for service are, on the whole, not too high. They have recommended certain changes having as their object the equalizing of rates to make them more uniform between the large and the small users of telephone service. They find that the value of the plant of the New England Telephone and Telegraph Company is from ten to twelve per cent. in excess of its capitalization.

The Western Telephone and Telegraph Company, which is the holding company of eighty per cent. of the stocks of the Northwestern Telephone Exchange Company of Minneapolis, the Southwestern Telegraph and Telephone Company, the Wisconsin Telephone Company, and the Cleveland Telephone Company in its annual report for the year ending January 31, 1910, shows that at that date its subsidiary companies had 311,556 stations, an increase of 34,329 for the year. They also make connection with 1,970 other companies, operating 293,482 stations, making a total of 655,038 stations comprised within their system, as compared with 481,821 a year ago.

American Telephone and Telegraph Company Increases Capital Stock.

At a special meeting of the American Telephone and Telegraph Company which was held in Boston, March 29, immediately preceding the annual meeting it was voted to increase the capital stock from \$300,000,000 to \$500,000,000, as was recommended by President Vail in his annual report. None of this amount of new capital will be needed during the current year for ordinary expenditures. The limit of the authorized capital with what is reserved against the conversion of the convertible bonds, however, has almost been reached. The expansion of the business is continuous and probably will continue in the future at least as fast as in the past. It is believed that in the future much of the financing can be done locally, thus relieving the parent company of the burden and strengthening the local companies.

In addition to the increase in capital, it was also voted to increase the number of directors.

Annual Report of American Telephone and Telegraph Company.

The annual report of the American Telephone and Telegraph Company for the year 1909, a summary of which we gave in our March 16 issue, is a most comprehensive document consisting of forty pages and outlining in full the financial condition of the organization at the present time, together with a concise statement of the development of the company and its affiliated interests during the past year.

The number of stockholders of the company December 31, was 35,823, an increase of 9,453 during the year.

A feature of the report is a financial history of the Bell system which shows that in the days of early struggle, when money was not to be had, a few hopeful men put their time and work into the business to create its first assets, practically with their own hands. It shows furthermore that the capital of the American Telephone and Telegraph Company and its predecessor represents actual cash paid in by its stockholders in excess of the par value of all the outstanding obligations in the hands of the public, and that it is not represented by stock obtained for surplus earnings, inflated valuations, franchises or other intangible property, no matter how valuable.

The report shows further that improvements in plant and operating methods are more responsible for reduction in rates than competition; and that there is within reach of almost, if not every one desiring it, some kind of telephone connection;

That the organization is probably the most effective that could be devised for the business as a whole, and certainly is the only one possible under all the existing conditions;

That the administration and policy have been consistent and uniform from the beginning; that the interests of the Bell system are dependent upon giving the best possible service under existing conditions and anticipating as far as possible any improvement.

Telephone service in its close personal touch with every subscriber is a unique service, different from all other services, and efficient telephone service requires co-operation on the part of the user.

In every use of the telephone system three human factors are brought into action—one at each end, one or both anxious and probably impatient, the one at the central office, as nearly a machine as is possible, a trained expert with at least as much intelligence and reliability as the best stenographers, typewriters or bookkeepers. This central office factor is the personal servant for the time of the factors at the ends and is entitled to the same consideration that is given to their own personal staff. Perfect service depends on the perfect co-ordinate action of all of these factors—any one failing, the service fails. This should never be forgotten. All attempts

so far to eliminate the personal factor of the central office, to make it a machine, have failed in systems of any extent; there are times when, at the central office, action guided by intelligence, is absolutely necessary.

In speaking of the arrangements that are being made to extend the use of the telephone for the collection and delivery of messages, the report states that by this method the electrical transmission of messages will be extended from the actual point of origin to the actual point of destination.

There are comparatively few places where there is business enough to warrant a "night and day" telegraph service, but there is no place where "night and day" telegraph service is maintained that is not in the centre of a "Bell system." Practically no Bell exchange is ever closed, therefore there are few subscribers of the Bell system who cannot be placed within reach of night and day telegraph service.

Under the new conditions, when in full operation, each service, the telephone and the telegraph will find its level of use, its field of best usefulness, with a distinct improvement in, and advantage to, both services.

Such economies as follow will be taken advantage of to increase the facilities and where possible reduce the cost to the public.

The idea of operating the telephone and telegraph in accord, each supplementing the other, is not a new or untried one, but has been ineffective because of the lack of common influence in the control of the operations. With the employees of both companies actuated by a common purpose this can be effectively done; without a common influence in the operation it has been practically impossible.

As for the company's policy toward the independent concerns and competition generally, President Vail sums it up briefly in the report, saying:

"A large number of opposition and independent companies have been absorbed into the Bell system during the year. Our position has been consistent. Wherever any opposition company can be legally brought into and made a part of the Bell system, it is done if it can be done to the advantage of the public, by and with the assent of all parties interested, including not only the public served, but the public authorities."

Speaking of the general consideration governing the management and operation of public utilities, President Vail says:

"It is the duty and obligation, as well as self-interest, of a public service corporation to give efficient service up to the limits of reasonable practicability and to furnish such a service at a reasonable price.

"As a rule all capital invested in any public utility is permanently invested. It cannot be salvaged to any extent, nor can it be used for any other purpose. The chance of any return upon the capital is entirely dependent upon inducing

or educating the public to make use of the service so offered. To do this, whatever is offered must be offered at a price which leaves the user a margin of profit—if not in money, in comfort and convenience—at a price which the public will accept, and that must necessarily be below the actual value of the service to the public.

"Although there have been abuses in corporate management and in the manipulation of both property and securities, for which there is ample remedy if existing laws are enforced, yet it must be admitted that the tremendous development of utilities in this country as compared with other countries, with their contribution to the comfort and convenience of the public, is to a certain extent due to the lack of proscriptive restrictions.

"The profits that have been realized by public service corporations in the development of new and beneficial facilities are insignificant in comparison with, and are certainly justified by, the enhancement of values and the unearned increment which have accrued to the public and which could not have existed but for this development.

"The one attracts more attention because of its corporate character, while the benefits are of a private character, widely dispersed in smaller units and as a rule to individuals.

"It is but natural that corporations should have some misgivings about a control of internal management by a body without any responsibility that could be called accountability, and without the practical knowledge or experience or information which comes from the daily dealings with questions; a control which would undertake to decide upon questions widely different, complex and far-reaching, over which expert managers of lifelong study and experience are sometimes at a loss; a control over methods of business which usually are the evolution of years of practice, and are so interwoven with the fundamentals of business that they cannot be changed suddenly without great disturbance.

"Too much importance is apt to be attached to claims of theorists or inventors, as any one can judge by comparing the wonderful promises and claims made with the results achieved.

"All great developments in any line of industry have been from crude and imperfect beginnings by a process of evolution, by improvement in detail the result of suggestion from association, operation, or study.

"The original idea upon which may be founded great development may be revolutionary but it never springs full-fledged or perfect into the world.

"Public utility companies have obligations and are responsible both to the public and to their shareholders. It is responsibility with accountability. Prevent them from imposing upon the public with fictitious issues of securities, or with exactions on the public with which to pay dividends on those fictitious securities.

"As to their internal management, operating

methods, leave something to their self-interest, to their responsibility with accountability; do not impose upon them such control as might force upon them new methods, new apparatus, new ideas which have not been tried out, which have not been put through the crucible of practical experience. Theories and new ideas will be welcomed by any progressive corporation for without them development would be stayed, but all that is improvement must come through a process of evolution, by the gradual elimination of the useless and adoption of the useful, through experimental application modified to existing conditions.

"We believe that if there is to be control, there should be protection, and that beyond the lines set forth, any control ceases to be control and becomes management or operation. We believe that management or operation by a body without any accountable responsibility would be prejudicial to the best interests of the service and of the public, and destructive of property and the rights we are supposed to possess.

"Our company has a vital interest in the proper solution of the telephone problem, and we believe that we are working the problem out on the broad lines of the greatest benefit to the public as a whole."

Dinner of British Post Office Engineers.

The seventh annual dinner of the British Post Office Engineering Department was held at the Hotel Cecil, London, February 15. Postmaster-General Sydney Buxton, in speaking of the work of the Post Office Department, said that it was nearly forty years since the taking over of the telegraph system by the State from the telegraph companies. In 1869, the year before the companies were taken over, the actual number of telegrams dealt with was 6,750,000; in 1909 there were 85,000,000. The mileage of land wires at the time of taking over was 60,000 and it is now over 1,000,000. The total engineering force in 1873 was 630, and last year it numbered nearly 2,900.

Chief Engineer Major Walter A. J. O'Meara, in speaking of his recent visit to the United States, said that he desired to acknowledge publicly the exceedingly courteous manner in which he was received by the officials connected with the telephone and telegraph systems of America. That was one thing that impressed him, he said, and that was the very deep study that had been made of organization. In America the engineer was certainly very much appreciated, and had risen to very high positions. The art of administration was very highly developed, and he attributed the success of the American telegraph and telephone undertakings to the organization and to the power of administration possessed by their officials.

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APRIL 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

An Awakening in the Telegraph.

There seems to be in progress at the present time a general awakening among the rank and file of the telegraph service. Members of the profession throughout the country, especially those residing in the larger cities, are apparently becoming alive to the fact that the only way in which they can secure promotion is by applying themselves to studying and mastering the various electrical problems involved in the system with which they are concerned. The same thing is true in both of the great telegraph companies. A good indication of this spirit of desire to learn more is found in the increased sale which we are having of electrical and telegraph books. The telegraph has probably never had a more progressive corps of officials than those in charge of that industry in this country at the present time, and they are showing their progressiveness by encouraging their subordinates, in every way possible, to study and fit themselves for promotion. Night telegraph schools are being established and those

deserving are being given such assistance as they may need in their electrical studies. Clubs are being formed among telegraph employes in large cities having as their object the investigation of technical questions and the careful study of the problems entering into telegraph operation.

All of this cannot help but result in benefitting those who come within the range of these educational influences and make good use of their opportunities. If continued it ought to result in restoring to the telegraph a large measure of the prestige which it formerly enjoyed as the most important branch of the electrical industry.

A Compliment to Our Telegraph and Telephone Officials.

Elsewhere in this issue will be found a brief account of the annual dinner of the British Post Office Engineering Department at which Major Walter A. J. O'Meara, chief engineer, gave some of his impressions of the telegraph and telephone systems of this country, which he formed during his recent visit. The thing that impressed him most strongly was the deep study that has been made of organization, and he attributes the success of these enterprises in this country to the perfection of their organization and the administrative abilities of their officials. This is a fine compliment to the executive officials of the telegraph and telephone in this country, and they have good reason to feel proud of this impression which they have given the head of a telegraph and telephone system, which handles over 85,000,000 telegrams a year. This is an age of organization, and in a business like the telegraph which carries messages at rates which are but little higher than the actual cost of handling them, the difference between a profit and a loss is very easily a difference in the extent to which the idea of organization in every department is carried out. Our telegraph officials hence have an especial stimulus to do their best to make all of the component parts of the system work together for their mutual advantage. Upon their success in doing this depends the success of their administration. The same thing is true of the telephone officials as well.

In England, where the telegraph and telephone systems are not operated for a profit, but any deficit is made up by the government, the need of such thorough organization is not thrust upon the officials with the force that it is in this country. Other matters are considered of more importance and greater development has been made in other lines than in this country, especially in the underground system. The officials of this country were glad to welcome Major O'Meara upon his recent visit and to give him any information in regard to their systems that they were able. They realize that the same treatment would be accorded to them if they took occasion to inspect English methods, and perhaps in their broad-mindedness in this subject lies another reason for their success, besides those mentioned by Major O'Meara.

The Rating of Telegraph Messages.

Mr. Roland R. Dennis, of Auburn, N. Y., one of the representatives of the United States at the Lisbon Telegraph Conference of 1908, in a recent article, has this to say regarding the rating of messages:

"I am much interested to note that the telegraph companies are being urged to adopt some sane method of rating ordinary messages. The telegraph service of the United States, Canada, and Mexico is controlled, directly or indirectly, by the Postal and Western Union companies, and these are the only three countries in the world that use so antiquated and unpractical a system.

"Having been named, by the State Department, as a delegate to the Conference of the Union Telegraphique Internationale, which was held in Lisbon, Portugal, in 1908, I was brought in contact with most of the prominent directors and managers of the government telegraphs throughout the world. My fellow colleague, as delegate to the conference from the United States, was Charles Page Bryan, at that time our minister at Lisbon, and in our report, in referring to this subject, we said:

"We find in consultation with delegates to the conference that the whole world, with the exception of the countries served by our United States telegraph companies, has long since discarded as cumbersome and inequitable our manner of rating messages. Messages of ten words at a fixed rate, address, and signature gratis, in reality, means that the telegraph companies transmit, on an average, twenty-four words for the ten-word rate. The natural result of this is that the business world is paying much higher rates than are at all necessary. After discussing the question with gentlemen who have had life-long experience in telegraphs, we are confident that the introduction of a dual system of rating messages, continuing the present ten-word rating for those that prefer it, and allowing the great mercantile houses the benefit of a per-word rating, at a corresponding reduction, would result in a great decrease of expense to both the commercial world and the telegraph companies, at the same time considerably increasing the profits of the latter."

"The European managers of both the Commercial (Postal) and Western Union transatlantic cables, who were present at the conference, approved our suggestion, and the foreigners, one and all, expressed the greatest surprise that a nation so practical and progressive as we are supposed to be should adhere to our present system of rating."

In a note to the editor of *Telegraph and Telephone Age* Mr. Dennis adds:

"Having spent eighteen years in resident charge of European branches of important United States factories, my practical experience with the foreign telegraph organizations has been very extended. Their system of per word rating—universal throughout the world except in the United States,

Canada and Mexico—commends itself at once to any business man, and the more you have occasion to use it the greater becomes your astonishment at our persistent adherence to the ten-word rating.

"Many years ago I formulated a plan for a change of our domestic rating that I believe is perfectly practical and could be worked out without any very great opposition on the part of the public or trouble to the companies."

Book Review.

"Telegraphing in Battle," by Doctor J. Emmett O'Brien, of Scranton, Pa., is the latest addition to the literature dealing with the operations of the United States Military Telegraph Corps during the Civil War. Dr. O'Brien himself served as an operator in the military service for four years and his brother, Richard O'Brien, who is now assistant superintendent of the Western Union Telegraph Company at Scranton, Pa., occupied a prominent position in the telegraph corps throughout the war. From his own personal recollections and from the diary which his brother Richard kept during the war, together with some historical matter which he has collected from other sources, Dr. O'Brien has written a book which will be read with interest by every one who was connected in any way with the military telegraph service. It will also be appreciated by those who enjoy reading a good story of some of the thrilling events connected with the civil war, told in a pleasing manner. The charm of the story lies in the straightforward way in which the author narrates the personal experiences of himself, his brother and other military operators during the stirring events of that memorable conflict. The book, which is dedicated to Andrew Carnegie, founder of the United States Military Telegraph Corps, contains 312 pages, and is illustrated by numerous half-tone engravings of those prominently identified with the military service, as well as several maps of the territory in which the telegraph played a prominent part. The price of the book, which is a splendid monument to the military telegraph, is \$2.00, carrying charges seventeen cents extra, and copies may be obtained by addressing J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

A bill has been introduced in the New York Legislature appropriating \$27,000 for the expenses of the committee which has been investigating the telephone and telegraph companies in this state. This is in addition to the sum of \$10,000 which was originally appropriated for that purpose.

At the annual meeting of the Engineering Society of Wisconsin held in Milwaukee, February 23, 24 and 25, Mr. W. R. McGovern presented a paper upon "Protection of Telephone and Telegraph Lines Against High Potential Circuits," in which he considered the mechanical requirements for preventing low-potential circuits from getting into physical contact with high-potential lines at points of crossing or where they closely parallel each other.

TALKING AND TELEGRAPHING SIMULTANEOUSLY OVER THE SAME LINE.*

The Repeating Coil and the Simplex Circuit.

BY N. C. KISSELL.

(Concluded from page 226, March 16 issue.)

Conditions which would exist if the neutral points of the secondaries of balanced repeating coils at the terminals of a telephone line were connected together have been explained in connection with Figure 2. A more perfect analogy with the state of affairs which exists in a simplex circuit used for transmitting telegraphic signals can be worked out by observing what takes place when a battery is connected serially in such a third wire, as shown in Figure 3.

To make the explanation of the electrical and magnetic phenomena which occur in the coil itself clearer, consider only the windings on the iron core at the left of Figure 3. If current is passed through

netic flux set up in the core and the windings act simply as a conductor. The magnetizing force of the current flowing through one coil in one direction is neutralized by the magnetizing force of the current flowing through the other coil in the opposite direction.

This is what happens when the battery is connected in series with wire *y* as shown in Figure 3. Current flows from the positive pole of the battery to the point of connection of the windings *c*, *d*, and at this point divides, part going through winding *c*, wire *x*, winding *e* on the other repeating coil, and back to battery over the wire *y*; the other part goes through winding *d*, wire *z*, winding *f*, and back to battery over wire *y*. The resistance of these two divided circuits must be equal; that is the resistance through winding *c*, wire *x*, winding *e*, wire *y* must be the same as the resistance through winding *d*, wire *z*, winding *f*, and wire *y*. When this is the case, the current will divide equally through the repeating coils, and be in opposition in two sections of each coil, consequently the iron cores will not be magnetized. This condition is brought

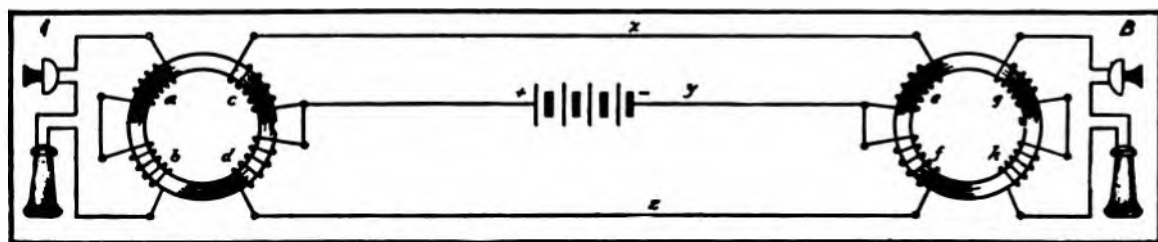


Figure 3. Diagram used in tracing path of direct current which passes around cores of repeating coils without magnetizing them.

this winding in the direction from *a* to *b* the core will be magnetized and the magnetic flux will travel around through the core in the direction opposite to that taken by the hands of a watch. If current is passed from *b* to *a* the flux will travel in the opposite direction. If current is passed from a point between the two windings, through the winding *b* only, the magnetic flux will travel around the entire core, as the magnetic circuit is closed, in the same direction as when the current was passed through both the windings from *a* to *b*. If passed from the point between the windings through *a* only, the current will create a magnetic flux in the iron core in the opposite direction. Now if current be passed from this point between the windings through both *a* and *b*, it will divide half going through *a* in one direction, and half going through *b*, but in the opposite direction. This tends to create two opposing magnetic fluxes in the core, one winding setting up a flux in one direction, the other in the opposite direction. Both of these fluxes being equal (provided the number of turns and the resistance of both windings and their positions in relation to the core are exactly the same) they will neutralize each other, and consequently there will be no mag-

about in practice by winding the coils *c*, *d*, *e*, *f*, of the same resistance and number of turns, and using two line wires of the same resistance and properties.

The wire *y* being common to both divided circuits its resistance will not have to be considered, as the current in each wire will be the same. For instance, suppose there is one-half ampere flowing in each line wire and the resistance of the wire is five ohms per mile. Then for each mile of wire carrying this current, there will be a drop in potential of five times one-half ampere, which equals two and one-half volts. As the current is flowing in the same direction in both wires and the drop along each wire being the same, there will be no difference of potential across the two wires at any point and other telephone stations can be bridged across the line. Under these circumstances a second circuit can be made out of this telephone line without interfering with its use as a metallic circuit for transmitting speech, and the new circuit thus obtained can be used commercially.

In Figure 4 is shown a telephone line with repeating coils in the circuit. From the centers of these coils are taken taps which enter into a second circuit over the line wires. This circuit instead of going through an expensive wire (as *y*, Figure 3), is completed through the ground. In this second circuit

*Article reprinted from the American Telephone Journal.

have been introduced two sets of telegraph instruments, thereby creating a grounded telegraph line in conjunction with the telephone line. In this way a telephone company makes a telegraph circuit without actually building the line itself, and doubles the earning capacity of its wires. The telegraph current will divide equally over both line wires and will not

graph noise in any telephone instruments which may be connected to the line when the Morse signals are sent.

This action of the condenser is due to the fact that it has the property of absorbing a certain quantity of electricity, and this amount must flow before the current reaches its full value in the line.

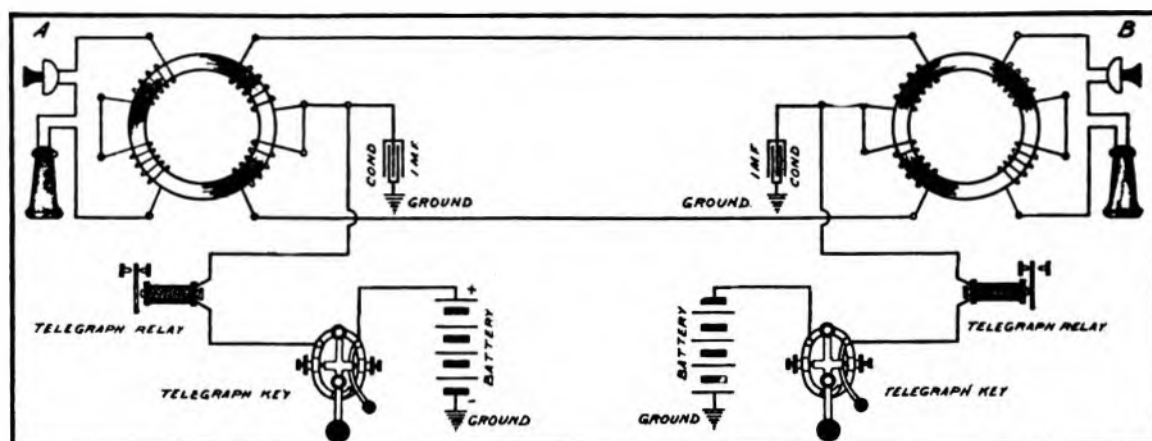


Figure 4. Commercial type of Simplex circuit, comprising a metallic telephone and a grounded telegraph line.

interfere with the talking circuit provided the conditions are such as have been explained.

The circuit of the telegraph being completed through the ground, and as the ground connections are at points distant from each other, there may be a difference of potential between the two grounds which will cause earth currents to flow over the line. The latter will, therefore, flow just the same

The instant the key is closed, the condenser sucks in a certain amount of the current flowing, and, as it becomes charged to the potential of the E. M. F. impressed upon it, the current starts to rise in the line until, as the condenser becomes fully charged, it reaches its full value as determined by the resistance of the line. Therefore, instead of the Morse current reaching its full value instantly, it does

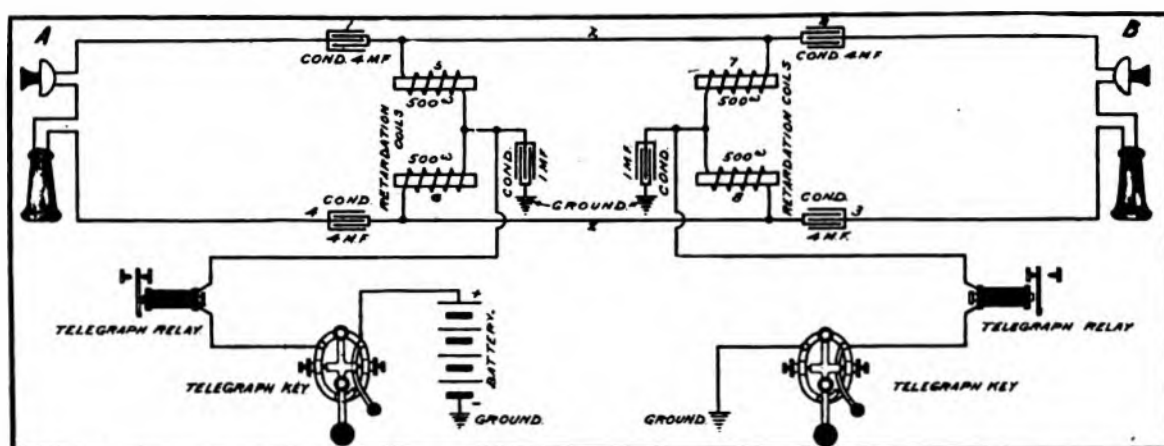


Figure 5. Retardation coil type of Simplex circuit.

as the telegraph current and will cause no annoyance in the telephone circuit. A one micro-farad condenser is placed in the Morse circuit as shown in the diagram. The action of the latter is to take off the sharp edges of the Morse impulses or to round off their corners to a certain extent so the rise and fall of the telegraph current will not be so abrupt and consequently there will be a great deal less likelihood of inducing a tele-

so more gradually on account of the condenser sucking in a portion of the current. When the key is opened, the E. M. F. which holds the charge in the condenser is taken off, and the latter discharges in a direction opposite to that in which the current flowed when it was charged, which will be out over the line to the ground at the distant end. The instant the key is opened the condenser discharges into the line and tends to keep the Morse current

from falling suddenly, so that it dies out gradually. This condenser placed as shown will have the effect of rounding off the corners of the waves produced by the instantaneous Morse impulses, by causing the current to rise and fall gradually instead of abruptly.

The circuit as shown in Figure 4 and described is called the simplex circuit and comprises a metallic telephone circuit with a grounded telegraph circuit superposed upon it. It is the principal one used commercially to-day, and is very satisfactory in operation when properly set up and maintained. It is not the only commercial type of simplex circuit, however, as the form shown in Figure 5 is sometimes used. This circuit likewise produces an extra telegraph circuit from a metallic telephone line.

Telephone terminals *A* and *B* are connected to the line through four condensers 1, 2, 3, 4, each having a capacity of four micro-farads. The talking current being alternating and of very high frequency will readily pass through these condensers. Two coils are bridged across each end of the circuit, on the line side of the condensers. These coils are of 500 ohms resistance each, and consist of many turns of wire wound on an iron core, which gives a very high impedance to alternating currents. Between these two coils the telegraph circuit is tapped in and completed through the ground. The action of this circuit is different from the one previously discussed. When *A* is transmitting to *B*, at a given instant, current passes through condenser 1, line wire *x*, condenser 2, through *B*, to condenser 3, line wire *z*, condenser 4, to *A*, and vice versa. Now, as the coils are bridged across the line, it might appear that some of the talking circuit would be shunted out. This would be the case if it were not for the property called self-induction, which the coils possess. When the current rises in the coil, the magnetic lines of force created in the iron core in turn cut all the turns of wire of the coil thereby inducing a current in the coil in an opposite direction to that which is flowing, thus tending to choke the original current back. The reactance depends upon the number of turns of wire on the coil, and the frequency of alternations of the current. The higher the frequency the greater the impedance, the number of turns remaining the same, and the lower the frequency the lower the impedance. Such a coil is called a choke-coil, impedance or reactance coil.

When *A* or *B* is transmitting practically all of the current that would tend to pass through the coils is choked back. The telegraph current passes through the two coils, 5, 6, over the line wires and through the other two coils 7, 8, to ground. The resistance and reactance of the coils and of the line wires on each side of the circuit being the same, the current divides equally over both sides of the line, and, the drop in potential along each wire being the same, there is no difference of potential existing across the line; consequently the Morse signals cannot be heard in the telephone circuit and other stations can be bridged across the line. The one micro-farad condenser answers the same purpose as in the

repeating coil circuit. In ringing over this circuit the alternating current passes over the line like the talking current, and no difficulty is experienced, provided the condensers are of large capacity, on account of the low frequency of the ringing generator. In many modern exchanges one side of the ringing generator is grounded and obviously this could not be used with this circuit, because current would pass through the Morse leg to the ground, thence back to the generator, and a metallic generator circuit will therefore have to be used. In the repeating coil circuit this feature makes no difference, as the two windings on the coil have no direct metallic connection with each other.

Crystal and Solid Contact Rectifiers.

In a recent number of the *Physical Review*, Mr. A. E. Flowers, in an article on "Crystal and Solid Contact Rectifiers," describes the characteristics of the galena rectifier of which he had made a study to ascertain the cause of rectification. Galena was chosen for his study because of the fact that it has a higher conductivity than most of the crystalline rectifiers used. The rectifying effect, however, is not as great as that of some other substances, only about half of the current being rectified. The author concludes from his experiments that the rectification is not due to a thermo-electric effect or to a difference in conductivity of the two materials in contact. He advances two possible explanations of the phenomena.

One is that the film between the two substances, when once formed, has unidirectional conductivity. The other explanation is that the film is produced in an infinitesimally short length of time by the passage of a minute quantity of electricity. The tendency of the resistance to rise when current is flowing to the crystal, the direction of highest resistance, and to fall when the current is flowing from the crystal, seems to favor this view. The sluggishness of change of resistance sometimes observed at high temperature and with some crystals also tends to strengthen the probability that the rectifying film is re-formed electro-chemically with each reversal. If the film is re-formed at each reversal, then there must be a definite quantity of electricity, however small, required for the production of the film, and one should find that the rectification is less perfect for very small currents or for very high frequencies.

Mr. F. B. Gerrard, superintendent of the Commercial Cable Company's station at Hazelhill, N. S., in renewing his subscription says: "Telegraph and Telephone Age is too good a paper to miss."

J. R. Terhune, superintendent of the Western Union Telegraph Company at Nashville, Tenn., in renewing his subscription recently said:

"I desire to congratulate you on the improvements in the Age. I find much valuable information in every issue."

The Military Telegrapher in the Civil War.

PART XXXVI.

Mr. T. E. Rawlins, who is at present living at St. Joseph, Missouri, is one of the many military telegraphers who were made prisoners by the Confederates during the war. Unlike some of the others however, he made his escape before he was confined in a prison. In writing to Colonel William R. Plum, historian of the United States Military Telegraph Corps in 1878, Mr. Rawlins gave the following account of his connection with the service:

"I enlisted August 12, 1862, at Dwight, Ills., and was mustered in September 8, 1862, at Pontiac, Ills., for three years in Company B, 129th Regiment, Illinois Volunteer Infantry. I served with my company until we reached Crab Orchard, Ky., some time during the following October where I was detailed to assist in the brigade commissary and remained there until we reached Bowling Green, Ky., when I was assigned to my company again and served with them until August 1863, when I was again detailed at Nashville, Tenn., to assist John P. Lathrop, operator at Wartrace, Tenn., on the line of the Nashville and Chattanooga Railroad. I remained with him about three months when I was sent to La Vergne on the same road to assist George Railton from Toronto, Canada. While I was at La Vergne on February 26, 1864, I was furloughed by order of E. M. Stanton, secretary of war to enter the United States Military Telegraph Corps until further order, I remained at La Vergne a few months and was assigned to Smyrna, the first station south, where I had charge with John T. Duell as assistant. August 13, 1864, I received permission to visit my home in Illinois for thirty days, during my absence the Wheeler Raid on the Nashville and Chattanooga Railroad was made and my office fixtures, instruments, etc., captured together with Duell and his assistant who was staying in my place. I learned of the raid while at home and, cutting my leave of absence short fifteen days, returned and reported for duty to Captain J. C. Van Duzer who, giving me a pocket instrument, assigned me a place with the repair force to repair the line and railroad from Nashville to Murfreesboro. I attached my instrument to the wire first about three miles south of Antioch. We then worked south repairing the line until we reached Smyrna where we found the depot so badly damaged that we established the office in a private house temporarily until the depot could be repaired. Operator Duell was now with me again, having been turned loose by Wheeler before he left the state. We remained here until the December following when Hood's raid through Tennessee was made. At the approach of Hood's army we remained in Smyrna, taking our meals at the boarding house of Charles Fox and lodging at Dr. Kennedy's. Our object in taking lodgings at one place and boarding in another was to better secrete ourselves. In this we

made a mistake from the fact that Hood's army needed recruits and they were conscripting all the men they could find. A party of three cavalymen came to Dr. Kennedy's looking for a brother of the doctor's and finding us in bed, took us without any ceremony. We were mounted on their horses in the rear of their saddles and conveyed to their camp, a distance of perhaps twelve or fifteen miles reaching there about sunrise. General Bates, the Confederate commander, immediately interviewed us in regard to the present outlook of affairs as viewed by the northerners, I informed the general that I knew very little in regard to army movements and scarcely anything as to how the north felt in regard to closing the conflict. Our answers to his direct questions were not entirely satisfactory to him and he directed the guard to turn us over to the provost-captain. We now went into camp as prisoners of war and were regarded as such. The treatment we received, as far as I was individually concerned, was all that I could expect. Boiled beef was given us in pound packages or pieces of near that amount for each prisoner without salt or bread. Not being used to eating my meat fresh without salt I did not relish that morning meal and threw it into the ditch. We were soon on the march in the direction of the railroad and came to a block house north of Florence where a battle ensued which lasted from early in the afternoon until dark. The wounded and dying were carried into camp and cared for. As yet we prisoners had eaten nothing except the boiled beef and I had not eaten that so that we were pretty hungry about sundown. The captain in command gave me a piece of corn pone, about three inches long by one and one-half wide and I have no recollection of ever eating food that tasted better than that little crumb of corn bread mixed with water and baked in the ashes. About ten o'clock that night we were sleeping soundly in a pile of leaves that we had gathered together when we were aroused and a full sized corn pone dealt out to us for our supper. We did justice to that meal without any loss of time and went to bed again. We were aroused early the next morning and moved in the direction of Murfreesboro. That day was spent in skirmishing and we camped in sight of the Stone River breastworks. The next day, the third day we had been with them, was spent similarly to the previous day and we camped within a mile of where we were the night before. The fourth day they skirmished until about four p. m., when they drew the Federal force from Stone River and Murfreesboro out and lines of battle were formed. They scarcely fired a gun, however, before the whole Confederate command was on the run and they kept up this stampede until they were out of sight. This I thought would be a good time to escape but the guard was faithful and proved too strong for us. They marched us north on the Nashville and Murfreesboro pike,

halted within a mile of Smyrna, the place where we were captured, and went into camp. The Provost Guard could not find headquarters so they camped by themselves regardless of the rest of the army and we built a log fire, laid down and went to sleep. Along towards morning I awoke and I was so cold I could with difficulty straighten myself. I discovered that some of the prisoners were already gone. All the guards were sound asleep except one and he was very busy at one end of the fire parching corn. Duell, was awake too and I said to him, 'Now is our time,' but he did not believe there was any chance. I made the attempt, however, was successful and went directly to Dr. Kennedy's and took quarters in the cellar. Duell stayed with the guard until they got to Pulaski when he too escaped and walked to Nashville.

"In the cellar at Dr. Kennedy's I had the company of John Kennedy who was avoiding the conscript. We remained in that cellar ten days until the southern army left that part of the country. We were fed by the mother of John and Dr. Kennedy and I never will forget her kindness. She was as regular as clock work in bringing us our meals except once or twice when she was afraid of being detected. One night General Bates had his headquarters in the doctor's room and we got no supper or breakfast then but by noon they had left and we got the well-filled basket as usual. We did not venture out until we heard that General Steadman with his colored troops had passed down the road. We came out of our hiding places then much to the surprise of the people in the town and vicinity who thought we were well on our way to Andersonville or some other southern prison. I secured a conveyance and went to Nashville and reported to Captain J. C. Van Duzer for duty. He gave me a pocket instrument and started me out with the repair force again. I remained with them until the railroad was rebuilt and then reopened the Smyrna office. I remained there until the next summer and was sent to Wartrace where I was located when the war closed. I accepted the agency for the Nashville and Chattanooga Railroad at that point and remained there until September 1, 1868 when I returned to the north."

A Military Telegraph Martyr.

Reference has been made in our columns several times, especially in the series of articles on "The Military Telegrapher in the Civil War," to the killing of D. B. Lathrop, a military operator at Yorktown, Va., by the explosion of a torpedo buried by the Confederates before they evacuated the place. In Colonel Plum's history of the United States Military Telegraph Corps it is stated that operator Lathrop was buried at Mount Vernon, Ohio, and that a fund was started to build a monument to his memory. As the history fails to reveal whether the monument was actually erected or not we began an investigation

to learn, if we could, any more facts in regard to this sad case. Upon communicating with telegraph people at Mount Vernon we found that nothing was known at that place in regard to this operator who met such an untimely fate.

With the assistance of David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, however, we have secured some further information about the facts in this case which will clear up some points which have heretofore been in doubt.

Mr. Andrew Schnell, now of Guthrie, Oklahoma, writes that he started the subscription for the monument and afterward turned the money which he collected, together with the list, over to someone in General Eckert's office at Washington. His brother Mr. Joseph Schnell of Binghamton, N. Y., has written the following version of his recollection of the event:

"On page 314, in *Telegraph Age* for May 1, 1908, in an article headed, "United States Military Telegraph Legislation," by Mr. Jesse H. Robinson of Washington, reference is made to the death of D. Brainerd Lathrop by the explosion of a torpedo at Yorktown, Va. It quite interested me as I was by his side when he breathed his last. A few moments later I came very near meeting the same fate, as I discovered one of those torpedoes just in time to avoid stepping on it. Fortunately for me the rain had washed the sand from over it, exposing it to view.

"I have a clipping taken from a newspaper at the time, of which the following is a copy:

Death of D. B. Lathrop.

Washington, D. C., May 5, 1862.

D. B. Lathrop, operator in the United States Military Telegraph Corps, died last night from injuries caused by the explosion of a torpedo, placed by the Confederates, in the deserted telegraph office at Yorktown. Mr. Lathrop was a resident of Springfield, O., and highly esteemed by his brother telegraphers, and all who knew him. He was always one of the first to volunteer to fill the post of danger, and his services in the front ranks will be painfully missed.

"My impression is that his remains were sent to Springfield, O. I remember we started a subscription towards the erection of a monument to his memory.

"I never learned, however, what, if anything, was done in the matter. Mr. Thomas Morrison, who, I believe is in the State Department at Washington might be able to furnish you with any information desired concerning Lathrop.

"According to my recollection the explosion of the torpedo did not occur in the office as stated in the clipping, but outside, not far from the office."

Mr. Morrison who is chief of the bureau of accounts and disbursing clerk in the State Department at Washington, gives the following account of his connection with the affair.

"I accompanied the remains of D. B. Lathrop, from Yorktown, Virginia, to Springfield, Ohio. His residence was in Springfield where I believe

he was born and raised. I was at Yorktown, under General Fitz John Porter, and near Comrade Lathrop, when he was killed by the explosion referred to.

"Two or three years ago I fully explained the death of Lathrop to Mr. Jesse Robinson, of the Weather Bureau Service here, and I assumed that the information given him was for publication. The torpedo was placed by the Confederates at the base of a telegraph pole just across the street from the telegraph office, in Yorktown. Lathrop walked over to and was inspecting the pole when the shell exploded.

"I have no knowledge whatever of the monument fund. Evidently it failed, and no doubt the amount collected was turned over to Mrs. Lathrop."

Mr. John W. Parsons, superintendent and secretary of the board of trustees, of the Ohio Masonic Home at Springfield, Ohio, and a former military telegrapher has sent us the following letter in regard to his knowledge of operator Lathrop's death and burial.

"Mr. George R. Carter, manager of the Western Union Telegraph office in this city, has handed me your letter asking information concerning David Brainerd Lathrop, the operator who was killed at Yorktown, Va., in 1862, by stepping on a torpedo which had been placed near the telegraph office by the Confederates when they evacuated that place. Lathrop and an operator from Dayton, O., named Henry Smith, gained admission to the town by the use of an old military pass which Smith happened to have in his pocket, entrance having been forbidden by the commanding general except by special permission, on account of a report of the planting of torpedos in various places in the town by the fleeing Confederates. One of Lathrop's legs was blown off and he died within a few hours.

"His body was sent to Springfield, Ohio, accompanied by Thomas Morrison, now of the State Department, Washington, and buried in Greenmount Cemetery, where the remains still rest.

"I visited his grave to-day and found it in fairly good condition and surrounded by the graves of his parents and other members of his family. A modest marble slab, erected by his sister, his only living relative, marks his resting place. The slab bears the following inscription:

'A True Christian and Patriot

D. Brainerd Lathrop

Killed

At Yorktown, Va.,

May 4, 1862,

aged

21 Years, 8 Months and 13 Days

They Shall Walk With Me

In White For They Are Worthy.'

"David Brainerd Lathrop was born in Springfield. I knew him from his childhood and, in fact, was his instructor in learning the business of telegraphy. He was an excellent student; in

school always standing at the head of his classes; he quickly learned the business and became one of the best sound operators I have ever known. He was highly esteemed by the entire community and his untimely death was sincerely regretted.

"I was his partner in the United States Military Telegraph Corps, and for the first three months after entering the service in 1861, we were stationed at the Navy Yard, Washington. He was then ordered to the peninsula where he met his untimely death in 1862."

Thad M. Schnell Seventy-five Years Old.

Mr. Thad M. Schnell, the old time and military telegrapher of Des Moines, on February 16 celebrated his seventy-fifth anniversary.

Mr. Schnell was born in 1835 at Bellefonte, Pa., and spent his boyhood at that place. When but a young lad, he learned the art of telegraphy and is still working at that profession; having followed it throughout his entire life, at present being employed in the main office of the Postal Telegraph-Cable Company at Des Moines.

Many of those connected with the telegraph and intimate friends were invited to a dinner in his honor, which was given at the residence of his sisters upon the afternoon of his birthday. The centerpiece of the table consisted of a telegraph sounder and battery, surrounded by sixty lighted candles, representing the years of his telegraph service.

An enjoyable feature of the occasion was the presentation to Mr. Schnell of seventy-five postal cards, each bearing a message from some absent friend, marking the pathway from his boyhood at Bellefonte to his seventy-fifth birthday at Des Moines. This was in the nature of a surprise to him and was much appreciated. It made it seem that the guests of the occasion instead of being only a score numbered a hundred, and that time and distance made no difference.

The occasion was a most enjoyable one for those present and all expressed the wish that Mr. Schnell might live to enjoy many more birthdays.

"Doctor, there is something the matter with my right ear. There is something ticking inside of it and I cannot sleep. I have been sleepless for forty-eight hours," said a man who presented himself at the office of a New York hospital for treatment.

"It sounds like a telegraph operator sending a message and I hear it all the time," said he.

The doctor placed an instrument in the ear which enabled him to see to the ear-drum, and there in the very center he saw a small insect that appeared to be tapping on the drum with one foot.

The doctor flushed the ear and the "telegraph operator" floated out. "It is a very rare bug," said the doctor.

"What is it called?" asked a reporter.

"Well, you might call it a "telegraph bug," he replied.

The First Nantucket Cable.

Few people are aware of the fact that a submarine cable, fifteen miles in length, connecting Nantucket with the mainland was laid in 1856 two years before the laying of the first Atlantic Cable brought the possibilities of submarine telegraphy so prominently before the people of this country. This first cable was not a success but a description of the laying of this cable taken from the *Nantucket Inquirer and Mirror* will be of interest, showing as it does the great improvements which have been made in the art of cable laying since that time. This cable was laid on August 19, 1856, by the steamer "Telegraph," which at that time had been in regular service between Nantucket, New Bedford, and other nearby points for over twenty years.

This event was an important one, not only for Nantucket, but for the entire country, as the line of cable to be laid was heralded as "the longest American submarine cable ever laid." It was about fifteen miles long, was of No. 9 wire, covered with two coatings of gutta percha, and was about five-eighths of an inch thick. The cable was brought to Nantucket direct from New York, and was placed on board the schooner *Silas Parker* on reels, each reel containing a mile in length. On the deck of the schooner, back of the main cabin gang-way, a large reel was fixed in a most substantial manner, platforms being built outside the bulwarks, whereon the men stood who turned the cranks which wound the cable—a dozen men being necessary for this work. The cable was transferred to this reel on the schooner while she lay at the dock, each mile being properly joined as the winding progressed, the task requiring four days.

At 3 o'clock in the morning on August 19, the *Telegraph* took the schooner in tow, firing a signal gun as she rounded Brant Point, to let the inhabitants of the town know that the actual laying of the cable was to be started. At 5.30 o'clock the *Telegraph* brought the schooner to anchor off Great Point, fired a second gun, run up the American flag, and one from the schooner's mast-head on which was inscribed the words: "Nantucket Telegraph—the Longest American Sub-Marine Cable ever laid—August, 1856." Preparations for laying the cable went forward rapidly and at 8 o'clock one end of the wire was taken ashore in a boat and in half an hour connection was made with the land line, when the cannon again burst forth its exultation, followed by cheers on board and on shore.

A few minutes before 9 o'clock, the *Telegraph* started with her tow over the proposed route of the cable, which was run out from the schooner's stern over a roller fixed on the davits. It required the whole force to unwind the cable fast enough for the steamer to make any headway, and for a time her engines were stopped, the tide taking the outfit along as rapidly as necessary—at the rate of two miles an hour. The "log" kept upon that occasion

shows that at 10 o'clock the *Telegraph* had made about two and one-half miles. At 11 o'clock, five miles from Great Point, the cable was unreeling itself and the work progressing finely, with ten and a half fathoms of water. About noon a heavy swell set in and the work became more difficult. When the outfit passed the *Shovel* lightship, the crew of the beacon ran up flags, rang the bell and cheered, and the *Telegraph's* gun again pealed forth. At 1.30 in the afternoon the steamer anchored off Monomoy Point and fired a signal gun—less than five hours after she left Great Point.

Owing to a slight dragging of the anchor, while a sufficient amount of the cable was being stowed into a boat to be taken ashore, the wire became tangled and it was nearly an hour before the end was placed on the beach. At 3.05 o'clock, however, the end was joined to the land wire at Monomoy, and thus having connected Nantucket and America together, the *Telegraph* gave a few joyous toots with her whistle and started with her tow for Nantucket. To Nathan Manter, at that time mate of the steamer "Island Home," the credit for the laying of the cable without mishap belonged. Manter was given command of the *Telegraph* upon this important occasion, he being considered an authority on the shoals, tides, etc., and the *Nantucket Inquirer* of that week thus compliments him for his excellent work:

"It is but simple justice to say that Nathan Manter, mate of the steamer *Island Home*, who had charge of the steamer *Telegraph* on the occasion of the laying of the cable, discharged his onerous duties in the most efficient manner. Without competent help, he was obliged to act in various capacities, frequently executing his own orders, to be sure of promptness, the crew not being familiar with steamboating. He is a cool, active and efficient officer, and showed that he had well improved his opportunities to acquire a practical knowledge of the management of a steamboat."

From Monomoy Point (the terminus of the Nantucket cable) to Chatham Light, a distance of six miles, the line ran over a land wire. At the latter point, however, another cable one and one-half miles in length had previously been laid, connecting Monomoy Point with the main land on the Cape—thence running over a course of two and one-half miles to the telegraph office in Chatham. This first cable never worked very satisfactorily, and the project proved a complete failure, the cable being subsequently taken up and laid from Madaket to Tuckernuck and thence across to Martha's Vineyard. This second attempt was almost as unsuccessful as the first, and only one or two messages were sent over it. Nantucket did not get into actual cable communication with America until the government laid its cable across Vineyard and Nantucket sounds in 1886.

Award of President's Prizes of Postal Telegraph-Cable Company.

The annual prizes, amounting in all to \$2,500, given by President Clarence H. Mackay of the Postal Telegraph-Cable Company to managers and messengers of the company throughout the country for excellence in certain particulars, have been awarded for the year 1909. The following were the winners:

Second Prize, Class B, \$50, S. H. Flint, Bridgeport, Conn.

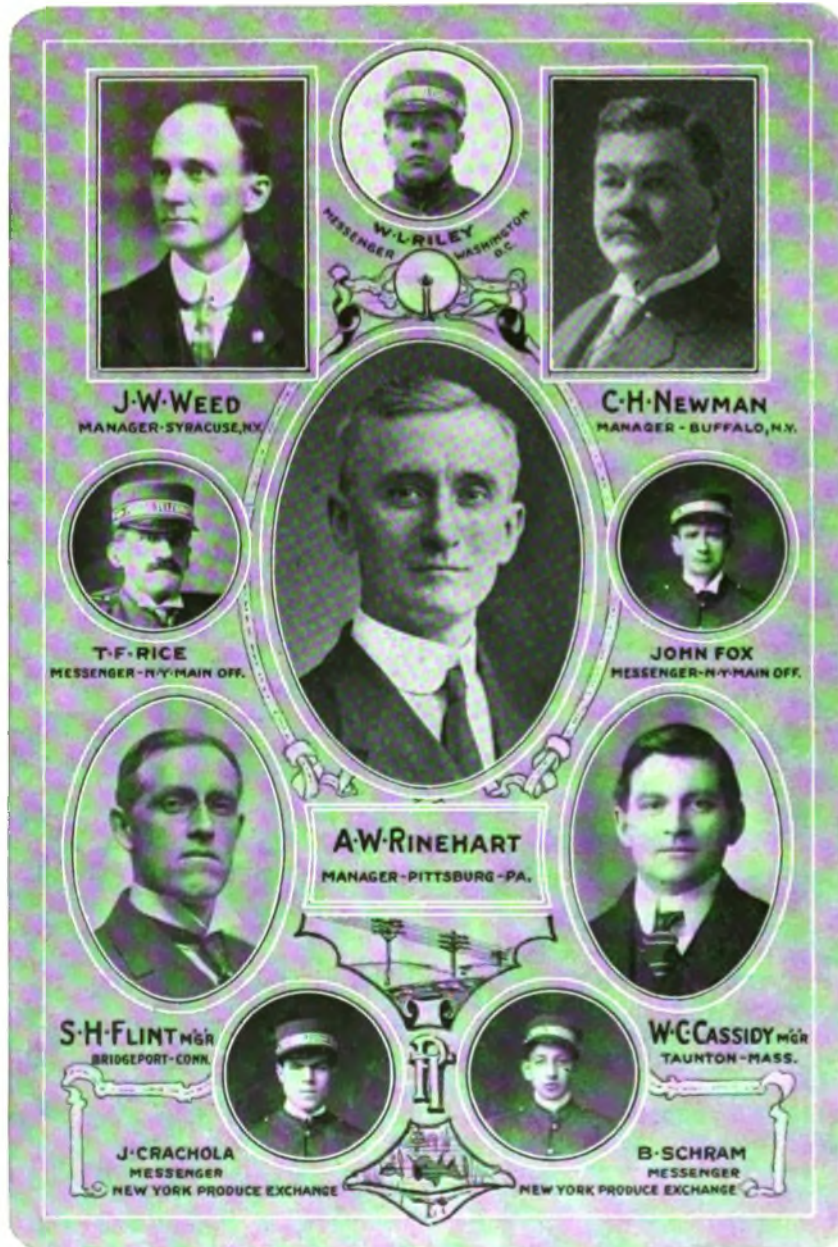
First Prize, Class C, \$50, W. C. Cassidy, Taunton, Mass.

MESSENGERS.

First Prize, Class A, \$25, T. F. Rice, New York Main Office.

Second Prize, Class A, \$15, J. Fox, New York Main Office.

Third Prize, Class A, \$10, W. L. Riley, Washington, D. C.



WINNERS IN THE EASTERN DIVISION. *

EASTERN DIVISION, MANAGERS.

First Prize, Class A, \$250, A. W. Rinehart, Pittsburg, Pa.

Second Prize, Class A, \$100, C. H. Newman, Buffalo, N. Y.

First Prize, Class B, \$100, J. W. Weed, Syracuse, N. Y.

First Prize, Class B, \$15, J. Crachola, New York Produce Exchange.

Second Prize, Class B, \$10, B. Schram, New York Produce Exchange.

WESTERN DIVISION, MANAGERS.

First Prize, Class A, \$250, C. A. Comstock, Milwaukee

*Engravings loaned by Postal Telegraph.

Second Prize, Class A, \$100, O. B. Plumly, El Paso, Tex.
 First Prize, Class B, \$100, Miss F. M. Law, Flint, Mich.
 Second Prize, Class B, \$50, G. L. Pierce, Evansville, Ind.
 First Prize, Class C, \$25, A. S. McKellar, Vandalia, Ill.
 Second Prize, Class C, \$25, Miss D. M. Becksted, Newark, O.

Third Prize, Class B, \$5, John Hubler, Benton Harbor, Mich.
 First Prize, Class C, \$15, Frank Johnson, Leavenworth, Kan.

SOUTHERN DIVISION MANAGERS.

First Prize, Class A, \$250, G. W. Phillips, Raleigh, N. C.
 Second Prize, Class A, \$100, L. A. Mitchell, Jacksonville, Fla.



WINNERS IN THE WESTERN DIVISION.

MESSENGERS.

First Prize, Class A, \$25, Julius Cohen, Chicago, Ill.
 Second Prize, Class A, \$10, John Klaric, St. Louis, Mo.
 First Prize, Class B, \$15, William Schindler, Cairo, Ill.
 Second Prize, Class B, \$5, J. Fortelka, Cleveland, O.

First Prize, Class B, \$100, V. S. Brown, Henderson Ky.
 Second Prize, Class B, \$25, C. A. Massenburg, Ft. Monroe, Va.
 Third Prize, Class B, \$25, J. J. Downing, Frankfort, Ky.
 First Prize, Class C, \$50, L. L. Armistead, Alexandria, Va.

PACIFIC DIVISION. MANAGERS.

First Prize, Class A, \$250, J. J. Dunne, Seattle, Wash.

Second Prize, Class A, \$100, V. V. Stevenson, Los Angeles, Cal.

First Prize, Class B, \$100, Mrs. H. H. Hall, Santa Barbara, Cal.

Second Prize, Class A, \$25, R. Saylor, Los Angeles, Cal.

First Prize, Class B, \$15, Archie Vignola, San Francisco, Cal.

Second Prize, Class B, \$10, O. C. Luelling, Fresno, Cal.



WINNERS IN THE SOUTHERN DIVISION.

Second Prize, Class E, \$50, S. S. Shea, Bellingham, Wash.

First Prize, Class C, \$50, Miss R. Blasingame, Chico, Cal.

MESSENGERS.

First Prize, Class A, \$25, Herman Miller, San Francisco, Cal.

Dinner of Pittsburg Postal Employees.

On Saturday evening, March 12, the chiefs, heads of departments and branch office managers of the Postal Telegraph-Cable Company at Pittsburg, assembled at a complimentary dinner given by Manager A. W. Rinehart, in the Fort Pitt Hotel, to celebrate the winning of the first prize offered by President Mackay, to managers of the

eastern division. As Mr. Rinehart does nothing by halves, the dinner was a success in every particular. The table was spread in the Dutch Room of the hotel and the arrangements were neat and artistic. Throughout the dinner, an orchestra rendered pleasing selections.

of New York, and Manager Newman, of Buffalo. Then, as toastmaster, he introduced Mr. C. E. Bagley, superintendent at Philadelphia, who spoke briefly on "The Value of Organization and Co-operation." Following Mr. Bagley's address, Superintendent Scrivens,



WINNERS IN THE PACIFIC DIVISION.

When the table was finally cleared, Mr. Rinehart made an address in which he said that it was by the united efforts of all the Pittsburg employes, that he was able to win the prize, and he urged continued co-operation. He read messages of regret from General Superintendent Pillsbury, Division Superintendent Lemon, Superintendent Kimmey and Superintendent Lane,

of Pittsburg, spoke on the conditions throughout the Pittsburg district and the necessity for continued hard work. Assistant Manager, H. J. Colebrook, the next speaker took as his subject, "Pillowcases"; Chief Operator A. M. Smith spoke of "The Relation of Main to Branch Offices"; Cashier W. H. Pennell discussed "The Right Thing, at the Right Time, in the Right

Place"; Chief Delivery Clerk Louis Mentzer told about "Sending out the Messages." Mr. Mentzer is said to have been with Noah in the ark, and is credited with having sent out the dove, but as no one present was there, it could not be verified. Following his remarks, Traffic Chief W. M. Munson spoke on the "R" business; Foreman Peckes on "The Linemens' Part of the Work"; Wire Chief Dull on "Fishing," and Night Chief, A. J. Eaves, on "Permanent Organization." The latter subject came in for some general discussion, and a committee of five was appointed to consider the formation of a permanent organization among the Postal employes in Pittsburgh.

Among those present were: C. E. Bagley, Mr. and Mrs. Henry Scrivens, Mr. and Mrs. A. W. Rinehart, H. J. Colebrook, A. M. Smith, A. J. Eaves, G. W. Dull, F. L. Bender, D. F. Lloyd, W. M. Munson, T. J. Hoge, A. J. Long, A. B. Lafferty, T. Peckes, W. W. Ryan, W. H. Pennell, Louis N. Mentzer, M. T. Finnell, C. E. Moreland, J. M. Burd, Mrs. J. M. Edwards, Mrs. Josie Rawson, Misses Katherine Early, Louise McFall, May Cartin, Louise Yetter, Emma Sellers, Bessie Fairgrieve; Messrs Archie D. Wise, C. A. Newhart, H. M. Kelleher, Joseph Frieman and Thomas Sinnott.

Dinner of Postal Employes at Milwaukee.

To commemorate the winning of the western division first-class prize offered by President Clarence H. Mackay, of the Postal Telegraph-Cable Company, the employes of the Milwaukee, Wis., office were given a banquet at the Hotel Blatz, Saturday evening, March 5, by Manager C. A. Comstock.

After an elaborate repast, the following toasts were responded to:

"Collections and Accounting," Philip L. Lee, cashier; "The Development of Electricity as it Pertains to the Telegraph," F. A. Villwock, chief operator; "The Delivery Department," M. F. Dunn, delivery clerk; "Making the Company Popular with the Public," C. A. Comstock, manager; "Work in the General Office as it Relates to the Local Offices," L. R. Thomas, chief clerk to the superintendent at Chicago. Mr. H. G. McGill, superintendent at Chicago, who was present, also made an address. Many suggestions of value were brought out in these talks which were an inspiration to those present.

Mr. S. E. Leonard, superintendent of the Western Union Telegraph Company at Denver, Colo., in renewing his subscription for another year, says: "It gives me great pleasure to enclose herewith my check for \$2.00 in payment of my subscription to your most valued publication, *Telegraph and Telephone Age*. I look eagerly forward to its receipt and would not under any circumstances do without it. I want to assure you further that I never miss an opportunity to speak a good word for the *Age* and know of several of our employes who have sent in their subscriptions on my recommendation."

The Development of Inventions.

There is a popular saying to the effect that any fool can think of a new device, but a clever man is required to make it in practical form, and a genius to sell it, says a writer in a recent number of the *London Electrical Review*.

There is something more than a basis of truth in this saying, and the patent records establish the fact that many good ideas have been protected without further development, while the difficulty of selling even an invention which has proved its utility, must have come home to the majority of patentees.

Unfortunately new ideas, and very often good ones, seem to occur more frequently to unpractical men as opposed to those having mechanical experience, with the result that the invention only reaches the protection stage instead of being carefully developed. It would seem that scope should exist for trained men to take in hand the ideas of others, and to put them into practical form.

The training required for those destined to undertake this work must be of the widest possible description, and not only should the aspirant be familiar with modern practice in all kinds of mechanical directions, but he should be a skilled worker in both wood and metal. In developing a mechanical invention a great deal of experimenting usually has to be done, and the appliances dealt with may often include several different kinds of material.

No doubt a number of ordinary workmen each skilled in one craft could be employed upon such work under the control of an experienced designer, but the risk of disclosure would be very much increased, and the work could not be so quickly carried out.

Such men are incapable of grasping an idea quickly, hence the designer would have to spend much time in explanation and the making of sketches before the parts required could be made.

On the other hand, a man skilled in almost any craft and possessing a wide experience of the devices adopted in many different kinds of machinery, would often be able to do the work in the time taken to explain the idea to an ordinary workman.

It must be admitted that men having these qualifications are difficult to obtain, and as time goes on the scarcity of those having an all-round training is likely to increase, owing to the spread of specialism; at the same time, it would seem that some of the younger generation who have an aptitude for invention might well consider the development of patents as a vocation for which they must fit themselves by an all-around training. The pay would be high for such services, and a demand for them is already apparent, this demand being certain to increase as the idea catches on and the existence of experts in this line becomes known.

Following the lead of New York State, recommendation has been made to the legislature of New Jersey that a committee be appointed to investigate the telephone and telegraph companies in that state.

Wireless Telegraph Tournament at Philadelphia.

The first wireless telegraph tournament in the history of that art was conducted by the United Wireless Telegraph Company at the Philadelphia Electrical Show on February 23. It was one of the best managed events of the kind that has occurred in many years. Every contest was called on time and there was no delay between the individual performances.

Clement H. Congdon of The International Bureau of Publicity, an old time telegraph operator, had entire charge of the tournament and it was due to his keen interest in telegraphy and telegraph men that the United Wireless Telegraph Company was induced to undertake the conduct of the tournament. Mr. Congdon acted as judge in all of the events.

A pleasing feature of the evening was the presentation of four loving cups to the operators of the Keystone Telephone Company for "courteous and efficient service," on behalf of all the exhibitors at the Electrical Show.

The official timer was Mr. Channing Eastburn president of the Philadelphia Market Street Business Mens' Association.

The contestants were: R. E. Scheirer, of Reed M. Morgan and Company; G. A. Hodgson, Pennsylvania Railroad; Richard C. Bartley, Pennsylvania Railroad, holder of the World's Championship for sending twenty messages in nine minutes and thirty-six seconds; W. V. Madden, Postal Telegraph-Cable Company; Harvey Williams of Ervin and Company, winner of the Championship of America at the Exposition Hall Tournament, Philadelphia, 1903; W. L. Street, Pennsylvania Railroad; W. F. Bannester, Pennsylvania Railroad; Edward M. Price, Postal Telegraph-Cable Company; J. L. Gilbert, S. M. and M. S. Fridenburg; Charles I. Kershner, Philadelphia and Reading Railroad Company; Miss Mary FitzGerald, Western Union Telegraph Company; Miss Edna Moyer, Western Union Telegraph Company; Robert F. Miller, United Wireless Telegraph Company; and David J. Heilig, United Wireless Telegraph Company.

The free-for-all class carried with it the Harr Prize Cup offered by Mr. M. K. Harr of the United Wireless Telegraph Company as well as four other trophies. In this competition wireless operators, amateur and professional, were permitted to enter but the showing of the wireless men was not considered in the awards made except as to the Harr Prize Cup. In other words the wire operators were permitted to try for the Harr Prize Cup but the wireless operators were not allowed to enter for any of the other prizes.

This test brought four world's champions into action. Harvey Williams and Richard C. Bartley, both medal winners and champions, divided the sending time while David J. Heilig and Robert F. Miller, rated as two of the fastest wireless operators in the service copied. When Bartley and Williams took this test Heilig and

Miller divided the sending time so that it is fair to say that no such quartette of telegraphers ever participated at one time in any tournament. Robert F. Miller won the Harr Prize Cup which was presented to him by Mr. S. S. Bogart, vice-president of the United Wireless Telegraph Company; the Sydney K. Allman Cup was won by Harvey Williams, the Philadelphia Electric Cup by Richard C. Bartley, the Philadelphia Record Cup by Charles I. Kershner, the Hotel Majestic Cup by W. F. Bannester.

In the class for ladies Miss Edna Moyer won the Keller-McManus Cup while Miss Mary Fitzgerald won the Frichoffer Baking Company Cup.

Three world's records were broken in the contests. One for sending messages, one for perfect score in receiving wireless messages and one for sending and receiving. Harvey Williams triumphed in two of these "record" events and Mr. Miller established a new high mark for wireless work.

The trophies awarded are valued at \$1,000 and they certainly are the most magnificent prizes ever offered in America for any free-for-all contest.

Two one kilowatt wireless outfits were installed in the Electrical Exhibition one at each end of the Armory in which it was held. One set was connected to the antenna on the roof. The working of this set was heard down the coast as far as Cape Hatteras and at stations in New York. The fact that these equipments were in continuous operation for five hours shows the ability of the apparatus to withstand constant use.

The Storage Wheel for a Telegraph Transmitter Not a New Idea.

We are in receipt of the following letter from a Norwegian subscriber concerning the new keyboard telegraphic transmitter which we described in our February 16 issue, the invention of Mr. E. E. Kleinschmidt, of New York. The principal feature of this transmitter is a storage wheel which stores up the symbols so that they will be transmitted over the wire at a uniform rate, independently of the speed of the sending operator. In regard to this device our correspondent says: Editor Telegraph and Telephone Age:

I have just received Telegraph and Telephone Age for February 16, with its interesting contents, among which I find on page 119, "A New Keyboard Telegraphic Transmitter." The "storage wheel" and the whole description points to an old friend which you will find described apparently like this one in the "Journal Telegraphique" of Berne, Switzerland, Volume II, 1874, page 423. One of these transmitters constructed by Messrs. Siemens and Halske was used more than thirty years ago between Norway and England on the North Sea cable.

Yours truly,

Joh Kjennerud,

Manager Government Telegraphs.

Voss, Norway, February 28, 1910.



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The Railroad.

Mr. A. B. Kratz has been appointed acting superintendent of telegraphs and telephones of the Panama Railroad, vice Mr. J. Beaumont, resigned.

The Los Angeles Convention of the Association of Railway Telegraph Superintendents which was to have been held from May 16 to 20, inclusive, has been postponed until June 20 to 24.

The New York Central Railroad is making preparations to equip its Ontario and St. Lawrence divisions with telephone despatching circuits.

Mr. W. L. Connelly has been appointed superintendent of telegraph of the Chicago, Indiana and Southern Railroad and the Indiana Harbor Belt Railroad, with headquarters at Gibson, Indiana.

The Michigan Central Railway is equipping four hundred and twenty-five miles of road with telephones for train despatching. They already have about three hundred and forty miles upon which the despatching is done by telephone.

The Lehigh Valley Railroad is making preparations to equip the entire mileage of their lines in New Jersey and Pennsylvania with telephone train despatching circuits. The total mileage embraced in these two states is three hundred and thirty-seven.

A meeting of the eastern division of the Association of Railway Telegraph Superintendents, was held at Washington, March 25. The Committee on the Standard Railway Telephone Contract made a report and this question was discussed preparatory to its final consideration at the Los Angeles Convention. Among those present were the following: Charles Selden, E. W. Day and B. F. Thompson, Baltimore; M. E. Launbranch, Chicago; N. E. Smith, New Haven, Conn.; E. P. Griffith, L. B. Foley, and H. E. Merrill, New York; J. C. Johnson, Philadelphia; W. F. Williams, Portsmouth, Va.; C. M. Lewis, Reading, Pa.; T. R. Gooch, Richmond, Va.; W. C. Walstrum, Roanoke, Va.; W. H. Potter, Washington, D. C.; W. P. Cline, Wilmington, N. C.

Mr. W. H. Hall, whose promotion to the position of superintendent of telegraph of the Missouri, Kansas and Texas Railway was announced in our March 16 issue, was born at Hannibal, Mo., October 31, 1869. He learned telegraphy at St. Louis and November 30, 1888, entered the service of the Missouri, Kansas and Texas as operator and clerk at the roundhouse at Hannibal. He served as operator and manager at various points on that system until February 28, 1896, when he entered the office of the superintendent of telegraph at Sedalia as clerk. The following year he became chief clerk, which position he held until April 1, 1905, when he was appointed assistant superintendent of telegraph. February 1 of this year, owing to the retirement of Mr. S. K. Bullard from the superintendency on account of ill health. Mr. Hall was advanced to his present position with headquarters at Denison, Tex.

The many friends of Mr. William Kline, formerly superintendent of telegraph of the Lake Shore and Michigan Southern Railway will regret to learn of his continued ill health. Mr. Kline, who is seventy-four years of age, has suffered two strokes of paralysis and is at present in a rather serious condition.

In a recent number of the Railway Age Gazette an outline is given of what is being done by the different railway systems in the line of pensioning employes. The figures given show that at present twenty-four railroads have pension systems of some kind in operation. It is estimated that over 7,800 persons are now on the pension rolls of the various companies. The Pennsylvania Railroad leads with 2,298 pensioners, and an annual expenditure of \$600,000 to which list the Pennsylvania Lines west of Pittsburg add 862 names and an annual outlay of \$222,500. Over \$2,000,000 is now being distributed annually by the different railroads to employes who have grown old in their service.

Mr. Edward C. Keenan has been appointed superintendent of telegraph of the Lake Shore and Michigan Southern Railway, the Lake Erie, Alliance and Wheeling Railroad and the Dunkirk, Allegheny Valley and Pittsburg Railroad, with headquarters at Toledo, O., vice Mr. William Kline, retired. Mr. Keenan was born at Toledo, April 20, 1868, and entered the telegraph service August 3, 1885, as a railway operator, serving in that capacity at various smaller stations and in the dispatchers' offices at Detroit and Toledo. In 1892 he accepted a clerkship in the engineering department of the Lake Shore and Michigan Southern at Toledo. He remained at that place until 1900, when he was transferred to the general offices of the engineering department at Cleveland. The next year he was appointed chief clerk in the engineering department of the Lake Erie and Western Railroad at Indianapolis. In 1906 he was made chief clerk of the engineering department of the Lake Shore and Michigan Southern Railroad at Cleveland, which position he held until his present promotion.

Recent numbers of a German publication contain a paper discussing the prospects of telephony and high speed telegraphy over ocean cables, contributed by the German Telegraph Experiment Station.

The new Federal Incorporation bill, which has been drawn up by Attorney-General Wickersham, and endorsed by President Taft, has been introduced in both branches of Congress. The proposed bill, which is over fifty pages in length, places great power over commercial enterprises in the hands of the Commissioner of Corporations, places restrictions upon the consolidation of different interests and requires all corporations to make semi-annual reports giving such information in regard to their business as the commissioner may require. If this act becomes a law it will affect all telegraph and most of the telephone companies.

Radio-Telegraphy.

Wireless telegraph apparatus will be installed on some of the steam fishing trawlers operating in the North Sea, the object being to keep the fishermen informed of the state of the market.

A project is on foot to install a wireless telegraph station at Ohio Wesleyan University and establish a course in wireless telegraph engineering at that institution.

One of the features at the electrical show which is now being held in Minneapolis, having opened March 26 and continuing until April 2, is a balloon which is directed in its movement overhead in the building by wireless.

The United Wireless Telegraph Company has opened its station on the Hotel Nassau at Long Beach, L. I., and will handle the marine business from that point until its new station at Montauk Point is ready for business.

During the recent British army manoeuvres at Aldershot, in which 12,000 troops participated, portable wireless telegraph stations were successfully used to keep the various commands in constant touch with each other.

The steamship Tennessee, on a recent voyage across the Pacific, when five days out from Honolulu, going westward, claims to have received by wireless a weather report sent out from Table Bluff, on the coast of California, 4,580 miles distant.

The Marconi International Marine Communication Company reports that since the first of the year they have received orders for the equipment of over thirty ships. Among these are some of the vessels of the Atlantic Transport, the Red Star, the White Star and the Leyland Lines.

At the annual meeting of the United Wireless Telegraph Company, held in Portland, Me., March 9, L. C. Wallace was elected a director to succeed I. Newton Snively, who died recently. F. X. Butler and E. P. Davis were added to the board. Other directors were re-elected.

It is reported that an American company is endeavoring to secure a concession to construct a wireless station at Singapore to connect with similar stations at Manila, Hong Kong and Bangkok. The station at Hong Kong would be capable of communicating with all of the others and with Shanghai and Yokohama as well.

Mr. L. H. Walter, in a recent article in an English contemporary, discusses the question of directive wireless telegraphy, taking up the methods of Artoni and of Bellini and Tosi. He gives the results of an examination of the radiation which could be expected from a single aerial of the Artoni type and shows that instead of propagating waves chiefly in a direction perpendicular to the aerial plane, it radiates waves which have practically the same intensity in all directions. He concludes that the method of crossed directive aerials employed by Bellini and Tosi appears to be the only one which actually accomplishes the desired results.

A patent, No. 950,781, for a detector for wireless communication, has been secured by J. L. Hogan, of New York. Ferro-silicon, consisting of a fused mixture of iron and silicon, is used.

A patent, No. 951,524, for a wireless controlling device has been granted to Charles L. Coleman, of San Leandro, Cal. A kind of make-and-break device co-operates with a coherer, etc.

A patent, No. 952,403, for wireless telegraph receiving apparatus has been granted to C. D. Babcock of New York. A receiver, a direct-connected syntonizer, and inductively connected syntonizer and means for connecting either one to said receiver.

The Grand Trunk Pacific Railway has asked the Canadian government for authority to erect wireless stations to communicate across the mountains and connect Edmonton with Prince Rupert. This would aid materially in construction work, and at the same time make it possible for the general manager at Winnipeg to communicate with the officials in charge on the Pacific Coast.

The annual election of officers of the Society of Wireless Telegraph Engineers occurred at a meeting held February 28. The following were elected: Dr. Lee De Forest, president; John S. Stone, vice-president; V. F. Greaves, treasurer; E. D. Forbes, secretary; W. H. Bathrick, J. H. Campbell and E. B. Moore, managers. A paper by Dr. Louis Cohen, entitled "Coupled Circuits in Which the Secondary has Distributed Inductance and Capacity," was discussed by Mr. O. C. Roos.

It has been suggested that one of the automobiles which participate in the Glidden Tour during the coming summer be equipped with a wireless telegraph outfit. A considerable portion of this year's tour will extend through territory where telegraph and telephone services are comparatively inefficient, and it is planned to have the car provided with the wireless apparatus follow in the wake of the tour so that any accidents may be promptly reported.

It has been decided to expend about £70,000 in constructing a wireless system to connect the British possessions in the Pacific. These stations will be under governmental control and the expense will be divided between the British government and the governments of Australia, New Zealand and Fiji. High power stations will be established at Sydney, Australia; Doubtless Bay, New Zealand, Suva, Fiji and Ocean Island, Medium power stations will be erected at Tulgai, Solomon Islands and Vila in the New Hebrides.

The bill introduced in Congress by Senator Frye, of Maine, requiring ocean-going steamers, carrying fifty or more passengers to be equipped with efficient wireless apparatus which shall be capable of transmitting and receiving messages over a distance of at least one hundred miles has been favorably reported to the Senate by the Committee on Commerce to which it was referred. Penalties are provided in this measure for failure to comply with its provisions and any fine assessed in this connection would be a lien upon the vessel.

The regular monthly meeting of the Wireless Institute of New York will be held April 6, in the lecture room of the department of physics of the College of the City of New York. A discussion on "Experimental Tests of the Radiation Law for Wireless Oscillators" will be opened by Professor M. I. Pupin of Columbia University.

Students of Harvard University have formed a wireless telegraph company having five stations in operation. The principal work of the company at present is in testing out interference preventing devices. The effects of varying the wave length of stations and their power of radiation is also being studied with reference to the interference problem.

The attorney-general of Michigan has decided that the United Wireless Telegraph Company may be admitted to that state under the telegraph incorporation act. As this company does not use wires for the transmission of its business there was some doubt as to the classification under which they should be incorporated. Although their apparatus is different, it has been decided that as their purpose is the same as that of the wire companies they must be incorporated under the same act.

The German Colonial Company of Berlin has announced that as a result of preliminary trials which have been made they believe that wireless communication can successfully be established between the high power station at Nauen, near Berlin, and the German Cameroons, 3,410 miles distant. To accomplish this a station of the same size as the one at Nauen would have to be erected in the colony and this would have to be at some distance from any high or wooded mountain.

Wilson Military Academy at FINDERNE, N. J., is probably the only college preparatory school in the country giving regular instruction in wireless telegraphy. This institution has a five kilowatt wireless station which receives messages from points along the Atlantic Coast as far south as Charleston, S. C. Both commercial and wireless telegraphy is taught by Mr. Walter M. Ronan, a practical telegrapher, who was for several years wireless operator on the Ward Line boats.

It is stated that the French Line is preparing to equip two of their freight steamers plying between France and the United States with the Bellini Tosi "wireless compass" system. This consists of a small directive receiving system by means of which the direction from which signals are arriving is easily ascertained for distances up to fifteen or twenty miles. A greater range is not considered necessary as the danger zone lies within these limits. It is believed that by this device much valuable time may be saved by the vessels because of their ability to find their way into New York harbor in foggy weather by the aid of signals received from shore stations of known location.

A patent No. 950,257, for apparatus for generating undamped electric oscillations has been awarded to S. Eisenstein of Kiew, Russia. A negative electrode, a plurality of positive electrodes, a condenser connected to each positive electrode with means for establishing oscillations between the condenser and negative electrode and for supplying alternating current separately to the electrodes.

Wireless Legislation.

The Committee on Merchant Marine and Fisheries has reported favorably to the House of Representatives the Greene bill which provides that all wireless operators, and the companies employing them, shall be licensed by the Department of Commerce and Labor, such licenses being revokable in event of the violation of any of the provisions of the proposed law. Messages and signals relating to the distress of ships at sea have priority over all other forms of wireless communication. The transmission of false and fraudulent messages is punishable by a fine of not more than \$2,500 or imprisonment for not more than five years.

The President receives authority to establish from time to time regulations by designations of wave lengths or otherwise, governing commercial companies, such regulations to be enforced by the Department of Commerce and Labor.

The House Committee on Naval Affairs has also reported favorably the Roberts resolution recommending the establishment of a wireless board of seven members, who shall make investigations and report to Congress, December next, what legislation may be necessary to prevent interference with wireless messages.

A Telegraph News Bulletin Printer.

In our column of recent telegraph and telephone patents in this issue it will be noticed that a patent has recently been granted for a telegraph bulletin printer. The device is designed primarily for press bulletins and is controlled by a key board telegraphic transmitter from which news bulletins may be printed simultaneously at as many points as desired. These bulletins may be of any width and the printing may be done with as large type as desired. It is claimed that the printing apparatus can be operated from a distance of one hundred miles or more over an ordinary telegraph circuit. The paper upon which the matter is printed is unwound automatically from a roll and the bulletin displayed may be of any length suitable for the space in which it is shown. A company has been formed to manufacture these machines and it is expected that they will soon be placed on the market.

A bill has been introduced in the New York Legislature forbidding the employment of minors as telegraph messengers between the hours of 10 p. m. and 5 a. m. in cities of the first and second class.

"Operators I Have Known."

At the recent banquet of the Postal Telegraph Club of Atlanta, Captain William B. Kenny of the Associated Press in that city, gave a most interesting talk upon the topic of "Operators I Have Known." His remarks upon this subject were in part as follows:

"I recall," said Captain Kenny "an incident after the Russian-Japanese War. A crowd of correspondents had returned, and among the number was one from Hungary. He was a retired army officer and very dignified. When they reached San Francisco, the Americans of the party talked earnestly to the Hungarian, who was in this country for the first time, explaining that everyone here was equal and that any attempts to domineer would probably mean trouble. It so happened that as soon as he had landed, the Hungarian desired to cable his paper at Budapest of his arrival. For this purpose, accompanied by one of the Americans he entered a telegraph office. There was the inevitable gum chewing young woman behind the counter. Our friend wrote his cable and passed it over with a courtly bow. The young woman seized a rate book and began to thumb the pages. When she seemed in trouble, the American newspaperman tried to help her but she glared at him, turned a few more pages and shouted, 'Ain't no such town as Budapest.' Do you blame that poor Hungarian for forgetting his warning?"

"But a much more amusing episode happened in one of the Western states during a big strike several years ago, which was marked with much rioting and not a little bloodshed. One of the correspondents had been up in the mountains with a body of soldiers and had a first class story of a running fight which he knew absolutely was exclusive. He reached the little telegraph office about nine p. m. and found all the other specials taking it easy and bemoaning the fact that there was nothing upon which to hang a good yarn. Now this man represented an afternoon paper, so he wrote his story deliberately and carefully and when it was concluded, saw that it was not yet midnight. So he walked over to the telegraph office, now augmented by a number of fast press operators from nearby cities and filed his stuff. 'It does not have to be hurried,' he told the old manager in charge, 'do not let it hold up any of the morning paper stuff, but get it off at night rate.' And the old fellow thanked him and promised. The night wore on and nothing new happened. About five o'clock in the morning, the special visited the office again. 'Have you cleared on my stuff, old man?' he asked. 'Not yet,' replied the guileless old manager, 'you see the Hearst man is not through with it yet, but the others have finished with it and I can start it in a few minutes.'

"And the special was beaten on his own story!"

Captain Kenny recited many instances of striking devotion to duty and courage of a high order dis-

played by the men who sit at the keys and whose names are seldom heard.

"Only last fall, during the big storm in New Orleans we had a splendid example of this loyalty. Paul Joyner of the Associated Press operating force at New Orleans and W. J. McFatter were hurried into Hattiesburg, Miss., where the only flickering wire out of the storm swept country was found. These men stuck to their keys for thirty-one hours at a stretch, because a train wreck delayed their relief, and never whimpered. Joyner fainted as the men sent to help him walked into the room. Both of them were offered large sums to give brokers the exclusive cotton quotations from New York and withhold them, only a few minutes, from the papers which were supplying the New Orleans cotton exchange, but they refused, as everyone knew they would."

The speaker closed with a tribute to these men of the key whose devotion and intelligent co-operation he declared was one of the boasts and the pride of the big newsgathering association.

Operators in Canada.

Editor Telegraph and Telephone Age:

I notice in the February 16 issue of your paper an article under the heading of "The Telegraph Situation in Canada." The statement is made therein that conditions of living and employment are as good, if not better, than in the United States. I can cheerfully subscribe to all that was said in that article as I consider the conditions of employment and living here much better in every respect than in the United States. Although I have been here only three years I find I am better off in every respect than I would be if I had remained in "Uncle Sam's" domain. As many as a score of operators that I know accepted positions in various parts of Canada in 1907 and not one of them has ever regretted the change. I can recommend this country to every man who likes honest people who are warm-hearted and are not troubled with swelled heads. Nobody here feels that he is the pivot around which the whole thing revolves. You cannot tell who is a millionaire and who is a ditch digger. Since coming here my health has improved greatly. I would urge all operators who are struggling along in the large cities of the United States to make a break and locate in Canada. There are plenty of opportunities here and the country is expanding rapidly.

A Former New Yorker.

A bill has been introduced in the House of Representatives by Congressman Smith, of Michigan, to impose a tax of five per cent. upon the gross earnings of the telegraph companies in the District of Columbia.

An Illinois paper speaking recently of the fact that there were two new telegraph operators in town, said: "but operators here are always new, as they linger only from one moon until the next."

Obituary.

Frank C. Ball, a telegrapher in the employ of the American Telephone and Telegraph Company, New York and who was formerly identified with the Postal Telegraph-Cable Company died at his home at Woodridge, N. J., March 23, aged forty years.

Charles H. Haskins, a forty-niner of the telegraph, died at his home in Buffalo, N. Y., March 22, aged eighty years. Mr. Haskins had charge of the first telegraph line established between Queenstown and Ilamilton, Ont., in the late forties. He was an expert in telegraphy and telephony and the inventor of several devices used in these industries. He was also well known as an author of electrical books.

Mr. Nectaire Rousseau who was formerly a prominent figure in telephone and telegraph circles in Chicago died March 17, aged seventy-two years. Mr. Rousseau was identified with the early development of the telephone in Chicago and was connected at different times with the American District Telegraph Company, the Western Union Telegraph Company and the Chicago Telephone Company. He retired in 1894.

Mr. William A. Ingham, who was the first vice-president of the New England Telephone Company, died in Lowell, Mass., March 17. Mr. Ingham with Charles J. Glidden and others in 1879, purchased from the Bell Telephone Company the Lowell exchange, one of the first exchanges in the world. Mr. Ingham became the head of the Lowell Telephone Syndicate which at one time controlled one-sixth of the telephone business in the United States. He retired from the telephone field in 1887.

J. Wilber Bender, son of R. W. Bender, of the Washington, D. C., office of the Western Union Telegraph Company, died March 16, aged forty-seven years. Mr. Bender entered the employ of the Western Union at Washington in the spring of 1876, continuing therein until 1902. He was the "Fast Stock" operator for fourteen years and was an expert in that branch of the service. The exactions of this work, however, broke down his health and he was compelled to give it up in 1902, since which time he has been an invalid. Mr. Bender was among those who volunteered and went to Charleston, S. C., at the time of the earthquake at that place, remaining there for some weeks after that terrible catastrophe.

Levi C. Weir, a military telegrapher and for fifteen years president of the Adams Express Company, died in New York, March 28, aged sixty-eight years. Mr. Weir was born at New Haven, Conn. He learned telegraphy and at the outbreak of the war joined the military telegraph forces. A sketch of his experiences in this connection appeared in our columns May 16, 1909. He severed his connection with the military service in 1862, went to Cincinnati and took a position with the Western Union Telegraph Company, where he earned an enviable

reputation as a press operator. He was one of the few telegraphers in the United States who could copy from twenty to twenty-five words behind the sender. In 1868 he became private secretary to the general superintendent of the Adams Express Company, at Cincinnati, and has been connected with those interests continuously since that time. In 1894 he was called to New York to assume the presidency. This position he held until about a year ago when, on account of ill health he retired, becoming chairman of the board of managers and trustees.

Trade Notes.

Pierson Roeding and Company of San Francisco are now sole Pacific Coast sales agents for the Electric Storage Battery Company of Philadelphia.

The Kellogg Switchboard and Supply Company, Chicago, has been awarded the contract for a new common battery switchboard at Dickenson, N. D., which will have three common battery positions and one toll position.

After long-drawn-out litigation the rights of the American Electric Fuse Company in patent No. 521,018, covering double tubed connectors for telephone and telegraph wires have been upheld by the United States Circuit Court.

The St. Louis office of the Electric Storage Battery Company, of Philadelphia, has been moved from the Wainwright Building to the Fullerton Building, at Seventh and Pine Streets.

The business of the Chase Motor Truck Company, of Syracuse, N. Y., is growing very rapidly. They have recently enlarged their plant by a building 200 feet long and 60 feet wide and have equipped a new suite of offices which include a director's room, sales department, sales managers' private office, president's office and general manager's office.

The business of the Western Electric Company for the quarter ending February 28 showed an increase of over fifty per cent. over the corresponding quarter last year and officials of the company believe that the sales of the present year will amount to at least \$61,000,000.

Announcement has been officially made that The Electric Storage Battery Company of Philadelphia, has acquired all the patents and rights of the Westinghouse Storage Battery Company. The Westinghouse Storage Battery Company owned all the rights of the General Storage Battery Company, and the storage battery interests and patents of the Westinghouse Machine Company.

The Electric Storage Battery Company now has the sole right to manufacture Westinghouse batteries.

Smith, meeting Jones with his gun over his shoulder—"Been hunting eh? What did you kill?"

Jones—"Was not hunting to kill anything. I did, however, break ninety out of every hundred insulators that I shot at."

Boston Aid Society Annual Election.

At the annual meeting of the Telegraphers' Mutual Aid Association of Boston, held in that city, March 6, the following officers were elected: Robert E. Tobin, president; John B. Gatins, vice-president; W. H. Sullivan, secretary-treasurer; W. J. Mahoney, recording secretary; F. M. Kelliher, sergeant-at-arms; C. L. Mooney, chairman relief committee, with these assistants—Miss M. A. Murray, J. J. Carney, D. O'Donnell and J. A. Ryan; executive committee—J. R. McLean, A. V. Losea, T. R. Melville, P. T. Haggerty and J. A. McClinchey.

Electric Club of Boston.

With a membership of seventy, including the officers of the company, the "Electric Club of Boston" has been organized by employees of the Western Union Telegraph Company. Lectures by electrical experts from the various Boston colleges will be given weekly with a view to educating the members on the mechanics of every branch of the industry of which they are a part. Talks will also be given from time to time by the different heads of departments of the company on their particular specialty when the course of study reaches such points.

Superintendent C. F. Ames presided at the opening meeting and delivered an address on the objects of the new organization. The officers elected are as follows: president, R. W. Hall, in charge of the Barclay department; vice-president, W. G. Wetmore, acting chief operator; treasurer, G. W. Tracy, western wire chief, and secretary, George Cunningham, eastern wire chief.

At the close of the meeting an unanimous vote of thanks was given Mr. Ames for the substantial aid he has given the Club in acting as Chairman pro tem and in other ways.

Electrical School Organized in New York.

An electrical school was, on March 25, started among the employees of the Western Union Telegraph Company in New York. Mr. T. A. McCammon was elected president of the new organization and Mr. A. J. Heldman, secretary and treasurer. The school will have sessions of two hours each every Thursday evening. Mr. Lewis C. Williams, professor of physics and electricity at Erasmus Hall High School, Brooklyn, who has taught classes among Western Union employees for several years has been secured as an instructor. He will lecture and quiz the school every other week for two hours. On the alternate weeks he will lecture one hour and the other hour Mr. Charles Thom will devote to teaching the practical side of the telegraph. The class starts with a membership of about fifty.

At the first regular meeting of the Club held March 23, Mr. G. S. Burnham gave a lecture on "Magnetism." Mr. Burnham will deliver a series of eight or ten lectures dealing with the different applications of electricity and in the last

few talks will consider especially the action of the electric current as applied to standard telegraph apparatus.

OTHER NEW YORK NEWS.

At a meeting of the directors of the Serial Building Loan and Savings Institution, held March 17, Mr. Ashton G. Saylor, general superintendent of the eastern division of the Western Union Telegraph Company, New York, was elected president, vice Mr. John C. Barclay, resigned.

The annual election of the Telegraphers' Aid Society of New York occurred at 195 Broadway March 29. The following officers were re-elected: R. J. Marrin, president; H. C. Worthen, vice-president; Thomas M. Brennan, treasurer and C. A. Kilfoyle, financial secretary.

Assessment No. 506 has been levied by the Telegraphers' Mutual Benefit Association to meet claims arising from the deaths of John W. Haines, at Ridgedale, Tenn.; Neil S. Brown, at Nashville, Tenn.; William M. Ash, at Woodside, Md.; Thomas W. De Witt, at Montreal, Que., and Edmund R. Willerton, at Slingerlands, N. Y.

The economical management of the Serial Building Loan and Savings Institution, 195 Broadway, New York is responsible to a large extent for the fact that they can pay a higher rate of interest on savings than any other depository. All investments which they make have to be approved by the Board of Directors which consists almost entirely of telegraph men of high repute for their good judgment and who at the same time receive nothing from the association for their services. Start a savings account with this Institution today.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care Telegraph and Telephone Age, 253 Broadway, New York.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Leg Pattern \$2.50
Legless Pattern 4.00
F.O.B. Columbia, Pa.



THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

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Columbia, Pa. R. F. D. No 1.

Telegraph and Telephone Age

No. 8.

NEW YORK, APRIL 16, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Questions and Answers.

Among many questions received, the first one herewith presented offers an opportunity to state some interesting facts in connection with the action of an electric current in a conductor.

Question: When two wires are of the same length, or resistance, why is it that often one can be quadruplexed successfully while the other can not? According to Ohm's law the current strength or volume in each, when supplied by the same value of electromotive force, should be the same.

Answer: The working efficiency of a wire, single or duplex, does not depend solely upon the value of the current flowing, but more properly upon the speed with which the said current rises to its full value when an impulse is sent over or through the conductor; in other words, upon the factor called the time constant.

This point may be made clear from the following information:

When we send a current of electricity through a conductor it necessarily requires a fractional part of a second to dispose of itself throughout the entire length of the wire. Not that electricity when unhindered cannot travel fast enough to reach each part of the circuit in time to meet all practical requirements, but because there are some conditions existing in many circuits which tend to retard the manifestations of the work it is expected to do.

For example, if we take two wires of different gauges and lengths, but each having the same total resistance, and supply each with the same volume of current, the larger conductor will be a slower circuit than its companion, other conditions being equal.

The explanation is that owing to the greater superficial area of the larger conductor it takes longer for the current to fully charge the wire. It seems that the initial volume of current as it rushes through a circuit is partially swallowed up or absorbed for a moment, and as there is no manifestation of the current's activity on the relays until it reaches its final value, a signal is consequently delayed according to the capacity of the wire. The time lost, due to this so-called absorption, must be deducted from the duration of the period the current might have been effective had there been less or no absorption, in measuring the time constant, also the time lost due to the retarding effect of the line's discharge.

This property of a conductor is called its electrostatic capacity and its working efficiency is determined by multiplying the wire's capacity by the resistance in ohms of the circuit. When the product of the two reaches a prohibitive value, which latter has already been determined, we know, without trying, that it would be useless to attempt to quadruplex the circuit, or even work it single beyond a certain speed. It should thus be apparent why a very large wire, say between New York and Chicago, which possesses no more resistance than a No. 11 gauge copper wire half the distance in length, can not be quadruplexed while the shorter one can.

Another thing that retards the development of current in a circuit is the presence of one or more coils of wire in series with the conductor, such, for instance, as the windings of relays. The counter electromotive force developed, due to the interaction of the separate currents flowing side by side in the various convolutions of wire around the magnet, act as an impedance and thus add further to the retarding effect.

Hence the true efficiency of a wire depends upon percentage of effective current it delivers when in actual operation, and not upon the value of the current an ammeter would show while the circuit is closed and the current is at maximum strength. The more impedance there exists in a wire the greater will the tendency be to lop off a little time from the period or duration of the currents maximum strength, and lost time means so much lost power.

Question: In what way can I best determine whether the distant ground terminal of a ticker circuit is good or bad?

Answer: The inquirer does not state whether parallel wires are available or not for testing pur-

A patent No. 953,344, for a call-register for telephones, has been granted to John Merckens and Anton J. Herrick, of Chicago, Ill.

A patent, No. 953,361, for a mercury arc relay, has been taken out by J. B. Taylor, of Schenectady, N. Y. For telephone and telegraph lines, the relay including a vacuum receptacle, a vaporizable cathode such as mercury and two anodes with means for deflecting the arc stream from one or the other anode.

A patent, No. 953,550, for telegraphic apparatus, has been issued to H. E. Powell, of East Oakland, Cal. A main line sounder to be operated by weak currents.

The following patents have expired:

Patent, No. 494,185, for a printing telegraph, held by John E. Wright, of New York.

Patent, No. 494,385, for a telephone and signaling circuit, held by Frank A. Pickernell, of Newark, N. J.

Patent, No. 494,562, for a telautograph, issued to Elisha Gray, of Highland Park, Ill.

Personal.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company will sail for England April 20, on the Lusitania.

Captain Willard L. Candee, president of the Okonite Company, New York, is with Mrs. Candee enjoying a vacation in Bermuda.

M. Bela Gati, engineer-in-chief of the Hungarian telegraphs and telephones, expects to visit this country in the near future for the purpose of inspecting our telegraph and telephone systems.

Mr. H. H. Matlock, the well-known old time and military telegrapher, for many years past a telephone official of Springfield, Ills. who has spent the winter months at San Antonio, Tex. for the benefit of his health, has returned to Springfield, much improved by his sojourn in the south.

Mr. F. X. Cleary has been appointed advertising manager of the Western Electric Company. Mr. Cleary has been identified with that company for about twenty years and has held important positions in connection with the execution of sales campaigns of the company.

Mr. Hiram D. Rogers, manager of the Commercial News Department of the Western Union Telegraph Company at Cincinnati, O. in the late sixties and early seventies and for the past thirty-five years president of the Rogers Manifold and Carbon Paper Company of New York, has retired from active business and is now living with his son Albert R. Rogers in Boston.

Mrs. Mary H. Hall, mother of Edward J. Hall of New York, vice-president of the American Telephone and Telegraph Company and chairman of the executive committee of the Western Union Telegraph Company and of Sherman J. Hall, vice-president of the Missouri and Kansas Telephone Company, Kansas City, died in New York, April 1, aged seventy-six years. The interment was at Buffalo.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice president and general manager and Mr. W. I. Capen, general superintendent of plant, have returned to their offices after an extended trip of inspection through the western and southern States. Mr. Nally is in excellent health, having entirely recovered from the slight indisposition which he suffered while in Chicago.

General Superintendent E. B. Pillsbury has on permanent exhibition in his office one of the original Morse registers which has been used until recently at Suncook, N. H.

Mr. L. Lemon, division superintendent at New York has been visiting various New England offices of the company in the interest of the service.

Effective May 1, Mr. W. P. S. Hawk, superintendent of the eighth district, western division, will be transferred to Chicago, as superintendent of the sixth district, vice H. G. McGill, whose entire time will be devoted to the affairs of the first district. The present eighth district will be abolished, and the lines and offices west and north of Ogden will be transferred to the second district of the Pacific division, under charge of Superintendent J. A. Forehand, at Seattle. The lines and offices east and south of Ogden, including Ogden, will be transferred to the seventh district of the western division, in charge of Superintendent W. C. Black, at Denver.

Mr. D. McNicol, of the electrical engineer's office, New York is on the Pacific coast on company business.

A new line is being constructed between Kennewick and Seattle, Wash., which will materially shorten the length of the Spokane-Seattle circuit. Mr. J. J. Lynch, superintendent of construction of the Pacific division is supervising the construction work.

Judge Edward T. Sandford of the United States Circuit Court, at Nashville, Tenn. has handed down an opinion granting to the Postal Telegraph-Cable Company an injunction against the Cumberland Telephone and Telegraph Company, discriminating against the Postal in the way of use of telephones. A similar injunction was granted in behalf of the Postal against the East Tennessee Telephone Company, which is a subsidiary company of the Cumberland Telephone and Telegraph Company.

It was claimed that the telephone companies refused to furnish telephones to the Postal Telegraph Company for the same rental which was charged other subscribers to the telephone, and insisted on the Postal Telegraph Company paying to the telephone companies fifteen per cent. of the tolls taken in by the telegraph company on messages received over the telephone, and two cents on messages delivered by the telegraph company over the telephone. The Postal company refused to pay this commission and two cents a message, and the Cumberland Telephone

Company commenced taking out the telephones from the telegraph offices, the Postal Telegraph-Cable Company applied to the United States court for an injunction. This decision sustains the contention of the telegraph company and holds that the Postal Company is entitled to telephone service at the same rate charged other business subscribers and enjoining the telephone company from removing its telephones or otherwise depriving the Postal company of telephone service because of its refusal to pay a higher rate.

RESIGNATIONS AND APPOINTMENTS.

Mr. Percy Richardson has been appointed manager of the Clarksville, Tenn., office.

Mr. Thomas N. Powers has been appointed chief operator of the Chicago office, vice Frank N. Roberts promoted.

Mr. Elmer Cox, chief operator of the Denver office has been appointed chief operator of the San Francisco office. Mr. F. Arnberger becomes assistant chief operator and Mr. M. O'Neill has been appointed traffic chief of the same office.

Mr. W. W. Morrison, who was formerly manager at Des Moines but who for some time past has been acting as manager at Salt Lake City, has returned to Des Moines to engage in other business. Although he was in Salt Lake City only six months he became so favorably known that upon his departure the employees of the office presented him with a gold handle umbrella. Mr. R. M. Robinson, manager at Michigan City, Ind., has been appointed manager of the office at Salt Lake City, vice Mr. Morrison.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

The party of officials consisting of E. J. Hall, chairman of the executive committee; Belvidere Brooks, general manager; S. M. Williams, special agent and F. A. Pickernell, of the American Telephone and Telegraph Company, who have been making a trip of inspection through the south and middle west were well entertained at the different cities which they visited. At Atlanta Mr. W. T. Gentry, president of the Southern Bell Telephone Company gave a dinner to them at his club, which was attended by thirty Georgian gentlemen who gave the visitors a most cordial greeting.

In a famous old French restaurant in New Orleans a company of foremost citizens of that southern metropolis gathered around the dinner table to welcome their guests from the north.

At Dallas Texas Mr. H. J. Pettengill, president of the Southwestern Telegraph and Telephone Company, entertained the party at dinner at the Country Club where they were met by a dozen prominent business men of Dallas.

At Oklahoma City Mr. E. D. Nims, president of the Pioneer Telephone Company, gave them a dinner, which was attended by a large number of members of the Oklahoma City Chamber of Commerce.

At Kansas City Mr. Charles S. Gleed, president of the Kansas and Missouri Telephone Company, entertained the visitors at a luncheon which was attended by about fifty local telegraph and telephone officials and business men.

At all of these cities cordial speeches of welcome were addressed to the visitors by foremost men of the respective communities.

A conference of the superintendents of the eastern division for the benefit of the service, was held in New York April 8 and 9 in the office of General Superintendent A. G. Saylor. Among those present were E. M. Mulford, New York; E. P. Griffith, Jersey City; N. E. Church, Pittsburg; W. A. Sawyer, Philadelphia; C. F. Ames, Boston; F. E. Clary, New Haven and D. C. Dawson, St. Johns, N. B.

Mr. B. F. Dillion, recently appointed general superintendent of the southern division, was presented with a handsome gold ring, bearing the Shriners emblem and set with diamonds, by the employees of the company at Jacksonville, Fla., where he had been superintendent for twenty-two years.

Mr. W. R. Chapman, manager of the St. Paul office has been appointed superintendent at St. Louis, vice Mr. G. J. Frankel, who has resigned on account of ill health. Mr. Frankel has not been well for some time and has gone to Arizona hoping to be benefitted by the change.

Among the recent executive office visitors was Mr. J. C. Nelson, superintendent at Omaha, who was in New York on company business.

Mr. R. W. Gillette, electrician of the Pacific division at San Francisco, who was formerly located in New York, took occasion while on his visit here recently, on business connected with the service, to call on many of his old friends.

The Journal of the Telegraph is now issued in magazine size and in addition to the usual tariff notices, contains several pages of news matter of general interest to employees of the company. This publication is now produced under the supervision of Mr. William Holmes, superintendent of tariffs.

The executive committee at its meeting April 6 adopted the following resolution, indicative of the present policy of the company in the matter of dividends, employees, etc.:

"This committee recommends to the Board of Directors that no increase in the present rate of dividends be made until the plant of the company, wherever it may be found necessary, is placed in the highest possible condition, the working conditions of the employees improved and their salaries rearranged, recognizing in this readjustment merit, proficiency and length of service modified by location."

Colonel Robert C. Clowry, president of the company in explanation of the resolution of the executive committee said in part:

"All earnings of the company above the present dividend rate of three per cent. per annum will be put into the property in order to raise it to the highest standard of efficiency. Whenever renewals of trunk lines are necessary it is our intention to substitute copper for iron wires.

This will tend to improve greatly the efficiency of transmission. The speed of transmission of all messages is to be increased by the introduction of additional equipment in offices and additional direct wires between traffic centers.

"With the expansion of our business changes have become imperative in the physical condition of many offices, both for the accommodation of the public and the welfare of our employes. The capacity of operating rooms has almost been reached in many cities. We plan to enlarge and improve the offices in some of these places and to move into entirely new and better quarters in other localities.

"Our policy will be to treat employes individually as human beings and not in bulk as a mathematical problem, rewarding merit as it deserves in all cases."

General Manager Belevidere Brooks has sent out the following letter to the various superintendents of the company:

"The resolution of the executive committee is to be taken in connection with my recent letters on the subject of improved quarters and accommodations for employes and a higher standard of compensation if justified by the character and extent of service rendered, etc. No horizontal increase is contemplated or possible, but as stated in the resolution the working conditions of employes are to be improved and their salaries rearranged, without favoritism or prejudice, on the sole basis of merit as determined largely by the character and output of work.

"The management plans to greatly increase the business and usefulness of the company, and intends that zealous and efficient employes shall participate in the benefits therefrom. It desires it to be known that the hearty co-operation of all employes is expected and will be recognized and rewarded. To this end a careful record should be made and kept in each office showing for each employe the length and nature of employment, the character and extent of work done, the degree of interest and zeal displayed and any special points of merit or demerit having a bearing on the case. As far as possible, the record should be kept in such a way that the work of employes of the same class or grade can be compared, and each employe's record should be kept open to his inspection.

"Managers, chief operators, etc., should be on the look-out for employes who show an unusual aptitude and interest in their work, whether in the solicitation of business or the handling of traffic or any other branch of the service, and should encourage them by advancement as the circumstances warrant."

RESIGNATIONS AND APPOINTMENTS.

Mr. C. B. Kelly, manager of the Montpelier, Vt., office, has been appointed manager at Burlington, Vt., vice W. M. Martin, deceased.

Mr. R. T. Ledden, of Montpelier, has been appointed manager in that city, vice Mr. Kelly.

Mr. Guernsey Horton has been appointed manager at Hutchison, Kan., vice Mr. A. J. Knight, transferred to the Omaha office.

Mr. Frank O. Dwyer has been appointed manager of the office at Newport, R. I., vice Mr. H. J. Lockrow, resigned.

Mr. A. C. Cronkhite, formerly in the office of Superintendent J. F. Wallick at Indianapolis, and recently with Superintendent I. N. Miller at Cincinnati, has been appointed manager at Terre Haute, Ind.

The Cable.

The cable steamer "Colonia" began on March 31 the laying of the deep sea section of the Western Telegraph Company's cable from Ascension Island to Buenos Ayres.

The Direct West India Cable Company has established a wireless station at Kingston, Jamaica. This station has been erected to supplement the cable service in case of interruption by reason of severe storms as is often the case in the West Indies. The new plant was installed by the Lepel Wireless Telegraph Company and has a guaranteed range of 200 miles at day and 300 miles at night and communicates regularly with stations at Santiago and Guantanamo, Cuba.

To Control Cable Rates in Canada.

Postmaster General Lemieux has had passed in the Canadian House of Commons a bill to control the rates and facilities of ocean cable companies, and to amend the Railway Act with respect to telegraphs and telephones. The bill provides for placing under the jurisdiction of the Board of Railway Commissioners all matters pertaining to cable traffic with Canada, which shall include messages transmitted from Canada to any other country; to Canada from any other country; through, or into, or from any part of Canada, acting in conjunction with land lines; or by land lines acting in conjunction with cables, by means of a through route or otherwise.

This action has been taken in place of the proposition for the laying of a trans-Atlantic cable by the government. In connection with the bill a schedule of rates is proposed whereby urgent messages are to be transmitted at the present rate—one shilling a word; semi-urgent messages at six pence a word, and press matter at three pence instead of the present rate of five pence a word. The introduction of this measure followed consultations with the Right Hon. Sidney Duxton, former British Postmaster-General, who promised to pass concurrent legislation through the British Parliament, following which, upon a proclamation, the Canadian legislation is to become operative.

The annual dinner of the Metropolitan League of Co-operative Savings and Loan Associations will be held at the Marlborough Hotel, New York, on April 23. For the first time in the history of the league, women will be invited.

Some Recent Chicago Promotions in the Western Union Telegraph Company.

MR. A. B. COWAN BECOMES ASSISTANT SUPERINTENDENT.

Mr. Alexander B. Cowan, who has been appointed assistant superintendent of the Western Union Telegraph Company at Chicago, has been identified with telegraph interests since 1878, starting at that time as a messenger boy. He entered the employ of the Western Union in 1882 at Quincy, Ill., remaining at that place until 1894 when he entered the Chicago office as



A. B. COWAN,
Assistant Superintendent, Western Union Telegraph Company,
Chicago.

operator. His ability was soon recognized at that place and he was successively made loop chief, division chief of the St. Louis section, assistant night chief operator and night chief operator. In January 1907 he was promoted to the day chief operatorship which he held until his present promotion. Mr. Cowan is highly esteemed by his associates and his present advancement is a popular one as it is well deserved.

MR. CHAS. H. FINLEY PROMOTED TO CHIEF OPERATORSHIP.



C. H. FINLEY,
Chief Operator, Western Union Telegraph Company, Chicago.

Mr. Charles H. Finley, assistant chief operator of the Western Union Telegraph Company at Chicago, who has been appointed chief operator to fill the vacancy caused by the promotion of Mr. A. B. Cowan to the assistant superintendency at that point is one of the most popular members of the force in that city and his many friends rejoice at his advancement. Mr. Finley began his telegraphic career on the Chicago, Burlington and Quincy Railroad in 1880, but the next year entered the employ of the Western Union at Chicago. He soon established a reputation for himself as a first-class operator and has a record of handling five hundred ordinary messages in nine hours between Chicago and St. Paul, before the advent of the typewriter. He rose steadily from the ranks serving successively as division chief, quad chief and Sunday chief operator. May 1, 1901, he was appointed assistant chief operator, which position he held until his present promotion.

MR. J. W. KONIGSMARK BECOMES ASSISTANT CHIEF OPERATOR.

Mr. John W. Konigsmark, who has been appointed assistant chief operator of the Western Union Telegraph Company, at Chicago, as briefly announced in our April 1 issue was born in that city, November 21, 1873 and has spent all of his life there. He entered the telegraph service May 16, 1886, as messenger. April 1, 1890, he joined the operating force and by strict attention to his duties and a careful study of telegraphic problems he has advanced himself to his present responsible position having served first as assistant wire chief and later as general wire chief, which office he held at the time of his recent promotion. Mr. Konigsmark is very popular among his fellow employees in the Chicago office and they all join in congratulating him upon his advancement and hoping that further promotions are in store for him.

MR. C. H. SHELL APPOINTED GENERAL WIRE CHIEF.

Mr. Charles Howard Shell, whose promotion to the position of general wire chief of the Western Union Telegraph Company at Chicago was briefly mentioned in our April 1 issue, was born at Steeleville, Ills., June 3, 1865. He began his telegraph career in the railroad service at Chester, Ills., in April 1882. The next year he entered the commercial field in St. Louis. He soon became chief operator of the Baltimore and Ohio Telegraph Company at that point retaining that position until 1887 when that company was absorbed by the Western Union Telegraph Company. He was then made night manager of the Pacific Mutual Telegraph Company at Kansas City. He next served the Postal Telegraph-Cable Company as manager at Wichita, Kan., and later as manager of the Board of Trade office at Kansas City. In 1891 he entered the St. Louis office of the Western Union as assistant night chief, which position he held until 1902 when he was promoted to the position of

general traffic chief. In 1904 he engaged in the brokerage business at Cincinnati. He returned to the Western Union service in the Chicago office in 1908 as an assistant wire chief. He later became assistant traffic chief which position he held until his present promotion. Mr.



C. H. SHELL.

General Wire Chief, Western Union Telegraph Company, Chicago.

Shell is one of the most popular men in telegraph circles in the middle west and by reason of his long experience and faithful service is well qualified to perform the duties of the position which he has now assumed.

JOHN M. DIEGEL, MANAGER, AMERICAN DISTRICT TELEGRAPH COMPANY, MINNEAPOLIS.

Mr. John M. Diegel, assistant manager of the Minneapolis office of the American District Telegraph Company of New Jersey has been appointed



JOHN M. DIEGEL.

Manager, American District Telegraph Company, Minneapolis.

manager vice Mr. A. T. Williams resigned. Mr. Diegel was born in Minneapolis in 1873 and has always lived in that city. March 13, 1885 he

entered the service of the American District Telegraph Company as a messenger. His worth soon became apparent to Mr. Williams who had organized the company in 1884 and January 1, 1886 he was placed in charge of the other messengers and given further responsibility as collector. In March 1888 he became clerk and operator and in December 1892, was given the title of chief operator, this position having been made necessary by the greatly increased business. In 1894, he began soliciting business for the company with such good results that in May 1896 it was necessary to have a superintendent and he was appointed to that position. He held this office until November 1906, when the company was sold to the American District Telegraph Company of New Jersey and he became assistant manager of the Minneapolis office, which position he retained until his present advancement.

Mr. Diegel has thus been in the District Telegraph service in Minneapolis for a quarter of a century and is largely responsible for the success of the company in that city which at the present time is one of the best branches of the American District Telegraph Company of New Jersey in the United States in point of service and business, operating 110 signal circuits in addition to a large messenger, hack and baggage business. He is well and favorably known in Minneapolis and enjoys the entire confidence and respect of the company's patrons in that city.

Municipal Electricians.

A patent, No. 952,024, for a fire alarm intercommunication system, has been granted to Alden D. Wheeler of Hyde Park, Mass. Each station has a multiple-signal transmitting device for controlling the operation of the main circuit.

William H. Carpenter, who was the first operator in the electrical bureau of Philadelphia, and who was employed there for more than fifty years until his retirement in 1908, died in that city April 3, aged eighty-three years.

The fifteenth annual convention of the International Association of Municipal Electricians, which meets at Rochester, N. Y., September 6, 7, 8 and 9, promises to be one of the most successful gatherings ever held by the association. Mr. Frank P. Foster, of Corning, N. Y., secretary of the association, is especially anxious that there be a good attendance.

Complaint has been made in Brooklyn that various telegraph, telephone, electric light and street railway companies maintain overhead wires upon streets where orders have been issued to place all wires underground. The city has been unable to enforce such orders owing to the fact that its own fire alarm and police wires are all overhead in the same district and it can not make a private corporation obey an ordinance which it is itself violating. It is stated that \$100,000 would be required to place underground all of the city's wires in the various streets in question.

The Telephone.

The Pioneer Telephone and Telegraph Company is contemplating the installation of three new exchanges at Oklahoma City, increasing the capacity of their equipment in that place to 45,000 lines.

Mr. Sherman R. Hall has been elected vice-president and Mr. F. L. Gilman has been elected general manager of the Bell Telephone Company of Missouri.

Mr. J. S. Wiley, auditor of the Bell Telephone Company of Pennsylvania, has been appointed assistant comptroller of the American Telephone and Telegraph Company with headquarters in New York.

Mr. Martin H. Buehler, general manager of the Central District and Printing Telegraph Company of Pittsburg, succeeds to the position made vacant by Mr. Wiley's promotion.

Mr. M. C. Hurt, manager for the Pioneer Telephone and Telegraph Company at Muskogee, Okla., has been transferred to the main offices of the company at Oklahoma City. He is succeeded at Muskogee by Mr. Harry Lyon.

At the annual meeting of the Ohio Independent Telephone Association, held in Columbus, March 17 and 18, resolutions were adopted endorsing a state commission with full power to regulate the telephone business.

The Cumberland Telephone and Telegraph Company has declared its regular quarterly dividend of two per cent. Mr. J. F. Howell, of Nashville, Tenn., has been elected a director to succeed Mr. W. K. Phillips, deceased.

The State Telegraph and Telephone Company has been incorporated at Butte, Montana, with a capitalization of \$500,000 for the purpose of constructing and maintaining telephone, telegraph and wireless systems.

A concession has recently been granted by the Cuban government to the Cuban National Telephone Company to install and operate local and long distance telephone service in the six provinces of the island. It is stipulated that long distance lines must be in operation between Pinar Del Rio, Havana and Santiago, within eighteen months.

One of the largest and most up-to-date private branch telephone exchanges for railway use is being installed in the new Pennsylvania Terminal at New York. The switchboard has six positions and is equipped for four hundred lines and one hundred and twenty trunks. Direct lines will connect this board with the private telephone switchboard of the Pennsylvania at Philadelphia.

The Southwestern Telegraph and Telephone Company has established what is known as a half-hour service, which is coming into general use. The plan is to sell a certain firm or party thirty minutes use of a line between any two cities or more cities if desired, during a certain time of the day, during which time accumulated orders, correspondence and reports may be handled to the exclusion of all other use of the line. This service has met with considerable success from the fact that it eliminates the

necessity of delays in handling large amounts of business.

In connection with the merger of the various Bell companies operating in Pennsylvania, the executive offices of the Central District and Printing Telegraph Company of Pittsburg have been moved to Philadelphia. The officers of the company who remain in Pittsburg are M. C. Rorty, division manager; Sergius P. Grace, plant superintendent; F. T. Ewing, traffic superintendent; J. H. Boeggman, assistant auditor, and G. L. Herron, assistant secretary and assistant treasurer.

Mr. C. F. Mason has been appointed commercial engineer of the Pacific Telephone and Telegraph Company. In 1897, Mr. Mason entered the service of the Postal Telegraph Cable-Company in their executive offices, New York and remained there until 1907, when he went to San Francisco as secretary to Mr. E. C. Bradley vice-president and general manager of the Pacific Telephone and Telegraph Company. Since August, 1909, he has also acted as superintendent of leased wires for that company and has largely built up that branch of the service.

The New Anglo-French Telephone Cable.

At a recent meeting of the Physical Society, London, Professor J. Perry, presented an interesting paper on "Telephone Circuits" in which he discussed the use of the Pupin coils for loading telephone cables. In the discussion which followed, Major Walter A. J. O'Meara, chief engineer of the British Post Office, gave some interesting data in regard to the new submarine telephone cable which will soon be laid across the English Channel. The insulation of this cable is to be of gutta-percha, instead of paper which is the only form of insulation which has previously been used for loaded cables. On account of the high electrostatic capacity of gutta-percha it was contended that the formulae which have been worked out for the design of such cables would not hold good in this case. Before starting the manufacture of the new cable Major O'Meara and his staff conducted extensive experiments with artificial lines and proved that the formulae generally used were as accurate as in the case of a paper insulated cable.

As a result of their investigation the cable has been made with loading coils inserted one nautical mile apart. The coils used have a resistance of a little less than six ohms and an inductance of one-tenth of a henry at a frequency of 750 cycles per second. The conductors are of 160 pound copper and the insulation consists of 300 pounds of gutta-percha per mile. The capacity between the two conductors is twelve hundredths of a microfarad per mile. The attenuation constant of this cable unloaded is .045 per mile, while after being loaded and tested it was found to be less than .014 or in other words the efficiency is increased about three times.

The total length of the cable is twenty-four and two-tenths miles and it will be the first submarine cable in which the loading coils are distributed throughout its length.

Magnetic Storms.*

BY J. E. TAYLOR, A.M.I.E.E.

Magnetic storms, to designate them by their popular title, are exhibitions of electro-magnetic activity on a gigantic scale, which occasionally overwhelm this globe. The immediate effects produced are to disorganize telegraph working by the appearance of stray electric currents on lines operated with an earth return and to cause a very considerable fluctuation in the horizontal component of the earth's magnetic field. On the occasion of the magnetic storm of September 25 last, fluctuating currents of, in some cases, three or four times the strength of the working currents, made themselves apparent all over the globe. These currents maintained a constant direction of flow for prolonged periods (fifteen or twenty minutes being quite usual), with occasional reversals of direction, at irregular intervals throughout the period of duration of the storm. In England the phenomenon commenced at 11.40 a. m. and did not completely pass off until about 2 a. m. on the following day. Lines from London north to Newcastle-on-Tyne, south to Penzance, to the North Walsham Repeater Station, and to the repeater stations at Llanfair and Nevin, appear to have been specially strongly affected. Measurements taken at Nevin on a London wire of about 1,700 ohms resistance showed currents up to 120 milliamperes. As compared with the previous storm of October 31, 1903, the recent storm was much the more intense, though the duration was about the same.

At all times there exist on earthed telegraph wires fluctuating earth currents of a mild character, having roughly defined periods of maximum and minimum activity corresponding with the hours of daylight and darkness and with the seasons of the year, but between these ever-present disturbances and visitations such as that referred to, a strong line of demarcation is drawn. The primary cause is possibly the same in each, but while one is probably a direct effect the other is more likely an indirect or secondary effect.

Considering for a moment the electromotive force necessary to produce an earth current of roughly 100 milliamperes on a London-Penzance circuit of, say, 2,000 ohms resistance, it is evident that a difference of potential of about 200 volts is maintained between two points on the earth's surface about 300 miles apart. The earth being a conductor, this must involve stupendous electric currents circulating in the ground. In the case of the oceans, where the conductivity is far greater, it cannot be an exaggeration to say that millions of amperes of current are circulating during a magnetic storm of moderate intensity.

It is usual to connect together the phenomena of sun-spots, earth currents, and the aurora borealis. Not infrequently also volcanic eruptions and earthquakes are cited as possible causes of magnetic storms. At periods of magnetic storms, exceptional auroral activity is always apparent. Periods of ex-

ceptional sun-spot activity are not, however, by any means invariably periods of magnetic storms, though the converse appears to hold.

It may occur to many to ask why it should be necessary to seek an explanation outside the realm of the earth itself. That it is necessary, however, is fairly evident from elementary considerations. An electric circuit must always be closed or completed on itself. If the circuit were confined to the earth the currents could only be produced by electro-magnetic or electrostatic induction. But to maintain even weak currents continuously in one direction for prolonged periods would involve the continuous building up of electrostatic or electromagnetic fields of force of an intensity far beyond anything possible in terrestrial conditions. Even assuming a condenser effect between the rarefied upper regions of the atmosphere and the surface of the earth, the capacity would only be such that it would be charged or discharged up to or from the disruptive point of the air in a small fraction of a second, by a flow of current infinitely smaller than that which circulates in the earth's crust during a magnetic storm. Equally untenable are the assumptions that anything in the nature of electromagnetic induction is involved, whether it be held to be caused by telegraph wires cutting a magnetic field due to changes in terrestrial magnetism, or a projection of a magnetic field from the sun or other cosmic body. In other words there can be no doubt that an effect of conduction is concerned, and that both in view of its magnitude and sustained character it is of extra-terrestrial origin. Latter-day researches on effects occurring in high vacua under the stimulus of electric stress prove the possibility of the convective passage of large electrical currents in a medium which is otherwise perfectly non-conductive, by myriads of corpuscles each carrying its own quota of inseparable and invariable electrical charge and capable of moving with inconceivable rapidity through empty space. Such considerations led Fitzgerald, Birkeland, Arrhenius, and others to surmise that the phenomena of the aurora borealis and magnetic storms were due to streams of corpuscles in space occasionally entering the earth's atmosphere and being diverted towards the poles under the influence of the earth's magnetic field. The researches of Sir J. J. Thompson, and numerous other workers, bearing on the mechanism of electrical conduction in gases and in vacuum, combined with researches on radio-activity, not only shed much light on fundamental processes of electrical conduction, but have afforded a glimmering of the constitution of matter itself and its connection with the basic ether of space.

The most vital point in relation to the subject of magnetic storms, however, is the discovery that vacuum space can be traversed by electrical currents of considerable density, measurable in amperes per square centimetre of cross section, provided that a sufficient supply of the carriers variously known as corpuscles, electrons or disintegrated atoms of matter

*Article appearing in the Post Office Electrical Engineers Journal, London.

(not matter itself) can be brought into service. In these circumstances vacuous space becomes a very fair electrical conductor instead of a perfect insulator. Hence it is conceivable that the earth may be enveloped in the stream-path of an electric circuit in space. That such an event does occasionally occur appears to be the only tenable explanation of so-called magnetic storm visitations.

In a communication to the "Electrician" under date of January 11, 1901, Professor Elihu Thomson gives the outlines of a remarkable theory of magnetic storms, very complete and reasonable in its assumptions, though a little too materialistic, which does not appear to have attracted the attention it deserves. He points to the probable electrical agency whereby the sun's corona and coronal streams are formed in virtue of continually augmented electrical repulsion of ultra-fine-particles of matter due to shrinkage of an initially electrified nebulous mass. He further points out that the luminous corona is probably but a small part of the whole, and that invisible (because non-luminous) coronal streams may spread far away out into space. In the passage of the earth through such an invisible streamer, the phenomena of auroræ and magnetic storms would find adequate explanation. Some of the phenomena of comets' tails are also explainable on the same assumption.

The weak point in this theory is, of course, the extravagant expenditure of matter which would be involved in maintaining continuously the tremendous electrical effects concerned. But substitute for electrified material particles, disintegrated matter or corpuscles, and combine with the knowledge concerning the vast internal energy of atoms, rendered evident by recent researches in radio-activity and kindred studies, and the difficulty disappears. This internal energy is liberated in the corpuscular state, and if the invisible corona consist of streams of such corpuscles journeying, with tremendous velocity, from and to the parent solar body—an electrical atmosphere in which, perhaps, the whole solar system is immersed—occasional electrical displays on this globe are not surprising. Another difficulty may, at first sight, arise from this assumption, viz., that if the earth is always immersed in such an atmosphere there should be continuous auroræ and magnetic storms. But if it be considered that in such circumstances the earth must always possess a high negative charge, it will exert sufficient electrical repulsion on the corpuscular streams to divert them to a sufficient distance away and thus screen itself from their direct effect. It would then only be affected by exceptional increases in the density and potential gradients of the corpuscular streams in its neighborhood.

In support of the view of corpuscular atmosphere it is known that hot bodies are capable of ionizing gases, and that flames of all kinds contain and emit free corpuscles, though their presence is often only indirectly observed through ionization by collision with the gaseous molecules. It is, therefore, reasonable to assume that in an intensely hot body like the sun the emission of corpuscles may be extremely

great. It is also known that various substances can be made to emit corpuscles by the direct effect of light. In photoelectric effects it would appear that sufficiently intense luminous vibrations are capable of exciting corpuscles to which they may be attuned, to a degree which determines the dissociation of those corpuscles from the main system constituting an atom of matter. In the intense luminous vibrations at the surface of the sun the effect may be greatly magnified. The peculiar phenomena associated with comets coming within the range of influence of the sun, the rapid development of tails, the repulsion of the tails, which are always directed away from the sun, and are therefore in front when the comet is leaving, the apparent development of intense heat in the nucleus and self-luminosity which they do not possess when at great distances away, all appear to argue in favor of such an atmosphere. The late Professor Fitzgerald showed conclusively that repulsion by light from the sun is insufficient to account for the comets' tails being directed away from the sun.

Following the nebular hypothesis, instead of the heat of the sun causing atomic disintegration and emission of corpuscles, it naturally occurs that the reverse may be the case, i. e., the solar nucleus may be in a certain stage of formation, matter itself may be in process of formation by the slow agglomeration of corpuscles originally composing a vast nebular system. It is to be expected in such a case that highly attenuated gases would first be formed, and these would become self-luminous by reason of the electrical currents traversing them. As the action progressed the solid nucleus would form at a later stage. This, however, is at present but pure speculation.

The foregoing surmises may perhaps have an additional interest lent to them in view of the approach of Halley's comet into regions near the sun—an approach which may throw more light on interplanetary conditions, and indirectly on the cause of magnetic storms.

Increase in Price of Platinum

It is reported that a Russian commission, which has been investigating the platinum situation in that country, will recommend that the government fix a minimum price at which refined platinum may be sold each year, and that the price which will be fixed next year will be about \$710 per pound, or about twice the present price at which it is sold by the refiners in this country. As about ninety-five per cent. of the platinum supply of the world comes from Russia, this action will result in greatly increasing the price throughout the world. It is said that the demand of platinum has greatly increased during the past year. This action will, of course, affect the manufacturers of telegraph apparatus, as no material has ever been found which can successfully be used to replace platinum for contact points on telegraph instruments.

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April 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Rating of Telegraph Messages.

In our April 1 issue we published a letter from Mr. Roland R. Dennis, of Auburn, N. Y., who represented the United States at the Lisbon Telegraphic Conference of 1908, in which he advocated the rating of telegraph messages in this country on a per word basis. In this letter he stated that he had formulated a general plan for making the change from the present system, whereby the addresses and signatures are sent free, to the new system in which every word transmitted is counted and which is in vogue in all foreign countries. At our request Mr. Dennis has given the following rough outline of the plan which he proposes:

"Rating messages on the ten-word-address-and-signature-free basis, having been in use by us since the introduction of telegraphy, any movement looking to the successful acceptance of any other system must provide for the continuance of this rating for a term of years to the general, non-business public.

"All parties desiring the benefit of a per-word tariff would pay a tax of \$5.00 per year for the registration of their code address as is the established rule in foreign countries. Any messages forwarded to such registered addresses to be rated on the per word tariff. This tariff to be made up of a basic charge of, say, ten cents to cover the cost of receiving and delivering the message, and a per word rate adapted to the zone divisions as they now exist.

"The selective tariff privilege to be continued say three, or perhaps more, years and then, the public having meanwhile become educated to the new rating, the per word tariff to be made obligatory to all.

"While I fully appreciate how conservative our public is, especially regarding changes of any kind that affect daily routine, I am confident they would gladly welcome the introduction of a per word tariff by our telegraph companies."

Under our present system it is claimed that a shrewd business man can take advantage of the fact that the address and signature is not counted and insert code words as part of the same, thus compelling the companies to carry, for nothing, words which convey as much information to the recipient of the message as those for which the sender pays.

While a per word basis seems to be the most equitable one for both the telegraph companies and the public it is contended that the adoption of a code address system for domestic messages in the United States would lead to untold confusion. In Europe where the government owns the telegraph, the business man submits to paying \$5.00 per year for registering his telegraphic address. When the year has expired unless he has paid an additional \$5.00 no further telegrams are delivered to him and messages are reported back "party unknown." In foreign countries this course being taken by the government there is no redress. In the United States, however, such a course would be referred to the courts for adjustment and it is safe to say that the plaintiff in all such cases would be awarded damages. In any event if such action were taken by a telegraph company it would cause ill feeling on the part of the customer and he would be apt to not only transfer his own business to another company but would influence others to do the same. It is also claimed that the delay in decoding the address at the receiving end would be a source of annoyance. In this country the business man who makes use of the telegraph expects his message to be rushed through with all possible despatch. The introduction into the system of any operation which involves the least delay will lower the value of the service in his estimation.

If the Government controlled all of the telegraphs in this country or even if one private company had a monopoly of the business it would be comparatively easy to introduce the proposed change. With the conditions which

actually prevail, however, many complications would arise besides those mentioned which would render the adoption of a code address system extremely difficult if not absolutely impracticable. Where much of the business has to pass over the lines of at least two companies the result of such an innovation would be constant friction between the various interests involved as well as between the public and the companies.

Night Letter Telegrams.

The success of the night letter telegram service has been so marked from its first inauguration that those who established it are fully justified in their belief that it is an institution which was desired by the public. The traffic has steadily increased from the beginning and now the telegraph companies are confronted with the possibility that it may increase in time to such an extent as to make it impossible to handle this class of business with the present wire facilities and under the operating methods now in vogue. If this should prove to be the case, automatic telegraphy may have to be resorted to in order to take care of the vast amount of matter which will have to be transmitted over the wires. Will necessity be the mother of invention in this case as it has in so many others and will some one devise a printing telegraph system with sufficient capacity to cope with this service?

This is a question which is being asked by thinking men who are conversant with the telegraph situation and the chances seem very good that it will be answered in the affirmative. There are many men with inventive genius who are now working on this problem and from what has already been accomplished it seems safe to predict that one or more of these inventors will, in the near future solve the problem and produce a machine which will accomplish the desired results.

April 1, of this year, marked the sixty-fifth anniversary of the opening of the first telegraph line for commercial business between Washington and Baltimore. The possibilities of the new invention were so little realized that but one communication was sent over the wire during the first four days after it was placed in operation. From this beginning the great system which now reaches to the farthest corners of the globe and the receipts of which amount to many millions of dollars yearly, has grown. While the night letter telegram is not so much of an innovation as was the telegraph itself, the way in which it has been received by the public affords a striking contrast to the way in which they regarded the telegraph sixty-five years ago. The telegraph had to create a field for its use. On account of the widespread system of postal facilities which has developed along with the telegraph, the night letter telegram finds a field for itself already created. Under these circumstances it would not be an inconceivable state of affairs if the amount of matter which the telegraph companies may be required to transmit should double within the next

year or two. To handle so much business with the present wire facilities and the present corps of operators would be a practical impossibility. The man who devises a system which will meet such a situation and operate successfully at all times ought to have a place in telegraph history second only to that of Morse.

Efficiency to be Rewarded.

The resolution of the executive committee of the Western Union Telegraph Company, given in another column, to raise the wages of employes and improve their plant before increasing dividends will be hailed with joy by thousands of telegraph people throughout the country. The contention so often heard that corporations have no soul and care for nothing beyond the paying of dividends seems to be disproved in this case. It is recognized by the present management that the increase in wages of telegraphers has not kept pace with the increased cost of living and that as a result a young man about to choose a profession is not favorably impressed with an industry which offers him no more inducements than the telegraph does at the present time. Such a condition naturally lowers the efficiency of the organization and the executive committee has very wisely decided to make the announcement and have it generally understood that they will recognize merit among employes and reward them accordingly.

This action is but another proof of the contention which we have so often made, namely that the man who shows himself worthy of better things will receive them sooner or later. While to many it seems that in the telegraph the rewards are slow in coming they will find that the same condition exists at times in other industries as well.

This announcement in connection with the establishment of electrical schools among the employes in various cities is bound to increase the efficiency of the operating force of the telegraph, as now the assurance is given that as the efficiency is raised the reward will increase accordingly. Employes are being given a new incentive to do better work, and at the same time are afforded an opportunity to learn how to work to better advantage. The latter feature is one of the most important links in the chain and great credit is due Mr. Ashton G. Saylor, general superintendent of the eastern division, who is the guiding spirit behind this movement, for his good judgment in having these schools established throughout his division and for the business-like way in which their organization has been effected.

Promptness a Necessity for Success.

Mr. E. W. Collins, superintendent of the Postal Telegraph-Cable Company at Cleveland, O., in an article published in the Postal Telegraph complains of a condition which exists throughout the country among all companies. Some of the managers of offices in his district, he says, have to be repeatedly appealed to for information which could be pre-

pared in a few minutes time and are guilty of gross carelessness in other respects. As Mr. Collins says, the managers who are successful and are forging to the front can always be depended upon and are always prompt in supplying desired information. And yet those who do not get ahead complain that there are no chances for promotion and that they never have any good luck, while at the same time, they neglect even the smallest opportunity to create a favorable impression with their superior officials. The man who fails to make good with small things entrusted to his charge can hardly expect to be given greater responsibilities. When a superintendent asks his managers for information it should be taken for granted that the data desired is important and will have to be supplied at some time, otherwise he would not ask for it. How much easier it would be to look up the required information send it in at once, and thus be able to dismiss the matter from the mind, than to wait until to-morrow or the day after or until the superintendent repeats his request, frequently by two or three despatches. Some even seem to think that it is unbusinesslike to answer communications the same day they are received. The sooner they get this idea out of their minds the better it will be for them. The best interests of their employers demand promptness in all things and the best interests of the employe are coincident with those of the employer. Those who are mere hangers-on to the payroll have little chance to succeed, as Mr. Collins truthfully says. The only ones who receive any great promotion are those who take an interest in their daily work and look after the small details as well as the large.

Unrecognized Heroes.

Many stories have been written about acts of heroism upon the part of those employed in the telegraph service, but few people, when they see a telegraph lineman, recognize in him anything of the heroic. In a certain sense, however, every lineman is a hero, as he takes his life in his hands every time that he climbs a pole. With the many high tension electric light and power wires which cross or run on the same poles as the low tension telegraph and telephone lines, there is always danger that the latter wires may be charged with a deadly voltage and the lineman has no means of knowing this until he has touched the wire. And then the knowledge usually comes too late to do him any good. Almost daily we hear of linemen being killed by coming in contact with deadly wires. In one mail recently we received notices of three such accidents from our Boston agent. Because of the fact that these occur in the ordinary routine of the lineman's work all of the public notice which the unfortunate victim receives is a scant two or three inches in the newspaper columns and he is soon forgotten. Yet, he is as much a hero as the man who fights his country's battles and is entitled to much greater respect than he usually receives.

Government Makes Raid on Bucket Shops.

The government officials at Washington have been engaged for some time past in collecting evidence against bucket shops operating in various cities and on April 2 warrants were issued for the arrest of twenty-nine men who were connected with three different concerns. All three were members of the Consolidated Stock Exchange of Philadelphia, which they used as a clearing house for their operations. It is claimed that 250 bucket shops were maintained in cities throughout the United States. It is alleged that the business of these concerns has been carried on over leased wires and it has been suggested that action might be taken against the telegraph companies for furnishing the wires for this use. Mr. Belvidere Brooks, general manager of the Western Union Telegraph Company, when asked in regard to the contention that his company ought to be aware, at least to some extent, of the character of its clients, said:

"Telegraph companies are required to render service to the public without discrimination, and must accept all messages couched in decent language when offered at a telegraph office for transmission, and cannot and should not be permitted to inquire into the character of the message or its purpose, nor to compel any disclosure respecting it by the sender, and in most of the states this right of the public to have its business transmitted is provided for by severe statutory penalty. It is utterly impracticable for a telegraph company to investigate the business affairs of persons dealing with it or to establish any system of espionage whereby the telegraph company may determine the use which the person filing or receiving a telegraph despatch or the lessee of a wire intends to make of the same, and it is under no duty to make such an investigation.

"The same doctrine and right obtains as to wires furnished whether to individuals or corporations, inasmuch as telegraph companies are engaged in the business of leasing wires for telegraph purposes generally.

"These leased lines of wire are in the possession of and under the control of and are operated by the lessee. The telegraph company has no more legal right or moral right to ascertain the character of business sent over a leased wire making a large return annually as rental than it has to require the filer of a twenty-five cent message to disclose the nature of the contents and the purpose of sending it."

A Houston, Texas paper recently, in commenting upon the fact that Judge Robert S. Lovett, president of the Union Pacific Railway System and Belvidere Brooks, general manager of the Western Union Telegraph Company were both visiting in Texas, their native state, at the same time said: "Another half a century the head of everything worth talking about will be a Texan and when the universal republic appears, a Texan and his immediate democratic neighbors and friends will run that."

TALKING AND TELEGRAPHING SIMULTANEOUSLY OVER THE SAME LINE.*

The Composite Circuit.

BY U. C. KISSELL.

Two line wires are needed for a long distance telephone line to form a metallic circuit. Transmission of telegraphic messages is customarily carried on over a single wire, the circuit being completed through the ground. It follows that every metallic circuit telephone line has enough wires for two telegraph circuits. Each wire can actually be made to carry a two-fold burden without causing interference between the apparatus used for telegraphing by the electrical currents used for talking and signalling for telephonic purposes and vice versa. The circuit used for this purpose and known as a composite circuit is shown in an elementary form in Figure 2.

Considering the circuit first as representing only two telegraph lines the diagram shows a telegraph instrument placed at each end of each wire and connected to the "live" pole of a grounded battery common to both instruments at that end of the line. At each terminal an impedance coil is put in series with each line wire, between the line and the telegraph instrument. This impedance coil has a core containing a considerable amount of iron and is wound with a large number of turns of rather coarse insulated wire to a resistance of fifty ohms. Although the resistance to direct current is low the large number of turns of wire and the large amount of iron in the core make the impedance to alternating current high, and it is this quality which makes it possible to utilize the coil for the separation of telephonic and telegraphic currents. The precise reason why it performs this function depends upon a few simple principles of electromagnetic action and may be explained as follows:

An electrical circuit has a certain kind of inertia analogous to the inertia of water in a circuit of pipe, and this inertia of an electric current is called inductance. If an electric current in a circuit is made to change in value a portion of the electromotive force acting upon the circuit must be used to cause the current to change. The instant current is passed through the impedance coils a magnetic flux is set up in the iron core, and this flux will pass through all the turns of wire on the core. Now if a magnetic field is passed across a conductor an E. M. F. will be induced in the latter and this is what happens in the coil when current is turned on. Just as soon as the circuit is established the magnetic flux in the core, created by the magnetizing force of the current, changes

from zero to a certain positive value. The lines of force thus created spread outward, cutting all the turns in the coil and induce in it an E. M. F., which is opposite in direction to the impressed E. M. F. which is causing the current to flow. Here then is found an opponent to the very cause of its existence. This induced E. M. F. only appears or shows itself while there is a change going on in the strength of the magnetic field. When the flux is changing from a zero to maximum value there is an induced E. M. F. in the coil in a direction opposite to the E. M. F. which is sending the current through the coil. The difference between these two E. M. F.'s is the pressure which is actually causing the current to flow. When the current reaches a certain strength and remains so the magnetic flux will remain constant, and consequently there will be no opposing E. M. F. in the coil and the current will then encounter only the ohmic resistance of the coil.

If a current flowing through a coil is suddenly stopped the process is in a manner reversed, and

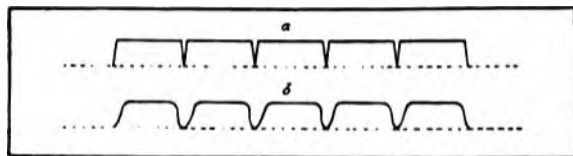


Figure 1. Wave forms corresponding to impulses of direct current passing through line without inductance (a) and forms corresponding to similar impulses passing through impedance coils (b.)

the magnetic flux in the core then changes from a maximum value to zero. This change or decrease in the number of lines of force induces a current in the coil in the same direction as that which was originally passing through the coil. The action of the coil therefore tends to oppose for an instant any rise of the current in the coil and to temporarily build or boost up any falling current. The effect of this action upon a train of electric waves is shown graphically in Figure 1. At a is shown an electric wave which would pass over a line or through a coil containing no self-induction without change of form if the effect of capacity, which does not relate to the immediate branch of the subject discussed in this paragraph, is overlooked. Starting from zero it rises to its maximum value almost instantly, staying at a certain strength until the circuit is broken, then falling abruptly to zero. At b is shown a wave created by application of the same electromotive force as that shown at a to the terminals of the line, but in this case the form is drawn as it would appear when the wave passes through a coil having inductance. When the circuit is established the current, instead of rising to its full value instantly, does so gradually on account of the opposing E. M. F. induced in the coil pushing it back. When the circuit is broken the falling off in value of the current also takes place gradually

*Article reprinted from the American Telephone Journal.

on account of the induced current due to self-induction being at this time in the same direction as the applied E. M. F. This tends to build the wave up, or add to it, to prevent it from falling abruptly.

For the foregoing reasons a coil of wire having the property of self-induction, when placed in an electric circuit, tends to flatten the electric waves or, in other words, would have the effect of rounding off the corners of any sharp electrical impulses which are passed through it.

There is something else to consider in relation to a circuit containing inductance, and that is time. It takes a fraction of a second to start a current flowing in a circuit, stop it and start it again in the opposite direction. For instance, suppose E. M. F. is impressed on a circuit and stops and reverses itself before the current has

of six micro-farads connected to ground as shown in the diagram. This condenser has the property of absorbing a certain amount of electricity and, as placed in the circuit, this amount must flow before the current passes on. The amount of electricity which it will hold or the charge it can contain depends upon its capacity (measured in micro-farads) and the E. M. F. of the charging circuit.

When, in operating one of the telegraph circuits the upper key at A is closed a current impulse starts from battery and passes through the telegraph instruments to point 1. Here it will suffer a delay on account of the condenser, as a certain amount of electricity must flow to charge this condenser before the current passes on. This will require a fraction of time, and the length of this interval depends upon the

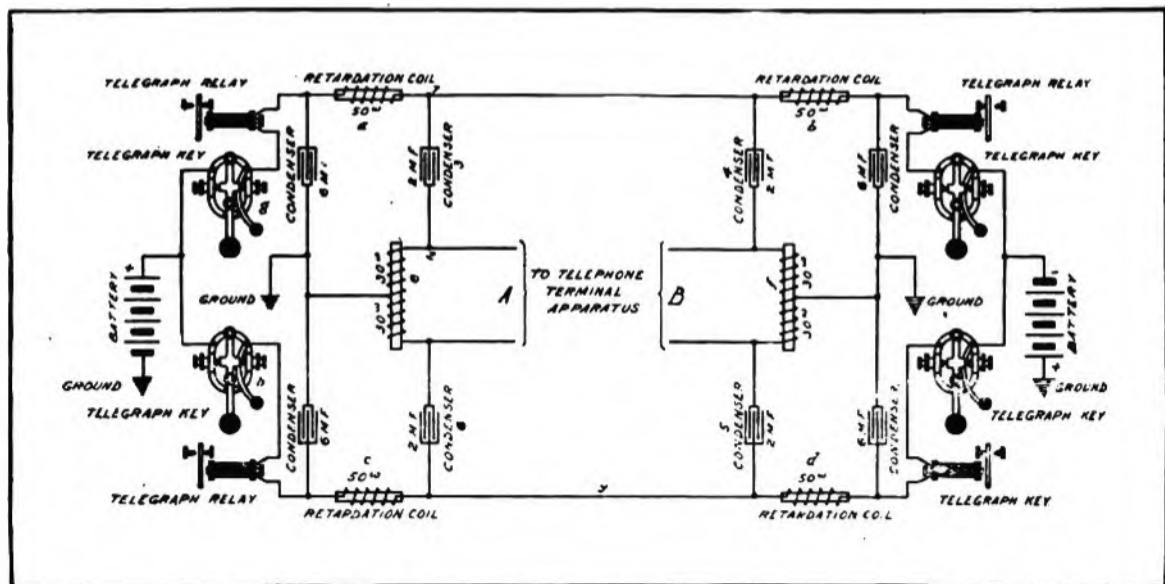


Figure 2. Elements of Composite Circuit—two grounded telegraph circuits and one metallic telephone circuit worked on one pair of wires.

had time to get started on account of the inertia (inductance) of the circuit. No current will pass in this event, simply because the E. M. F. is stopped and starts in an opposite direction before the current has had time to flow. The amount of time necessary for the E. M. F. to overcome the inertia of the circuit depends upon the inductance and resistance of the circuit. These facts make it possible to introduce a coil in a circuit which contains a large inertia or inductance and alternate the current so rapidly that none will be able to flow through the coil. A coil which will bring about this result is termed an impedance or reactance coil.

The coils placed in series with the line wires and between the telegraph instruments and the line in Figure 2 have the effect of rounding off the sharp edges of the "Morse" impulses. Between these coils and the telegraph instruments are placed condensers, each having a capacity

capacity of the condenser and the resistance of the circuit. From this point current will pass through the impedance coil a, where it suffers another delay on account of the self-inductance of the coil. From here it passes over the line, through coil b, through the telegraph instruments at station B to battery, to ground and back to battery at A. Not only is the current impulse thus made to suffer a delay by reason of the charging of the condensers on each end of the line, but it has its wave flattened out on account of the inductance of the coils. In practice the key at A is opened almost as soon as it is closed. When the key is opened the coils a, b prevent the current from falling instantly and therefore, by placing the coils and condensers in the telegraph circuit, the sharp Morse wave is slowed down and altered in shape. The circuits on both sides of the telephone line being the same, of course their action is the same.

On the line side of each of the impedance coils in the main circuit is bridged another coil connected to the line wires by means of two condensers of two micro-farads capacity each, as shown in diagram. Directly across the terminals of the latter coil two taps are taken off, and these lead to the telephone circuit. The action of the latter coil in the circuit can also be explained in simple terms.

When A is transmitting speech to B the waves of comparatively high frequency talking current are choked back by the coil *e* on account of its high self-induction and pass through the condensers 3, 6 to the line wires in preference. Here the waves are again choked back by the coils *a* and *c* and prevented from passing through the "Morse" instruments, which, if ohmic resistance alone were considered, would seriously shunt the telephone line. The waves pass over the line wires *x* and *y* and, upon reaching the other end of the line, they pass through the 2 M. F. condensers 4, 5 to B's instrument, being confined to this path by the impedance of the coils *b*, *d*, *f*. Therefore at a given instant the high frequency talking current from A passes to point 2, through condenser 3, line wire *x*, condenser 4, through B's instrument, condenser 5, line wire *y*, condenser 6, back to A. The ohmic resistance of each of the coils *e* and *f* is 60 ohms, and they are connected at their centres to ground. Their action is to equalize any difference of potential between the line wires and to prevent this levelling of potential from passing through the telephone instruments. If in their absence the keys *g* and *h* were open and then key *g* closed, key *h* remaining open, the telegraph current upon reaching point 7 would pass over line wire *x* and also through condenser 3, telephone at A, condenser 6 to the other line wire. This would cause an intense click in A's instrument. As the circuit is actually wired coil *e*, being of low ohmic resistance and offering very little impedance to low frequency currents, shunts out practically all of the current that would tend to pass through the telephone instrument. This would also be the case if the batteries used on the two-line wires for "Morse" operating were not the same. For instance, if the voltage of the "Morse" battery on one wire was 110 volts and on the other eighty volts there would be a difference of potential between the line wires of thirty volts, providing the current was in the same direction in both wires. This difference of potential would be constantly shifting and equalizing itself through the telephone instruments if provisions were not made to shunt them out.

In the practical operation of a composite circuit it is very desirable that the currents flow in the same direction in both line wires and be of the same strength and voltage. If a line had 110 volts positive potential on one wire and 110 volts negative potential on the other as both batteries are grounded there would be a dif-

ference of potential of 220 volts across the two line wires, which is rather a high voltage to operate through ordinary telephone cable and wiring. If the voltage used on both line wires is the same and the current flowing in the same direction in both, with sets of terminal apparatus of the same resistance on each side of the line, there will be practically no difference of potential between the two line wires when both keys are closed. The best conditions for practical work and the maintaining of homogeneity between the two line wires in operating composite circuits will be taken up in another article.

General Mention.

The headquarters of the Associated Press at Atlanta have been moved and are now located in the Austell Building.

Arrangements have been made in Mexico City for placing all of the Government telegraph wires underground, during the coming summer.

Plans have been completed for installing at Rio de Janeiro a modern pneumatic tube system for transmitting telegrams and other messages to various parts of the city.

It is reported that the adoption of a night letter telegram system similar to that recently instituted in the United States is being considered by the telegraph companies of Canada.

The Telepost Company is securing rights of way in Delaware and Maryland for a line from New York to Washington. A bill has been introduced in Congress authorizing the entrance of the Telepost Company to the District of Columbia.

A bill has been introduced in the New Jersey Legislature prohibiting the employment by the telegraph or telephone companies of any person under eighteen years of age to deliver messages between the hours of 10 p. m. and 5 a. m.

At the annual meeting of the Montreal Telegraph Company, the following officers and directors were re-elected: H. A. Allan, president; W. McMaster, vice-president; other directors: W. R. Miller and W. Wainwright. The lines of this company are leased to the Great North Western Telegraph Company.

It is reported that experiments will soon be conducted between London and Paris with the Pollak-Virag system of high speed telegraphy. Similar experiments were tried several years ago, but were unsatisfactory because of interference from neighboring circuits. It is believed now, however, that this difficulty has been overcome.

By a strange coincidence four presidents, or former presidents of large express companies have died within the past seven months, all of whom were well known in the telegraph field. The first of these Colonel M. J. O'Brien of the Southern Express, died September 11; Thomas C. Platt of the United States Express, died March 13; Colonel Dudley Evans, of the Wells-Fargo Express, died March 27, and Levi C. Weir of the Adams Express, died March 28.

The Military Telegrapher in the Civil War.

PART XXXVII.

Mr. Sidney B. Fairchild was prominently identified with the military telegraph service of the Department of the Gulf during the last two years of the war. After the close of that conflict, he went to St. Louis and served the Western Union Telegraph Company at that place for nearly forty years, until his death, February 27, 1904. For many years of that time he acted as night wire chief. In writing to Colonel William R. Plum, historian of the United States Military Telegraph Corps in 1878, he gave the following interesting account of his war-time experience.

"In the spring of 1863, while manager at New Haven, Conn., I received a very pressing letter from Charles S. Bulkley, captain and assistant quartermaster at New Orleans, in charge of the government telegraph lines for the Department of the Gulf. It contained a tempting offer for me to join him. I had served with Captain Bulkley during the time he was superintendent of the old Washington and New Orleans line at Washington, D. C.; we had become good friends and it seemed that when he again entered the telegraph service, he remembered his former employes. The inducement of a salary double that which I was receiving was so great that after a little hesitation, I accepted his offer. My transportation papers were forwarded to me by General Stager and I sailed for New Orleans the day the New York draft riots were at their highest.

"Edward Conway, who had seen service in the army of the Potomac, was chief assistant to Captain Bulkley. Mr. Conway seemed especially adapted to out door work, field labor, line building and engineering, indeed I do not think he had his superior in the government service during the war. He would keep the lines working through the enemy's country where it seemed almost impossible to do so and was restlessly energetic in his department, but for office work and the indoor management of affairs he was not a success. After a few weeks an arrangement was made whereby Mr. Conway became the manager of the lines outside of the office and I became chief operator of the Department of the Gulf.

"The wires then extended up the Mississippi river to Morganzia at which point steamers from the north would touch and report their arrival to the general, commanding at New Orleans or, if the wires were not working to Morganzia they would report at Baton Rouge.

"A. W. O'Neil was the operator at Morganzia and S. L. Griffin at Baton Rouge. Down the river from New Orleans, the wires extended to South West Pass and Pass à l'Outre having offices at Forts St. Phillip and Jackson and at the quarantine station. There was also a line to Franklin, La., over the Brashear City railroad, another to Pass Manchac and in the direction of Mobile to a point I do not now remember. The fire department wires of the city of New Orleans were

also at that time under Captain Bulkley's jurisdiction. To keep the wire up the river in working condition was a most difficult task. Bushwhackers were continually interrupting communication. Finally the commanding officer, General Banks, issued an order which was proclaimed throughout that region that whenever the wire was molested every house or habitable building for a distance of twenty miles in each direction would be destroyed and I think in one instance this order was executed. After this became generally understood there was little trouble except from natural causes. Towards the close of the war the Confederate ram Arkansas in trying to reach the gulf hitched the wire onto its stern, tearing the line down for about half a mile before it broke. This was in the vicinity of Bonnet Carre, La.

"Early in the spring of 1864 the army of the gulf began its march having for its object the siege of Shreveport and the destruction of the forces of Generals Kirby Smith and Dick Taylor. Some disagreement having taken place between Captain Bulkley and Conway as to the management of field work in this expedition, Conway in a moment of anger resigned. I was then placed in charge. We had five wagons, three of them loaded with wire on reels and two containing the lighter paraphernalia, the traps of the line men, operators, etc. With me as operators were W. H. Munro, William Foley, Horace Nichols and one other whose name I cannot recall. We reached Brashear City by railroad, from thence we went to New Iberia by steamboat sailing up the beautiful Bayou Teche. We remained at New Iberia some days, having communication with New Orleans all of the time. I was glad enough one of these days to hail the arrival of Conway, who had made peace with Captain Bulkley, and was sent forward to relieve me of the command but with orders to me to keep along with the expedition. On the fifteenth day of March we had moved seven miles but were still in communication with New Orleans. Most of us had obtained horses and rode them in preference to riding in the wagons. Conway and Munro were good riders, but the rest of us were novices of the most awkward kind. An incident occurred after severing communication with New Orleans, which came very near terminating the telegraphic part of the expedition. We were placed for a day or so under the immediate care of the second New York volunteer cavalry. The officers in command, when they marched forward, overlooked us entirely. We were still in our office tent having received no orders to move and the army had gone on leaving us alone in the enemy's country. It was not long before the bushwhackers found us and realized our situation. We were startled by the report of rifle shots coming from an unknown source and realized that they were not accidental when one struck the pole of our tent. Fortunately, General Banks needed his cipher operator and sent to the Colonel of the second New York cavalry for him. When

it was discovered that we were left behind the whole regiment was immediately ordered to our relief. They came back with a rush and I will never forget the feeling of gladness which came over us all and even the Colonel himself seemed overjoyed to see us for a rumor had reached him before he met us that we had been captured. Indeed such a report reached New Orleans and was a cause of great suspense to our friends for many days.

"We arrived at Vermillion on the 9th of March. Here we found the first elevated ground we had seen. Riding along on level ground for so many days the drivers of our wagons had become careless. William Foley and myself were made aware of this fact by turning a double somersault to the foot of a hill the contents of the wagon following us. No one was injured however. On the twentieth, we reached Washington and rested a day. On the next day we covered twenty miles through a heavy rain. At night it became quite cold. Our tents were but little protection from the pelting rain, which poured down with an incessant patter. We slept in the mud and water with considerable discomfort, but with no harmful results. Captain Bulkley gave me this advice when I left him; 'Now some of the headquarters men are taking along cots and other absurd contrivances for keeping off the ground. You will find yourself far more comfortable and in better health if you sleep right on the ground in your blanket.' I had had trouble nearly all my life with catarrh and although I caught a severe cold the very first night out, that was my last. I recovered from it in a couple of days and it never returned. I was also completely cured of my catarrhal tendency and my health improved day by day amid all the exposures of camp life.

"Passing Holmesville and Cheneyville through magnificent plantations, constantly hearing of the enemy in front, slowly retiring as we advanced, we arrived on the twenty-fourth of March at Governor Wells' home within fifteen miles of Alexandria. The next day we reached Alexandria. Here we remained until April 3, receiving supplies via Red River. Thus far the general commanding had ordered that property along the line of march should be protected from pillage and non-combatants should not be disturbed. So far as I could observe, this order was sacredly carried out. Occasionally a barn would be sacked of its contents for the necessities of the forage department, but no dwelling was molested.

"On the third of April, the operators left their wagons and horses at Alexandria to accompany the army and took the steamer Laurel Hill for Grand Ecore. The steamer having been aground at the rapids all of one day and part of the next, our teams arrived at Grand Ecore before us. We reached that point on the night of the fifth. The next day Munro, Foley and myself obtained permission to ride outside the lines and visit the old town of Natchitoches. While on the edge of the town, passing through a grove of trees, Munro, who was familiar with the people discovered that

we were being followed by guerillas. Being outnumbered and not well armed we fled for our lives at a rapid pace, several shots passing harmlessly by. Upon our report of this fact Natchitoches was immediately occupied. On the eighth of April, the whole army began its march for Shreveport direct. The first day we made fifteen miles in a hard rain storm. By night the roads were in a wretched condition. The next morning, however, was clear. It seemed an auspicious day for us but it ended in gloom and defeat. We had reached Pleasant Hill without seeing any sign of the foe, but two miles farther on, at a place since known as Mansfield, we encountered the enemy and were badly beaten. We won a partial victory next day, but we did not, however, recover what we had lost and were obliged to retreat to Grand Ecore and ultimately to Alexandria and New Orleans. Conway left Grand Ecore on the twentieth with Admiral Porter, with batteries and other electrical apparatus to be used in blowing up the gun boats in case they could not pass over the falls above Alexandria. The rest of us continued our retreat to Alexandria by land. On the twenty-third the battle of Cane River Crossing which was a victory for us was fought. We were somewhat harrassed in front and rear, however, until we reached Alexandria. It will be seen that as telegraphers we had little to do but it must be remembered that we carried the cipher book and were continually in demand at the General's tent deciphering communications from Washington and from Commanders of other departments and other points. I remember I sat up one night in the general's tent at Grand Ecore from 6 p. m. until 6 the next morning trying to decipher a message from General Steele, which had been 'put up' wrong, but I succeeded at last.

"At Alexandria, I was ordered by Captain Bulkley to return to New Orleans by boat. Leaving there on the thirtieth of April I narrowly escaped capture by a Confederate battery, which destroyed the boat immediately in our rear, killing or capturing every one on board. I arrived safely in New Orleans on the second of May, where I remained until the war was over."

Humorous mistakes are sometimes made in sending telegrams. Such an error which was not attended by any serious results occurred recently in a western city when the secretary of the Board of Trade wrote a telegram stating the board's endorsement of the proposition for the government to erect embassy houses, intending to so notify each representative of the state. This message was addressed to the local congressman and a list of the other representatives in congress was left at the telegraph office with instruction to repeat the message to each. The telegraph clerk, misunderstanding the instructions, sent the message to the local representative with all the other names, those of his colleagues, most of whom were in Washington at the time, attached as signers.

Telephone Train Despatching.

BY J. B. SHELTON, OMAHA.

Superintendent of Telegraph of the Union Pacific Railroad.

GENERAL.

For the past two years, the subject of telephone train despatching has been prominently before the railroad world with ever increasing strength and popularity, and the inroads it has made, within so short a time, upon the time-honored and seemingly perfect and permanent system of telegraphic despatching, is really quite marvelous and nearly beyond calculation.

Trial circuits that were established by some of the more venturesome roads, but not without some misgiving as to the ultimate and complete success of the innovation, proved so thoroughly reliable, expeditious and economical in operation that telephone train despatching was soon adopted as standard by the very conservative American Railway Association, and, since then, upwards of forty of the leading railroads in the United States and Canada have gone into it and are constantly putting this system into more extensive use. It is likely to be only a comparatively short time before the telephone is used altogether, in place of the telegraph, for the despatching of trains.

Before the incipency of telephone train despatching over railroad operating districts, averaging from one hundred to one hundred and fifty miles in length, the telephone had been used quite extensively in the operation of large yards and terminals, and, what is known as railway composite telephony or simultaneous telegraphy and telephony on a single grounded wire, had been used considerably, with telephone sets on trains, or in booths at sidings, for use in helping trains along that would otherwise lose valuable time at sidings waiting for delayed trains to pass. The telephone was found so beneficial in these ways, especially by trainmen, who could not operate the telegraph, that its development and enlarged use in the movement of trains was naturally only a matter of time. There was some prejudice to overcome, as usual where any radical departure from long continued practice is proposed, but the benefits to be derived were so certain and indisputable that even the most conservative could not long hold out in opposition.

UNION PACIFIC INSTALLATIONS.

The Union Pacific management early became convinced, after careful investigation, of the desirability of this new system and authorized the construction and equipment of a circuit between North Platte and Sidney, a distance of 123 miles, that has been in successful operation for more than a year. Since then, other circuits as follows have been authorized and will soon be ready

for operation: Sidney to Laramie, 159 miles; Rawlins to Green River, 134 miles; Green River to Ogden, 176 miles; and it is predicted that comparatively soon this system of despatching will be in use along the entire length of the main lines of the road.

COST OF CONSTRUCTION AND EQUIPMENT.

The cost of these circuits, that consist of two copper wires, each weighing approximately 210 pounds per mile, is from \$105.00 to \$115.00 per mile; the dispatcher's telephone equipment costs about \$40.00; the telephone equipment for each station is valued at about \$20.00; the booths cost about \$60.00 and booth apparatus nearly \$50.00; and the selector equipment costs approximately \$40.00 for dispatcher's office and \$30.00 for each station.

TRANSPPOSITIONS.

The two wires, composing the circuit, are transposed, in respect to their locations on the cross-arms, as often as is found necessary to overcome cross-talk from other telephone circuits and the noisy effect of induction from the telegraph and other outside influences. It has been the rule on the Union Pacific to transpose every one-quarter mile, although one-half mile transpositions are more general on other lines. More frequent transpositions are necessary in some instances where there are paralleling high tension circuits that cause more than the usual amount of disturbance.

AUXILIARY CIRCUITS.

It is also customary to transpose the former telegraph despatching wire with the local railroad message wire, to form an auxiliary telephone circuit that can be patched into the regular despatching circuit between any two testing offices as may be necessary, to make the circuit good. Then the trouble is located and repaired, after which the circuits are restored to normal condition. This auxiliary circuit can be used in some cases to supersede the telegraph, if desired, for the handling of local railroad messages.

INSTRUMENT CONNECTIONS.

These circuits, with modern equipment, admit of the connection of quite a large number of instruments, at regular stations as well as for use of trainmen in booths at sidings where operators are not maintained, with very satisfactory results. Our present and proposed circuits have and will have from twelve to twenty-three station sets and from six to twelve booth sets. In some cases on other lines as high as forty-five sets are in satisfactory use on a single circuit.

DESPATCHERS EQUIPMENT.

The telephone equipment at the dispatchers office is largely of special design for this particular service, as the dispatcher, who is in constant connection with the line, so it is not necessary for stations to signal him, and whose duties

are very intricate and exacting, should have the benefit of the best available contrivances, consistent with good service in general, for the ease and comfort of his work.

His receiver is a standard one of seventy ohms, which is of fairly low impedance and provides him with what is considered the best possible receiving. The receiver is of the head pattern, which the despatcher wears constantly, and is in series with a condenser as well as an induction coil that is specially designed to permit the best transmission consistent with good receiving.

The transmitter is of the chest type and has a special button, designed to give the best grade of speech in this class of service. A locking key is provided for closing the transmitter circuit, to permit the despatcher free use of both hands for his work.

Battery power required for the despatchers transmitter on the average circuit is approximately four volts. As his transmitter is connected in the circuit most of the time, consumption of battery is high compared with station equipment. On this account storage battery can be used for this purpose with economical and more satisfactory results.

Each despatcher is furnished a separate telephone set, which he connects with the line by placing a plug connected with his set in a jack provided for that purpose. This is desirable where instruments are used so long and continuously for sanitation and health.

STATION EQUIPMENT.

Telephone apparatus at stations is of a design that was found necessary to overcome the difficulties experienced with a large number of telephones on a circuit and a number of operators listening on the line at once.

In some of the first circuits, impedance, or resistance of varying degrees, was inserted in the telephone bridge at the different offices, the highest impedance being placed at the offices nearest the despatcher and tapering down from there to the end of the line, with the object in view of equalizing the distribution of energy between all the instruments on the line, instead of the nearer offices receiving an abnormal volume and the farther offices receiving less than required for satisfactory results.

Then a great improvement was effected by the development of the high impedance receiver, of about 700 ohms resistance, now in use on our North Platte-Sidney circuit, that enables the use of a uniform style of receiver throughout the length of the circuit without other varying resistances to equalize, the additional winding of the receiver affording sufficient impedance to approximately balance the flow of energy all along the line and permit the use of a large number of receivers at the same time without deteriorating the service. The placing of most of the impedance in the receiver itself, in this way, instead of in the circuit outside of the receiver, as formerly, has considerably improved

the receiving and made it more uniform throughout the line.

With the use of the high impedance receiver, other changes in the make-up of the circuit were required, as follows:

Formerly the receiver, when in use for receiving, was bridged across the line in series with a condenser and the secondary of an induction coil. Under the new plan, in such case, the receiver is simply across the line in series with a condenser. The former arrangement would not do with a high impedance receiver, because, under that arrangement, all the secondary talking current passes through the receiver and a high impedance receiver, used in such a way, would cut down the transmitted current and produce excessive side tones.

A retardation coil has also been installed, which is connected into the receiver circuit while talking, and is for the purpose of preventing excessive side tones in the receiver at such times, as well as, by thus raising the impedance of the receiver, to compel more of the transmission current to pass upon the line. The retardation coil is constructed, however, so that enough current will flow in the receiver to enable the despatcher to interrupt the transmission of the operator if he should desire to do so.

Also, when talking, the secondary of the induction coil is bridged across the line in series with a condenser, instead of in series with the receiver and condenser as formerly.

According to up-to-date practice, the transmitter is not connected in the circuit while the operator is listening, but is so connected only when the operator wishes to talk and presses a push button key for that purpose that is located on the table convenient for operation with his left hand. In this way, by keeping the transmitter cut out except when actually talking, noise at stations, such as vibration of telegraph instruments and passing trains, conversations of people in offices, etc., which would otherwise make the circuit more or less noisy, is almost entirely eliminated from the line. This also reduces consumption of battery, as battery is consumed only when the transmitter is in the circuit.

The transmitter at stations is attached to an adjustable arm, called a "flexiphone," that is mounted on the operating table, or on the wall adjoining, and can be readily moved to a position so the operator need not be in a strained position while talking.

Head receivers are also used by operators so they may have both hands free.

The operation of a station transmitter requires three cells of dry battery, or their equivalent, for distances from the despatchers office of approximately 100 miles, beyond which, up to the end of line as now satisfactorily worked, four cells are required.

BOOTH EQUIPMENT.

Booths for sidings are of standard construction, without windows, that would likely become

broken, but ventilated, are 6' x 6' in size and the doors are fastened with switch locks so trainmen can readily secure access.

Wall type telephones, with the high efficiency transmission arrangement similar to station sets, are used. These sets are placed in boxes on the wall, which will also hold the transmitter battery, where dry instead of storage battery is used, and the doors are locked with switch locks. When the door is unlocked and swings open a switch is operated that automatically lights a four volt, six candle power tungsten electric lamp, from storage battery, which furnishes sufficient light for the booth. This same switch, when the door is closed, disconnects the telephone from the line in case the user fails to place the receiver back on the hook when through talking.

Egry registers are also installed in the booths, under and a little to the right of the telephone, where convenient for the conductor to write his orders as given by the despatcher. Each register contains four rolls of train order forms with carbon paper; three copies can be torn off for use of the train crew, while the fourth copy is automatically rolled up in the bottom of the register and is under lock so it can be removed only by an authorized person.

SELECTOR EQUIPMENT.

In the early stages of telephone train despatching, a satisfactory means of calling offices by the despatcher was found very essential. While nearly all ordinary railroad telephony is on a magneto basis for calling, on account of its simplicity, the satisfactory use of such equipment is limited to a comparatively small number of offices on a line, and then, it is undesirable in a way, because the code calls for the different offices come in at each station. This makes it necessary for each office to take note of each call to determine whether or not it is for them, and, where there are many different and frequent code rings, this is quite annoying and interferes more or less with other work. There are also limits to code ringing, as each bell forms a shunt across the line, thus limiting the number that can be satisfactorily used.

Although devices had been in use for twenty years or so on telegraph circuits, that permitted the despatcher to call offices selectively by the making of various combinations with a telegraph key, it was not long after the start of telephone train despatching that several improved styles of apparatus were specially devised to meet this new demand for the calling of each station, independently of the others, by the despatcher when wanted. This is technically known as selective signalling and the instrument that accomplishes it is called a selector. Some of these systems operate with clock works and others on what is called the step-up plan.

After careful investigation, the Union Pacific adopted what is known as the bridging system that is entirely controlled by the despatcher. In the old style telegraph selector, the

bell would ring until the operator stopped it; while with the new, the despatcher can stop it at will. With this new selector, it takes approximately eight seconds for the despatcher to start the bell at a distant magnet at the station that gives a faint answer-back in the despatchers telephone, so he knows whether the bell is ringing; and, after the despatcher has made a call, he or others can continue work by telephone without interference from or to the operation of the bell.

This system also has the advantage that, in case of trouble at any one station, that station only is affected. The remainder may operate normally. It is the same principle as that involved in the present day system of incandescent lighting, where the lamps are wired in multiple and the burning out of one lamp affects that lamp alone.

The despatchers calling keys are mounted in a cabinet placed before the despatcher, there being a separate key for each equipped station on the line. These keys can be readily taken out of the case and replaced by others, as may be desired, and a few extra ones for emergencies, as well as room for others for future growth, are provided.

The contacts of these keys operate two telegraph relays, one located in each side of the circuit, through the contacts of which the direct current impulses are sent out on the line. A resistance and condenser are bridged around the key contacts for the purpose of eliminating sparking at these points. Retardation coils and associated condenser are placed in series with the circuit for the purpose of eliminating the noise due to application of the high voltage line battery.

In the ordinary bridged magneto lines, the bells are simply connected across the line. For comparatively short circuits with but few instrument connections, bells of 1,000 ohms resistance are used, while on longer lines, or on lines with quite a number of instruments, bells of 1,600 or 2,500 ohms resistance are used. In the bridged selector, the bell is operated in a local circuit from the contacts of the selector itself, and the selector magnet is what is bridged across the line. This double wound magnet is part of the selector. It is wound to a resistance of 4,500 ohms and is so designed that it offers a very high impedance to telephone talking currents. Thus, a large number of selectors can be bridged across a telephone line without injuring the volume or quality of the transmitted speech. An equal number of bridged bells would affect the transmission appreciably.

Inductance coils, or "choke" coils as they are commonly known, are installed in series with this relay to choke back any lightning discharges that may come in over the line. These protect the selector by making such discharges jump across the lightning arrester spark gap to ground.

(To be continued.)

A Telegrapher's Election Job.

A humorous incident, says an exchange, happened on the night of the national election of 1896 in a little mining camp hidden away in the mountains of southwestern Colorado, where the only means of quick communication with the world were a single uncertain telegraph wire and a single more uncertain telegraph operator. Naturally only the merest scraps of election news reached the camp, but before the certain news of McKinley's election could have been received the uncertain operator had fallen a victim to his favorite vice and, further, had fallen beneath the table.

The only other person who knew anything about telegraphy was "Shorty," the local wit and humorist, who volunteered to write out the election returns as they clicked off from the telegraph instrument. Political sentiment was aflame for Bryan. News of his election was not only sought, but demanded, for the average American miner is as sanguine concerning the uncertainties of politics as he is concerning the uncertainties of mining. The volunteer telegrapher was noted for an obliging disposition. He was the "good fellow" of the camp.

The miners had placed stores of giant powder at various points. They had cleaned and oiled their six shooters and refilled their cartridge belts. Bonfires were ready to be lighted on the hill-sides, and natural enthusiasm had been stimulated at the Metropole, the Cosmopolitan, the Fashion, the Trocadero and less pretentiously named oases in the desert of mining camp existence—in fact, every preliminary to the grandest celebration the San Juan country ever had known.

Shorty was not the man to neglect an opportunity like that. The first bulletin he handed to the waiting crowd stated that New York and Indiana were in doubt and it looked like a close election, with the chances favoring Bryan. That whetted the crowd's keen appetite for returns to razor edge. The second bulletin sent their spirits up with a leap. "Bryan has carried Kansas, and the Democrats are claiming Iowa."

"Whoopee!" from the crowd.

Shorty bent his ear to the clicking sounder and inscribed "Bulletin No. 3—Illinois joins the Bryan column with 500,000 majority. Indiana certain, New York very close."

When the deafening chorus had died down a young member of the party asked the leader, "Hain't we better begin to set off the giant?"

Before the leader could answer Shorty reproved him by word and look. "Don't begin to soon," he said. "It's always best to wait until you are sure. You can't be too conservative in a case like this."

After a long pause, in which the crowd displayed much impatience the imperturbable and conservative Shorty transcribed bulletin No. 4, but before passing it out he said:

"Now boys, don't do anything rash. Wait for the actual returns."

Bulletin No. 4 read, "Senator Jones claims Ohio and Pennsylvania for Bryan."

Under ordinary circumstances a doubt might have been expressed concerning the probability of such states reversing their political records, but the crowd was convinced of an impending landslide for their favorite and yelled with delight, "Now we are beginning to get the news," remarked Shorty when the cheering ceased, and he began to write bulletin No. 5 as follows:

"New York gives Bryan 100,000 plurality; Indiana, 40,000. Returns from Wisconsin and Minnesota indicate large Democratic gains."

The crowd heard only the first sentence. Shouting, cheering, yelling, screaming, it broke for the street.

"Hold on!" called Shorty. Here's another."

Bulletin No. 6, "Quay concedes Pennsylvania to Bryan."

Another fragment broke from the crowd and ran down the street shouting the news. The new operator's pencil was traveling rapidly over the paper, while his friends and fellow citizens crowded closely upon him and read as he wrote bulletin No. 7, "Mark Hanna has locked up Republican headquarters and gone home."

The roar of the crowd was drowned by the roar of exploding giant powder. Buildings shook, windows rattled, accompanied by the crash of broken glass. The celebration was on and Shorty McIntyre was alone.

The celebration lasted for two days. The morning after election the regular operator had recovered sufficiently to transcribe messages announcing McKinley's victory. Those who were sober enough to understand them didn't believe them. After several warnings of what would happen to him if he didn't quit "trying to fool people" the operator desisted and joined in the general jubilation. Not until the arrival of the Denver papers on the second day did that camp awake to a realization of the outcome of the election, and then there was not sufficient energy left to vent even indignation upon Shorty, much less to take revenge. On the third day the volunteer operator was more popular than ever, for all admitted he had given them the time of their lives.

In a recent debate in the German Reichstag complaint was made of the working of the American-German patent agreement. In Germany patents must be worked to hold good. As German inventors in this country do not have to submit to any such regulation a concession has been obtained from Germany exempting American inventors from the compulsory part of the regulations. It is claimed now that American firms incorporated in Germany and having patented articles there, transfer their patent rights to their American branch to avoid being compelled to work those rights. This action is objected to by the German vice-chancellor and he expects to take measures to prevent it.

The Old Operator's Story.

It was one of those cold, blustery nights of the winter of 1903-4. A party of gentlemen were sitting in the waiting room at a small station on the Rock Island waiting for a belated, snow-bound train.

We had exhausted about all the subjects of conversation that were current at the time, and one huge fellow stretched himself, yawned, and said: "Well, I've been on the road in this territory for the past fifteen years, but this is the worst snow-storm I have ever encountered."

The old station agent, who happened to pass at the moment, smilingly addressed the speaker: "Your experience doesn't run back quite far enough, Mr. Dean. I tell you right now that this storm isn't a marker to one we had on the old Hannibal Road when I was night man at Cameron Junction in 1861." He hesitated and was about to pass on into his office, when he was besieged by several of us to tell wherein the storm of 1861 was more severe than the present one. Anything to kill time, we thought.

Excusing himself for a moment the old man went into his office, and, opening his key, called up St. Joe and asked if the eastbound train had left there yet. Upon learning that it had not, he came out into the waiting room again, and, lighting his pipe, he began the story, which I will try to tell just as I heard it.

It was early in December of '61, when the storm I speak of struck this part of the country. As I said before, I was night operator at Cameron Junction. When I came to work on this particular night the day man told me there was a theater train somewhere between St. Joe and Cameron, which would probably be along before midnight. I was only a lad of twenty-five at the time, and I mention the fact for reasons which you will understand later on. I examined my signal lights, orders and switches, and finding everything in good shape I opened my key and called St. Joe to learn something of the theater train. It had left that place at 7.45 p. m., and not yet been reported out of Maysville. So I seated myself in my chair to enjoy the evening paper.

Any operator can tell you that no matter what he is occupied in doing while in a telegraph office he always hears the general drift of what goes over the wires. As I sat there reading war news, I heard the despatchers talking of No. 407, which had been snow-bound near Seymour for several hours. It was before the day of rotary snow plows, and the only way we had to get the track clear was to buck the snow, and then buck it some more. They were speculating whether Nos. 407 and 408—which was also several hours late—would be able to make their regular meeting point, which was Cameron Junction; but no man could tell where they would meet that night.

Along toward 9.30 the show train rumbled in, and pulled on a side track. They could go no further until No. 407 had cleared the main track of snow.

The platforms and trucks of the theater train were thickly encrusted with snow, and only the small cleared spaces served to indicate where the windows were located. After a little while several of the party came up to the office and inquired as to the prospects of getting any further before morning. I explained the situation to them, and, as there was nothing that could be done to aid matters, they concluded to go back to the train and retire for the night, hoping to find themselves further east by breakfast time.

One of the gentlemen asked permission to come in and stay with me for a while, to pass away the time. I let him in, and, as he entered, I was struck with his magnificent appearance. Tall and dark, with pearly white teeth and magnetic black eyes, he was a man to attract attention anywhere. He threw off his overcoat, and, turning to me, took his card case from his pocket and handed me his card. As I read the name, I gave a slight start, for even at that time John Wilkes Booth was a famous actor. He seated himself in one of my chairs, and his eyes roved around the room and over the desk at which we were seated. Happening to notice a book which I had been reading, he picked it up, and, glancing at the title, said, with a smile: "Hugo's 'Les Miserables,' eh? Do you like Hugo?" I replied that I was not very well acquainted with the writer, but that I liked that particular book.

We talked along on various subjects, and I noticed that he had a great predilection for Edgar Allan Poe. We discussed psychology, as far as I understand it, and at the end of a couple of hours Mr. Booth got up from his chair, and, pulling on his great Astrakhan coat, said he guessed he would go to bed. The snow had ceased to fall, and the moon shone brightly as he walked down the platform to his car.

As I returned to the office a slight shiver—caused by our talk of Poe—ran over me. I went in, and to take my mind off the grewsome subject, I opened the key, and called Seymour to learn what I could of No. 407. The operator told me that a yard engine had been sent from Spickards to help No. 407 clear the track, and that they must be pretty near through by this time. No. 407 was a Rock Island train, which ran over the Hannibal track to Kansas City, and the theater train wanted to go east over the Rock Island Road.

I figured that if they did well they ought to be at Cameron about 3.30 a. m., and as No. 408—east-bound Rock Island train from Kansas City—was running, they would, in all probability, meet here, or near this point. I got out my snow shovel, and for about an hour I shoveled snow myself, trying to get the platform in some sort of shape for the work incidental to the coming of the trains. At the end of my task I went back to the office, and, taking up "Les Miserables," I leaned back and began to read. It was 1.45 a. m. No. 408 had the right of way over No. 407, and, unless otherwise ordered, would go through Cameron at about 35 miles an hour. It

had begun to snow again, and as the warmth of the office began to steal over me, my head leaned back against the signal lever, and I slept.

How long I was asleep I never knew, but all at once I heard the despatcher's wire begin to call me; "UD, UD, UD; are you there, UD?" I strove to answer, but seemed paralyzed in my chair. "Hurry, for God's sake, UD, No. 407 has got through the snow, and I am unable to raise the operator at Kearney to hold her for No. 408, which will pass you in a few moments. UD, UD, UD, for God's sake, answer!" came pealing from the machine. With a mighty effort I reached the key—and fell with a crash to the floor. A strange murmur came to me, and glancing through the frost-encrusted window, I saw a gleam of light on the rails—No. 408 was coming. With a single leap I reached the signal lever and threw the red light, and in another moment the whistle for brakes was shrieking—the engineer had seen my signal just in time. As the last car came grinding to a stop in front of the office, Joe Shafer, the conductor, came running up to me. "What the — is the matter here? Why did you stop us? "No. 407! No. 407! For God's sake get on the siding; she will be into you in a moment!" Joe seemed to grasp the situation and gave the engineer the high sign to go ahead. They ran up to the switch, and, backing in on the side track, had barely cleared the main line when No. 407 came into the yard with a crash and a roar. That's all I knew for a while. When I came to, Joe was bending over me in the office. "No. 407!" I exclaimed; "is she safe?" "Sure she is!" replied Joe, "and thanks to you, Charlie, we are all safe and alive." He wrung my hand and tears came to his eyes. "When you are able, my boy, get our orders and we will go on, and I will see that the superintendent hears of your conduct to-night!" Even as he spoke, there came a click from the instrument as though a ground wire had been taken off, and the despatcher at once began calling me. I answered, and told him that No. 407 was gone and 408 was ready for orders. I added that I had received his message in time to stop 408 with only a moment to spare, but all was well.

"My message! I sent no message; this wire has been dead since 3 o'clock!" I glanced at the clock; it was 4.15 a.m. A mirror near the clock showed me my hair as white as you see it now.

As the old man finished speaking, a whistle was heard in the distance. "All aboard for Altamont and the east!" he called. And we all filed silently out into the night.—*Express Gazette*.

Railroad conductors are not usually considered poetical, but that some of them have an inclination toward versifying is shown by the following message which a conductor on a western railroad sent to his superior official in Chicago, when the engine on his train had broken down and could go no further: "H. M. Ballou, Engine 102, bu'sted a flue, and can't come through, what will I do? C. H. Magrew."

The Passing of the Oldest Railway Station.

The oldest railroad station in the country will disappear when the Erie Railroad builds its new station at Turner on the ground donated by Mrs. E. H. Harriman. Furthermore, in this station was established the first railway dining room. From this Turner station also was sent the first order by telegraph for the running of a train in the history of railroading.

The Turner station was built in 1840, in anticipation of the opening of the New York and Erie Railroad, which was put in operation in September, 1841, between Piermont and Goshen. The Turner family had granted the Erie free right of way over their property and constructed the station building on condition that every passenger train stop there and that the station be recognized as an official stopping place for meals and refreshments.

Peter Turner established an eating place for railroad travelers that in time became famous. Although only forty miles from New York, every train on the Erie at any time of day or night stopped from ten to twenty minutes at Turner for refreshments.

In 1851, the Erie was opened all of the way to Dunkirk. Charles Minot was the general superintendent. The track was single. The telegraph was a comparatively new thing commercially and unknown as an auxiliary to railroading. The train that hadn't the right of way had to wait on a siding for the passing of the train that had. If a train with the right of way was late, there was no way of knowing how late, and the waits were often long and travel was slow and tedious.

In the summer 1851, Superintendent Minot going west on a train, as has before been related in these columns, was waiting at Turner for a train coming east. One of Ezra Cornell's telegraph lines which ran along the highway parallel with the railroad had recently been cut into the stations along the line so that the railroad agents could also act as agents for the telegraph company. Mr. Minot telegraphed to Port Jervis and found that the train from the west had not arrived there yet. The run between Port Jervis and Turner was more than an hour. Mr. Minot instructed the agent at Port Jervis to hold the train there when it came in until further orders and had the agent repeat the message, and say that he understood it. Then he handed the order to the engineer of the train and told him to go ahead. The engineer refused to run his train on the telegraphic order, and Mr. Minot ordered him from the cab and ran the train himself, arriving at Port Jervis before the train from the west, thus saving an hour and a half's delay to the west-bound train; and the worldwide system of telegraphic railroad train orders was born.

The general manager of a telephone company in Maine has resigned and is going to keep summer boarders, having decided that the latter undertaking is more profitable than the telephone business.

Radio-Telegraphy.

Professor R. A. Fessenden is in Europe on business connected with his systems of wireless telegraphy and telephony.

A wireless station will be established in the Orkney Islands, north of Scotland, which will communicate with stations on the mainland.

Mr. O. C. Roos who until recently was connected with the National Electric Signaling Company at Brant Rock, Mass., has been appointed by the United States War Department as wireless engineer for the Bureau of Insular Affairs in the Philippines.

The French Government is equipping with wireless telephone apparatus of the Colin-Jeance system the two battleships "Justice" and "Verite," which it will be remembered formed part of the fleet which visited New York last fall upon the occasion of the Hudson-Fulton celebration.

A patent, No. 953,635, for a wireless transmitting system, has been granted to John Muth and Christian F. Heinkel, of Cleveland, Ohio. A system of wireless transmission of electromagnetic waves has a source of power conductively connected to the oscillator circuit and inductively connected with the radiator circuit.

The navy department has recently been engaged in making tests to determine the extent to which the wireless service is interfered with by amateurs and others. The naval station at Newport, R. I., has been in constant communication with the Brooklyn Navy Yard during the course of the investigation. The results obtained will be used in deciding upon the legislation necessary to prevent such interference.

Five wireless stations have been erected upon as many different islands of the Azores by the Portuguese Government and are now open to public service. These should prove a great convenience to the inhabitants of the various islands which are thus connected as they are frequently cut off from all communication with each other for months at a time. They will also be a convenience to trans-Atlantic shipping as nearly all vessels plying between Europe and the United States come within range of these stations.

The English and German Governments have both been making extensive investigations of the utility of wireless for transmitting weather reports between ships at sea and the land stations. As a result of their experiments they find that an extension of the weather charts to cover the ocean, which they are able to make by means of reports received from all vessels which are equipped with wireless apparatus, is of great assistance to them in foretelling weather conditions on land. However, the greatest drawback to the successful working of this plan at the present time is the inability to get the reports from ships, at all times of the day and night.

Efforts are being made in shipping circles in Germany to secure the removal of some of the restrictions now placed upon the operation of wireless in that country. Among these is a rule prohibiting the lightships, which are all equipped with wireless outfits, from communicating with other vessels except in cases of necessity. The ship owners believe that if this regulation was abolished the lightships could be of much service by giving information to approaching vessels concerning questions of navigation such as storm warnings, floating wrecks, etc.

When a British military expedition invaded Tibet in 1903 they laid telegraph wires along the ground, and to prevent the natives from cutting them told them that they were clues whereby they could find their way home. So anxious were the Tibetans to be rid of their uninvited guests that they let the wires alone, with the result that the British encampments were in daily communication with London. Since then, however, the Tibetans have, it seems, learned something, and the Chinese, it appears, are aware of this fact. For in the latter's late invasion of the land of the Dalai Lama, which caused that potentate's precipitate exit from Lhasa and flight into India the penetrating column took no chances on benefitting from British experience. It therefore depended upon wireless telegraphy for keeping in touch with cities beyond the Tibetan border, and it is stated it was able to do this most successfully.

The Colin-Jeance System of Wireless Telephony.

The system of wireless telephony developed by Lieutenants Colin and Jeance of the French Navy, employs a number of arcs burning between copper and carbon electrodes in air or in hydrogen, coal gas, ammonia or acetylene or in liquids such as oils and the various hydrocarbons. The primary circuit which is fed by a direct current dynamo contains a variable inductance and capacity. The inductance forms the primary of a transformer the secondary of which is also variable, and has in series with it a variable condenser and another adjustable inductance which forms the primary of a second transformer. One end of the secondary of this transformer, which is also a variable inductance is grounded and a properly chosen point is connected to the aerial through another adjustable inductance. The transmitting microphone has one side connected to ground and the other side connected to a suitable point in the secondary of the last transformer through a variable resistance. Instead of one transmitter a large number are connected in series all being mounted on a single base and having a common chamber leading to the mouth piece. The number actually used may be varied at will by means of a commutating switch. On the receiving end any kind of detector can be used such as the electrolytic, audion or perikon. The upper electrode of the arcs, which is of copper is in the form of a cylindrical reservoir which is kept cool by water circulating through it.



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The Railroad.

Mr. A. T. Hollenbeck has been appointed superintendent of telegraph of the Chicago, Great Western Railway with headquarters at Chicago.

Mr. E. D. Winslow has been appointed superintendent of telegraph of the Chicago, Rock Island and Gulf Railway, with office at Ft. Worth, Tex., vice Mr. A. B. Crowley, transferred to other duties.

Mr. W. W. Ryder, of Chicago, general superintendent of telegraph of New York Central Lines west of Buffalo was a recent New York visitor.

The Southern Railway is equipping its division from Greensboro, N. C., to Lynchburg, Va., a distance of 124 miles, with 36 way stations, with a telephone despatching circuit.

In the Erie Railroad Employees' Magazine for April, Mr. E. P. Griffith, superintendent of telegraph has an interesting illustrated article describing the use of portable telephones on the Erie and giving instances in which they have been a great time saver.

Mr. George H. Groce, for several years superintendent of telegraph and signals of the Illinois Central Railroad and for some time past assistant to the general manager, has resigned that position to associate himself with the General Railway Signal Company of Rochester, as assistant to the president. Mr. Groce will make his headquarters in New York.

At the meeting of the Eastern division of the Association of Railway Telegraph Superintendents, held in Washington March 25, Mr. E. P. Griffith, superintendent of telegraph of the Erie Railroad, New York; Mr. J. C. Johnson, superintendent of telegraph of the Pennsylvania Railroad, Philadelphia, and Mr. C. M. Lewis, superintendent of telegraph of the Philadelphia and Reading Railroad, Reading, Pa., were appointed a committee to confer with the general managers of all telegraph companies to formulate a system for delivering messages to passengers on trains, whereby a receipt can be obtained and returned to the telegraph company.

Annual Convention of Association of Railway Telegraph Superintendents.

The plans for the twenty-ninth annual convention of the Association of Railway Telegraph Superintendents which meets at Los Angeles, June 20 to 24, are nearly complete and the coming meeting promises to be one of the most successful ever held by the association. Among the papers which have been provided for by the committee on topics, of which Mr. J. B. Sheldon, superintendent of telegraph of the Union Pacific Railroad, is chairman, will be one on "Wireless Telegraphy," by Mr. William Mayer Jr., of New York, the well-known electrical engineer and authority on this subject. Mr. D. C. Buell, in charge of the educational bureau of information of the Union Pacific Railroad, which is probably doing more than any other railroad system in the line of educating its employees will

discuss "Education for Efficient Railroad Service." "Protecting Telephone Lines from Lightning and Other Disturbances," will be the subject of a paper by Mr. M. E. Launbranch, of the United States Electric Company, who has spent a large amount of time in investigating this question.

Mr. H. P. Ryner of the Hoeschen Signal Company will give a paper on "Automatic Block and Highway Crossing Signaling," and will explain a method of signaling that does away with storage batteries for block signals and crossing bells.

Mr. E. E. Dildine, assistant superintendent of telegraph of the Northern Pacific Railway, St. Paul, will discuss "Telephone Train Despatching." As the Northern Pacific already has over 500 miles of telephone despatching circuits in operation and is making preparations to install over 700 miles more, Mr. Dildine will undoubtedly be able to present some interesting information on this subject which he has gained as a result of his experience.

A paper on the subject of "Testing Telegraph and Telephone Circuits," will be presented by Mr. V. T. Kissinger, superintendent of telegraph of the Chicago, Burlington and Quincy Railroad, Chicago. Mr. Kissinger has had a wide experience in the use of various devices for testing and as this is a subject in which all of the members are vitally interested his paper will be gladly received.

Mr. E. P. Griffith, superintendent of telegraph of the Erie Railroad, New York will discuss "Telephoning to and from Trains." Mr. Griffith has made some extensive experiments along this line and will present some valuable information upon this subject.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Virginia, will present a paper upon "Composite Telephone Blocking." As such a system is successfully used upon the Seaboard, Mr. Williams is well qualified to discuss that subject.

Other persons well informed upon the various questions treated have been selected to lead in the discussion of these papers and it is evident that a large amount of valuable information upon each question considered will be brought before the convention.

The standard railway telephone agreement which has been under consideration for the past year, will come up for discussion and final action.

An attractive program has been arranged for the entertainment of the visiting ladies and of the members during their leisure hours. The general outline of this feature of the convention will be substantially as given in our March 1 issue. The headquarters of the convention will be at the Hotel Alexandria. This hotel is conducted on the European plan and the rates vary from \$2.00 to \$4.00 per day for one person in a room and from \$3.00 to \$6.00 per day for two persons in a room.

Arrangements have been made by the

members of the association in the middle West to go together by way of the Santa Fe System on the train leaving Chicago at 10 p. m., Tuesday June 14, and Kansas City the next morning, at 11:30, and arriving at Los Angeles Monday morning, June 20 at 8:30. This will give the party a day's stopover to visit the Grand Canyon. The eastern members will connect with this train at Chicago, or other points en route. It has also been suggested that the party return by way of the Southern Pacific stopping off at San Francisco, Salt Lake City and Denver on the return trip. The secretary of the Association, Mr. P. W. Drew, superintendent of telegraph of the Minneapolis, St. Paul and Sault Ste. Marie Railroad, Chicago, requests that all those who expect to take the special train notify him by May 20, in order that ample accommodations may be provided.

Annual Reunion of Old Time and Military Telegraphers.

Mr. W. J. Lloyd, superintendent of the Western Union Telegraph Company, Chicago, and president of the Old Time Telegraphers' and Historical Association is actively engaged with the preparations for the twenty-ninth annual reunion of the association which will be held in that city, September 8, 9, and 10, together with that of the Society of the United States Military Telegraph Corps. President Lloyd urges us to impress upon all members of the association and the society the importance of attending this year's gathering at Chicago. The committees there will do their utmost to make the reunion a banner affair. Mr. F. J. Scherrer, assistant secretary of the Western Union Telegraph Company, 195 Broadway, New York is secretary of the association and will furnish any additional information. Colonel William Bender Wilson, of Holmesburg, Philadelphia, Pa., president of the Society of the United States Military Telegraph Corps has appointed the following reception committee for that society: A. H. Bliss, chairman; E. W. McKenna, Hon. A. W. Nohe, Wm. R. Plum, H. P. Darlington, Daniel Hogan, Rev. W. D. Gentry, John R. Dixon, H. D. Sloat, John D. Voltz, Z. P. Hotchkiss Charles F. Gross S. E. Ingram, Cass. G. Sholes, and Henry W. West, Mr. David Homer Bates, 658 Broadway, New York, secretary of the society.

Mr. William J. Dealy, has been appointed by President Colonel William Bender Wilson, a member of the executive committee of the Society of the United States Military Telegraph Corps to succeed Colonel Levi C. Weir, deceased.

Bill Introduced for Control of Telegraph and Telephone Companies in New York State.

A bill has been introduced in the New York Legislature which, if passed, will place the telephone and telegraph lines of the State within the jurisdiction of the Public Service Commission of the Second District, in accordance with the report recently made by the special legislative

committee which investigated the subject during the last year.

Power is given to the commission upon complaint or upon its own motion to issue orders in relation to rates and service. This authority, the bill stipulates, shall not be construed as giving the commission power to make an order requiring a telegraph or telephone company to perform any act which is unjust or unreasonable or in violation of the requirements of its franchise or of any State or Federal law.

The commission receives the power of investigation and limited control over the forms of accounts and records of the companies, which are required to file annual reports with the commission. The commission is given the veto power over the exercise by the separation of rights and privileges under the franchises, which they have not exercised up to this time.

The measure contains provisions against discriminations in rates. It prohibits any corporation or association other than a telephone or telegraph company to acquire more than ten per cent. of the stock of any telephone or telegraph company. The bill prohibits the granting of reduced rates or free passes or franks for transmission of any messages except by officers or employees of the companies.

The bill requires that the permission and approval of the commission shall be given for issues of stocks and bonds, except that companies may issue notes payable otherwise than on demand for proper corporate purposes without the approval of the commission, and notes to be payable at specified periods of not more than twelve months.

Paris Conference of Telephone and Telegraph Engineers.

As we have received many inquiries from those interested in the United States and Canada in regard to the requirements for representation at the Conference of Telephone and Telegraph Engineers, which will be held at Paris in the fall of this year, we addressed a letter to Major Walter A. J. O'Meara, engineer in chief of the British Post Office Telegraphs and Telephones, London, and vice-president of the committee which arranged for the 1908 meeting at Budapest, for information concerning this subject. In answer to our inquiry Major O'Meara replied as follows:

"I regret that it is not possible for me to give you any information for publication which will lead to America being represented at the next conference. These conferences are convened by the principal European telegraph and telephone administrations and as the delegates are members of these administrations, the conferences necessarily have at present a semi-official character.

"Proposals for extending the scope and representation of the conference have reached me from time to time, but as you will readily perceive, no step could be taken without the full agreement of the various European administrations concerned."

Obituary.

Charles T. Melrose, a press telegrapher of Dayton, Ohio, died in that city March 29, aged forty-four years.

William M. Martin, manager for the Western Union Telegraph Company at Burlington, Vt., died March 27, as the result of a stroke of apoplexy.

Harry B. Apple, cashier in the office of R. T. Reid, superintendent of the Western Union Telegraph Company at Seattle, died March 31, aged twenty-four years.

Joseph W. Woods, an old time telegrapher, died in New York March 27, aged seventy-two years. Mr. Woods was in the service of the Western Union Telegraph Company for more than half a century, retiring in 1905. He served as manager of a number of branch offices in New York City.

Thomas R. Rusk, formerly superintendent of the Postal Telegraph-Cable Company, at Augusta, Ga., died March 17, aged fifty-eight years. Mr. Rusk entered the telegraph service at the age of fifteen and was employed at various places throughout the South. In 1889 he opened the office of the Postal at Augusta and served as manager until 1898, when he was promoted to the superintendency at that point. This office he retained until June, 1907, when he retired and engaged in farming.

Henry Clay Vincent, a military telegrapher, died at Marietta, Ohio, March 27, aged seventy years. Mr. Vincent was connected with the Marietta, Columbus and Cleveland Railroad from the close of the war until 1900, as operator and general freight and passenger agent. He was a frequent attendant at the reunions of the Society of the United States Military Telegraph Corps and the Old Time Telegraphers' and Historical Association, being present at the meeting held in Pittsburg last August.

S. W. Wingate, for the past twenty years identified with the Portland, Oregon, office of the Western Union Telegraph Company, died at Oakland, California, March 20, aged fifty-six years. Mr. Wingate was a well-known telegrapher. In the late seventies and early eighties, he was a member of the staff in New York. In 1884 he left this city for the Pacific coast, finally locating in Portland, where he remained until last fall, when, owing to sickness, he moved to California, thinking the change of climate would prove beneficial.

Matthew R. Wolff, a veteran telegrapher and a pioneer in the telephone business, died at his home in Wheeling, W. Va., March 19, aged sixty-seven years. He entered the telegraph service at the age of nine years as messenger and later became an operator serving at Pittsburg, Steubenville, O., and as manager of the Western Union Telegraph Company at Wheeling. About thirty years ago he became interested in the development of the telephone in the Ohio Valley and has been prominently identified with the Bell Telephone Company since that time.

John A. Casterlin, well-known by telegraphers throughout New York State, died at his home in Washington, D. C., March 31, aged sixty-seven years. Mr. Casterlin served in the army during the Civil War nearly three years, losing an arm at the battle of Cold Harbor. He afterward learned telegraphy under the instruction of the late Otis E. Wood. He was manager of the Waterloo, N. Y., office of the Western Union Telegraph Company for twenty-two years, being transferred from there in 1888 to Ithaca, where he remained until his retirement in 1906 on account of ill health.

Thomas A. Davin, an old time and military telegrapher, died suddenly of a stroke of apoplexy at his home in Dorchester, Mass., March 27, aged seventy-three years. Mr. Davin entered the telegraph service in 1852 at the Astor House office, New York. He was a prominent member of the Military Telegraph Corps during the war and afterward entered the employ of the Western Union at Boston, taking part there in the first speed tests of the quadruplex in 1876, a record of which was given in our February 16 issue. For nearly thirty years past he has been in the employ of the banking house of Richardson, Hill and Company in Boston. Mr. Davin is survived by a wife and one daughter, who is a teacher in the Phillips Brooks school, Boston.

Zalmon G. Simmons, who played a prominent part in telegraph development in Wisconsin, died at Kenosha, that state, February 11, aged eighty-one years. In 1856, soon after the organization of the Wisconsin State Telegraph Company, he secured a substantial interest in that project and took an active part in the extension of its lines, becoming president of the company in 1864. In 1865 the lines of the Minnesota State Telegraph Company were bought and the name of the enlarged company changed to the Northwestern Telegraph Company. Mr. Simmons retained the presidency of this organization until its final absorption by the Western Union Telegraph Company in 1881. He has led an active business life in Kenosha for many years, and was well-known to the older telegraph officials of the country.

The English telegraph management which abandoned the Wheatstone system for the transmission of messages a few years ago is returning to that method of handling the traffic. The reason for this is that a higher speed can be obtained by the use of the Wheatstone system on the long underground circuits than by hand Morse transmission.

Telegraph operators who wear celluloid eye shades should remove them before trying to light their pipes. A Port Deposit, Md. operator who neglected to take this precaution recently set fire to his shade and the flames were soon communicated to his hair and clothing. Fortunately a bucket of water happened to be nearby and the telegrapher threw this on himself and extinguished the flames before any serious damage was done.

Electrical School at Washington.

An electrical class has been organized in the Washington office of the Western Union Telegraph Company for the purpose of giving all interested an opportunity to pursue a systematic study of electrical matters pertaining to the present service, starting with the elementary subjects and gradually working up to the higher branches. Sixty-five employees have signified their intention of joining this class.

At a meeting held Saturday evening, March 26, the class was organized and the following officers elected: J. W. Collins, president; P. E. Brown, vice-president; J. D. Steele, secretary-treasurer. The officers and Wm. Niemeyer, R. W. Farrelly, E. R. Edmonds, and J. S. Conway, constitute the executive committee.

The class will meet each Friday night. There were present at the first meeting forty-two members.

The proposition of forming an electrical class was received with enthusiasm. It is the intention of the class to pursue a systematic textbook course and from time to time to secure prominent electrical engineers to deliver lectures. Not only telegraph and telephone subjects will be taken up and discussed, but also electrical matters generally considering first telegraph equipment.

Mr. Philander Betts, professor of electrical engineering, at George Washington University has been engaged for the lecture courses. It is believed that much electrical knowledge will be gained and that great good to the service and the individual members will result.

Organization of Electrical Club at Baltimore.

The members of the operating department of the Western Union Telegraph Company in Baltimore met Friday evening, April 1, and organized a class for the purpose of taking up the study of electricity, so far as it relates to the equipment in daily use by operators, and for the general purpose of increasing individual efficiency and interest in their work.

Twenty-seven were in attendance at the first meeting and a number of others have signified their intention of joining the club. Much interest was manifested by those present.

Mr. J. M. Creamer, manager, called the meeting to order, and a permanent organization was effected by the election of the following officers: Mr. E. S. Anderson, all night chief, president; Mr. Samuel T. Shutt, a branch office manager, vice-president; Mr. Charles E. Clagett, northern wire chief, secretary-treasurer. The officers named together with L. D. Wilbourn, chief operator, and Robert L. Dryden, assistant day traffic chief, constitute the executive committee.

This committee was instructed to draw up a suitable constitution for the organization, map out a course of study, arrange for instructors, lecturers, etc. and report at the next meeting.

Tuesday evening has been selected for the regular weekly meetings.

Pittsburg Electrical Society.

On March 29 the employees of the Pittsburg office of the Western Union Telegraph Company, met in the office of Superintendent Church for the purpose of organizing a class or society to take up the study of telegraph engineering. A permanent organization was effected to be known as the Pittsburg Society and the following officers elected: W. J. Dodge, president; F. C. Schiller, vice-president; E. R. Collins, secretary and E. R. Tilghman, treasurer.

There were fifty-two members enrolled at the first meeting. A standing committee was appointed by the president composed of the following: Geo. Kendrick, W. H. Maize, A. Kridel, E. R. Collins, and D. D. Calvert.

A committee to draft a constitution and by-laws was appointed, consisting of T. G. Gosden, F. C. Schiller, and E. R. Tilghman.

The society decided to hold its regular meetings on Tuesday evening of each week, at 8:00 o'clock. An instructor will be engaged and a standard text book has been adopted.

Great interest and enthusiasm was manifest in the undertaking by all present and the success of the society is assured.

Electrical School Organized at Philadelphia.

A meeting of employees of the Western Union Telegraph Company at Philadelphia, was held on the evening of April 1 in the Pennsylvania building for the purpose of organizing an electrical class.

Manager J. W. Reed acted as temporary chairman. A permanent organization was effected with the following officers: John V. Berger, president; Robert C. Murray, secretary; Mahlon G. Moyer, treasurer; executive committee: C. W. Pennyacker; H. V. Emanuel; D. Good; G. W. Wood; E. A. Dos Santos.

The following were present: J. W. Reed, Frank R. Webb, J. T. Wilde, J. Manlove Smith, A. W. Baldwin, A. H. Spracklin, R. C. Murray, J. V. Berger, J. T. Sheldrake, J. W. McIntyre, H. Lush, D. Good, J. W. Truitt, E. V. McElroy, Mahlon G. Moyer, Morgan G. Moyer, G. W. Wood, E. A. Dos Santos, C. W. Pennyacker, H. H. Swartz, F. G. Lamb, J. F. O'Neill, W. Carpenter, George L. Jack, H. A. Shinn, H. V. Emanuel, J. P. McGovern, G. O. Gregg, V. G. Hudgins, I. D. Maize, H. H. Peck, E. L. Maize, F. B. McCormick.

At a second meeting of the club held April 9, thirty-six were present. Professor W. J. Pollock of the University of Pennsylvania, has been engaged as a lecturer to speak three nights during each month. The fourth meeting night in the month will be set aside for general business, the interchange of ideas between the members and for social gatherings.

An Electrical Book for Practical Men.

"Lessons in Practical Electricity," by C. Walton Swope, which has been selected as an official text book by the electrical schools organized among the employees of the eastern division of the Western Union Telegraph Company, is, as its name signifies,

an elementary text book for the practical worker. It contains nearly five hundred pages and has over four hundred illustrations. It is divided into thirty-one chapters dealing with magnetism, batteries, electrolysis, current measurement, resistance, Ohm's law, circuits, galvanometers, electromagnets, measuring instruments, electrodynamics, induction coils, dynamos, motors, electric lighting and alternating currents. At the end of each chapter, there are given several questions for the student to answer and practical problems for him to solve. Numerous interesting experiments are also described, which can be performed by the aid of simple apparatus. The book was written especially for the use of evening classes in practical electricity and is admirably adapted to that purpose. This work, together with Jones' "Diagrams," Mayer and Davis' "Quadruplex" and Thom and Jones' "Telegraphic Connections," seems to meet all of the requirements of the student who desires to acquire a thorough knowledge of the principles underlying the operation of the telegraph system. The prices of these books are: Swoopes "Lessons in Practical Electricity," \$2.00; Jones' "Diagrams," \$1.50; Mayer and Davis' "Quadruplex," \$1.50; Thom and Jones' "Telegraphic Connections," \$1.50. Any of these books will be sent, carrying charges prepaid, upon receipt of price by J. B. Tahavall, Telegraph and Telephone Age, 253 Broadway, N. Y.

New York Telegraphers' Aid Society Election.

The following officers were chosen by the New York Telegraphers' Aid Society at their election, which took place on March 24: President, Robert J. Marrin; vice-president, H. C. Worthen; treasurer, T. M. Brennan; financial secretary, C. A. Kilioyle; recording secretary, Miss M. E. Saunders; members of executive committee: E. F. Howell, J. A. Hill, Miss S. Dougherty, E. E. Brannin, E. Mesler, A. J. Gillman, C. J. Lemaire, W. T. Rogers, A. M. Lewis, D. J. Condon and H. M. Heffner; auditing committee: J. F. E. Hopkins, and F. J. Nurnberg.

The statement of the society for the year ending March 6 is as follows:

President R. J. Marrin in his address to the society said in part:

"I beg to remind you that on March 7, this Society was in existence thirty years and I consider it an honor and a great privilege to address you this evening. If there are any charter members present, to them I desire to extend the best wishes of the entire membership, as their efforts and thoughtfulness made this grand organization possible; and for their associate charter members who have since joined the silent majority, we will always cherish their memories for their noble work in our behalf.

"In conclusion I wish to briefly call your attention to the immense amount of work carried out by this Society during these years. Thousands of visits have been made by our sick committees. We have disbursed \$87,434.51 in sick benefits, and \$21,500 to bury our deceased members, and in addition to these sums, and since the inception

of our Relief Fund, a most worthy charity, we have distributed \$9,843.85 among the sick and unfortunate. In all we have expended \$118,778.36 and our assets now amount to \$29,858.69.

"Surely these facts and figures should be a source of pride to each one of us, and I trust that each succeeding year will find our Aid Society progressing onward in the noble work instituted by our thoughtful brothers who laid the foundation of your society, on March 7, 1880."

Trade Note.

Mr. James Uncles, who was probably one of the most successful salesmen for the Yetman Transmitting Typewriter Company, has succeeded to the business of that concern at North Adams, Mass., as will be noted from his advertisement in another column of this issue. Mr. Uncles was born in England in 1867, and entered the telegraph service in that country. Since coming to America he has been employed by the Great North-Western Telegraph Company at Toronto and by the Western Union Telegraph Company and has had an extended experience with the Associated and the United Press and in the brokerage business. As a result of his wide acquaintance with the various classes of service as well as his former connection with the sales department of the Yetman company, Mr. Uncles is well qualified to push the sale of the Yetman transmitters and his many friends wish him success in his undertaking.

Letters From Our Agents.

PHILADELPHIA, WESTERN UNION.

Mr. N. E. Church, superintendent of the Pittsburgh district, was a recent visitor in the operating room.

Mr. John W. Benckert, for many years assistant manager of this office, has been transferred to the office of superintendent W. A. Sawyer.

Mr. R. A. Black, manager of the York, Pa., office since 1904, has been appointed assistant manager of this office, vice Mr. Benckert promoted.

Mr. Charles M. Pennypacker has been appointed assistant wire chief at night, vice S. S. Peck now first chief.

Mr. Harry V. Emanuel has been transferred from the Richmond wire to the first New York duplex, which has been started recently.

Mr. C. B. Wood, has returned to duty after seven weeks absence owing to several operations for the removal of a tumor on his cheek.

Mr. Thomas A. Maholland, an old timer, but for the last fourteen years engaged in other business, died in this city on March 31, aged 55 years.

Miss Edna Moyer, one of the winners in the recent wireless tournament, has resigned to engage in other business.

Mr. I. D. Maize, the well known old time and military telegrapher of this city had this to say regarding the story of the death of operator D. B. Lathrop, as related in the April 1, issue:

"The article in the Age of April 1, regarding D. B.

Lathrop was very interesting to me because of the fact that Mr. Lathrop was with me for six months immediately after his arrival at the front. He was studying for the ministry before he joined the military telegraphers, and was so extremely anxious to see active service, that when General McClellan moved to the Peninsula, he walked all the way from camp to Washington in order to get a chance to go to the front. The next I heard of him was his tragic death at Yorktown. He was a brilliant scholar and a gentleman and beloved by all with whom he came in contact."

NEW YORK, WESTERN UNION.

Mr. Alfred Winder, of the operating force, at 195 Broadway, has on account of failing health asked to be retired on a pension. His request has been granted and as a testimonial of his long and faithful service for the company, he has been given three months leave of absence on full pay before the pension goes into effect. Mr. Winder was born in 1834, and entered the telegraph service in 1851 at Indianapolis. He has been continuously engaged therein since that time. During the war he was employed in the military telegraph corps, was captured and confined in Libby Prison. For the past twenty years he has been identified with the New York staff of the company.

Mr. Wm. Levison, of the Jersey division, having passed a civil service examination, has resigned to accept an appointment as a mounted police officer of the Aqueduct Water Board.

William John Wilkie died recently in this city after a long illness, aged sixty-five years. Mr. Wilkie was well known and recognized as a gilt edge telegrapher of the old school.

Miss Lillian Lindquist of "Clarks" department, New York, and Mr. Andrew Turner, of the Associated Press, Holyoke, Mass., were married in this city, April 2.

Miss I. McGillis of the city line has returned to her duties after an extended trip throughout the far west.

OTHER NEW YORK NEWS.

The annual spring dinner of the Magnetic Club will be held at the Hotel St. Denis, New York, Tuesday evening, April 19, at 6.30. There will be no set speeches, but a first class entertainment will be provided for all who attend.

Mr. William J. Finn, a son of William Finn of the office of the engineer of equipment of the Western Union Telegraph Company, New York, was married March 30 at Orange, N. J., to Miss Gertrude C. Burt. Mr. Finn is a member of the cable staff of the Western Union at 16 Broad St., New York, and was presented by his fellow employes with a handsome silver service.

Business Notice.

Loftis Bros. and Company, the old reliable, original diamond and watch credit house, make it possible for every honest man and woman to own a genuine diamond, fine watch, or beautiful high-grade jewelry.

It is an easy matter to open a confidential charge account with this house. All you have to do is to make your selection from their large handsome catalogue, or any of their booklets, paying one-fifth of the purchase price as first payment, balance in eight equal monthly amounts. Diamond prices at present are higher than they have ever been, but lower than they will ever be again. The supply is growing smaller and the demand greater, yet by virtue of their immense purchases Loftis Bros. and Company are able to quote prices ten to twenty per cent. under those of cash stores, for goods of equal quality.

Every diamond sold by this house is accompanied by a signed guarantee certificate, attesting its value and quality. No broader guarantee was ever given by a responsible company. Write for their catalogue. Address Loftis Bros. and Company, E-795, 92 to 98 State Street, Chicago, Ill.

The secret of success of the Serial Building Loan and Savings Institution, 195 Broadway, New York lies in the fact that their funds are all invested in first mortgages, which have a stable unchanging value and that they keep no idle surplus on hand. They have sufficient assets at the present time to pay their depositors one dollar and ten cents for every dollar deposited. Write for their plan to assist any telegrapher to buy a home.

Wanted—Address of telegraph operator in city who wants railroad work in country. Address "Relief," care of Telegraph and Telephone Age.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

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I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEY-BOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

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Telegraph and Telephone Age

No. 9.

NEW YORK, MAY 1, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

Elementary Lessons on Electrical Measurements.

BY WILLIS H. JONES.

PART I.

If the writer should put down the fraction $\frac{E}{R} = 2$ there is probably not a telegraph operator who would fail to understand the formula. Not only that but if he gave them any two of those three factors they would know how to find the third. Yet should he substitute the letters E, R, and C, for those figures and ask them to work out the simplest example in electrical measurement the majority of them would immediately say: "Don't give me anything like that, I never studied algebra."

The word "algebra" and everything that looks like an algebraical formula seems to frighten the student at once and often causes him to leave out the fundamental, and really most necessary part of his education.

The fact is there is positively no difference between the two formulas $\frac{E}{R} = 2$, and $\frac{E}{R} = C$, except that the first is only correct as long as you use no other figures than the three given, whereas $\frac{E}{R} = C$ is absolutely correct for every example you work out regardless of what figure or figures are employed. $\frac{E}{R} = C$ is merely a picture of the positions you must place your figures in after you get them, and you always know two of the factors before you begin, no matter what example you wish to solve.

For instance, in every electric circuit there must

obviously be electromotive force, resistance, and current.

Now E stands for E, M, F, in volts, R stands for resistance in ohms, and C stands for current in amperes.

Each of these terms represents one unit of what it stands for. If we erase two of the letters and put in their places figures which show just how many such units of each we have to begin with, then we will have a plain example in arithmetic just like the first one given, viz.: $10 =$. All you have to do is to find the third factor in the usual way.

In order to illustrate this point, let us take the following example:

If we connect a battery possessing 140 volts electromotive force to a wire known to have a total resistance of 70 ohms, how much current in amperes will flow through the circuit?

Now just forget all about algebra and simply keep that picture of $\frac{E}{R} = C$ in your mind. All that is required is to substitute your figures for the letters they represent.

You have 140 volts, so rub out E and substitute 140 for your numerator. As 70 ohms means resistance, put down 70 in place of R. You now have a simple fraction $\frac{140}{70} = C$. Hence if we divide 140 by 70 we find the value of C to be 2. so we erase C and substitute figure 2, which latter is the correct answer.

Now suppose that you did not know the resistance of this wire but wished to ascertain that fact.

In this case you would insert an ammeter in the circuit and, as we have already proved, the needle will show 2 amperes of current flowing if you use the same battery. It is obvious that if $\frac{E}{R} = C$, then $\frac{E}{C}$ must equal R. Consequently change the formula to read $\frac{E}{C} = R$ and proceed as before. As E is 140 as in the first example there will be no change in the value of the numerator, but the denominator C is now 2. By dividing the 140 by 2 we find that the value of R is 70 ohms, thus again proving the accuracy of the original formula.

Next suppose you did not know the value of the electromotive force (or number of volts), but did know that the current was 2 and the resistance was 70, and wished to know the electromotive force of the battery.

In this case if $\frac{E}{R} = C$, then R multiplied by C should tell you what E is. You would then change the formula to read $R \times C = E$. Or you may omit the multiplication mark, as is frequently done, and make it $RC = E$.

Using the same example we find that E must be 140 volts, because 70, the resistance, multiplied by 2, the current, equals 140.

These three examples alone should suffice to

prove the simplicity of formulas as compared with long worded rules to be memorized. The student is only required to memorize three letters together with what each symbolize in order to be able to work out any example concerning current, electromotive force and resistance, where the value of any two of those factors are known.

There is one more letter to bear in mind, and that is W, but as it stands for Watt, the unit of electrical power, or work done, it is easy to remember. It represents the electrical equivalent of a unit of mechanical power. Of course, the student realizes that it requires more electrical power to force, say one ampere of current, through a high resistance than it does through a low resistance, hence the power expended in the way of work done differs in different circuits according to their respective lengths, or ohmic resistance.

The rule for ascertaining the work done in such circuits is to multiply the figures representing the electromotive force by those indicating the volume of current flowing. Thus in a circuit in which 2 amperes of current flows due to a battery of 140 volts the formula would be $E \times C = W$, or $EC = W$. Worked out we find that the energy expended is 280 watts, because $140 \times 2 = 280$.

In case you only know the value of the current and the resistance of the circuit, the power in watts is found by multiplying the square of the current by the resistance. The formula is $C^2 \times R = W$. Using the same example we get $4 \times 70 = 280$ watts, the same answer the previous formula gave.

Where a great deal of energy is expended and the horsepower value is desired, the fact is ascertained by dividing the total number of watts expended by 746 because 746 watts is the electrical equivalent of one mechanical horsepower. The formula is $H. P. = \frac{W}{746}$.

(To be continued.)

Recent Telegraph and Telephone Patents.

Patent, No. 953,701, for an alternating current telegraph system, has been taken out by C. Meyer, of Charlottenburg, Germany. For controlling the position of an indicating needle from a distance by varying the phase between the current and the electromotive force in the conductors used in transmitting the signals, thus reducing the number of wires.

Patent, No. 953,970, for a telephone receiver, has been granted to J. Noble, of St. Louis, Mo. A diaphragm with a circular iron disc carrying concentric superimposed iron discs of smaller diameter, thus increasing the bulk of the metal of the diaphragm.

Patents, Nos. 954,062, and 954,150, for a teleautograph, have been taken out by G. S. Tiffany, of Summit, N. J. The first consists of a main-line circuit, a second circuit, with circuit closer, the latter having loose contacts so that when vibrations occur in the main line circuit the contacts are disturbed and interrupt the second circuit. The second makes use of a master

switch, in one position of which the receiver is on and the transmitter off with relation to a distant station; in another position the condition is reversed, and in the third position both instruments are off. Also improvements in the paper feeding mechanism and in the relay and other parts.

Patent, No. 954,167, for a telephone bell or ringer, has been granted to P. C. Burns, of Chicago, Ill.

Patent, No. 954,298, for a telegraph instrument, has been issued to W. McL. Jackson, of Gastonia, N. C. A key, a pendulum and a lever arranged to be operated by the key for setting the pendulum in motion, thus giving dots by a single stroke of the key.

Patent, No. 954,340, for a lock-out device for party telephones, has been secured by D. W. Kneisly, of Dayton, Ohio.

Patent, No. 954,402, for a telephone repeater, has been awarded to P. Stragiotti, of Hurley, Wis.

Patent, No. 954,445, for a telephone system, has been granted to O. M. Leich, of Genoa, Ill.

Patent, No. 954,489, for a printing telegraph, has been issued to J. E. Wright, of New York. Column printing telegraph doing away with one transmission line, making use of a type wheel with a plurality of circles of type which is rotated step by step and moved along the line step by step and actuated by independent electromagnets included in the same circuit and actuated by independent electro-magnets included in the same circuit and actuated by positive and negative impulses.

Patent, No. 954,701, for an automatic telephone, has been secured by J. E. Rogers, of Danbury, Conn.

Patent, No. 954,734, for a combined telephone and telegraph system, has been taken out by G. T. Hiner, of New York. Eliminates the static discharge by impressing on the telephone line, rounded telegraph waves shading the impulses at the beginning and at the end, the waves being of such low frequency as to have no effect upon the diaphragms of the telephone.

Patent, No. 954,829, for telephone microphone, has been awarded to V. Tardieu, of Arles, France.

Patent, No. 954,931, for a receiver for sound transmitting instruments, has been granted to J. J. Comer, of Santa Monica, Cal.

Patent, No. 955,065, for an insulator, has been taken out by C. C. Hardin, of La Fayette, Ga. Telegraph and telephone line insulator which holds wires of different gages and consists of a block carrying different sized grooves and mounted on a stem between which block and superimposed plates and nuts the wires are clamped.

"Pocket Edition of Diagrams," etc., the latest revised edition, 334 pages and 160 illustrations, published by Telegraph and Telephone Age, contains just the information every telegrapher requires.

Personal.

Mr. Gerard Swope, general sales manager of the Western Electric Company, New York, has gone to Europe on business for the company.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, has contributed \$35,000 toward a teachers' endowment fund for Phillips Exeter Academy, to be used for increasing the salaries of the teachers.

Mr. M. Fitzgerald, formerly and for many years identified with the French and other cable companies in this country, but who retired from active service about four years ago is a frequent contributor of articles to the magazines. Mr. Fitzgerald now resides at East Brewster, Mass.

Mr. P. V. DeGraw, the old time telegrapher who is now Fourth Assistant Postmaster General at Washington, was paid a fine compliment in Congress recently when Representative Adamson, of Georgia, in speaking of the postal service said: "The most valuable branch of the entire department is the rural delivery, which under the management of General P. V. DeGraw and Mr. W. R. Spillman, two of the best business men I have ever met, is doing all the good possible to be accomplished with the money appropriated for the purpose. In my judgment those two vigilant public servants do their best to make the service satisfactory and efficient, and I believe that, with the money at their command they give to the rural population of this country every advantage possible."

Postal Telegraph-Cable Company.**EXECUTIVE OFFICES.**

Colonel A. B. Chandler, chairman of the board of directors, has left New York for his summer home at Randolph, Vt. Before going to that place he will visit his son Willis Chandler, who has been at Saranac Lake for some time past for the benefit of his health.

Mr. Minor M. Davis, electrical engineer, has returned from a trip to the west in the interest of the company.

Mr. S. B. Haig, superintendent of traffic, has returned to his office after an extended trip of inspection which took him as far as the Pacific Coast.

Mr. George H. Usher, general superintendent at Atlanta and Mr. T. W. Carroll, general superintendent at Chicago, were recent New York visitors. Among other executive office visitors during the past two weeks have been A. L. Edgecomb, superintendent at Boston; H. D. Reynolds, superintendent at Buffalo; C. E. Bagley, superintendent at Philadelphia; Manager C. A. Richardson and L. L. Howell of Boston; Manager V. J. Albert of Baltimore, Manager J. A. McNichol and A. E. Zintl of Philadelphia, Manager C. E. Diehl of Harrisburg and Manager F. B. Travis of Washington.

The litigation between the Company and the Southern Pacific Railroad for a right of way

across the State of Nevada having been settled work has been begun on the construction of the 600 miles of line between Salt Lake City and Reno. Many gangs of men with camping outfits have been sent out and the construction will be pushed with all possible speed. It is expected that a record job will be made of this piece of work. Right of way has also been secured for a trunk line between Seattle and Tacoma. All new lines will be built of 435-pound copper wires and will be transposed so that they can be used for telephoning as well as telegraphing.

Mr. C. H. Newman, manager of the Buffalo office, winner of the second prize of \$100 given to managers of the eastern division by President Clarence H. Mackay in 1909 has divided the amount received into prizes of \$4.00, \$3.00 and \$2.00 each for the messengers of the Buffalo force; these prizes to be awarded monthly during March, April and May. The winning of these is dependent upon the number of messages delivered, the number collected, number of answers received to delivered messages, behavior, appearance, etc. In a circular letter which he issued announcing these prizes Mr. Newman stated that it was only because of the loyal support which those associated with him gave that he was able to win the prize and that he could think of no better way of distributing the money than that outlined.

RESIGNATIONS AND APPOINTMENTS.

Mr. E. P. Tully, who for many years has been manager of the messenger department, in New York, has been appointed manager of the branch offices in the entire city. He is succeeded in the messenger department by Mr. John Hennessy who is promoted from the operating room.

Mr. J. M. Martin of the Birmingham, Ala., office, has been appointed manager at Pensacola, Fla., vice Mr. H. M. McClellan, resigned.

Mr. R. I. McConnell, of Concord, has been appointed manager of the office at Winston-Salem, N. C., vice Mr. J. M. Martin, who has been transferred to the Charlottesville, Va., office.

Western Union Telegraph Company.**EXECUTIVE OFFICES.**

Mr. I. McMichael, vice-president and general manager of the Great North Western Telegraph Company, Toronto, Ont., was a recent executive office visitor.

Mr. B. F. Dillon, general superintendent of the southern division, has been making a general trip of inspection through his territory in order to get better acquainted with the existing conditions and the needs of the service. Mr. Dillon was married on April 27 to Miss Emma F. Maxwell of Jacksonville, Fla.

Mr. J. M. Stephens, formerly and for many years superintendent at Atlanta, but who retired from that post about seven years ago, has been reappointed to that position, vice G. W. Lloyd transferred.

Mr. C. B. Horton, manager of the office at Lincoln, Neb. has been appointed assistant superintendent of the third district, western division, with headquarters at Omaha.

Mr. E. E. Williams, manager of the Birmingham, Ala. office, has been promoted to be assistant superintendent with headquarters at Atlanta, vice J. S. Calvert transferred to Richmond, Va., as superintendent.

Mr. Thomas E. Russell has been appointed assistant superintendent of the seventh district with headquarters at New Haven. Mr. Russell has been chief clerk in Superintendent Clary's office at that point for some years. Mr. Otto C. Faupel of Meriden succeeds Mr. Russell as chief clerk.

Mr. C. A. Crane, manager of the Duluth office, has been appointed manager at St. Paul, vice Mr. W. R. Chapman, promoted to the superintendency at St. Louis. Before leaving Duluth Mr. Crane was presented by the employees of the office with a diamond stick pin and a Knights Templar gold ring. Mr. E. F. Kelley, manager at Sioux Falls, S. D., has been appointed to succeed Mr. Crane as manager at Duluth.

Mr. John S. MacKearly, manager at Watertown, S. D., has been transferred to Sioux Falls, vice Mr. Kelley, and Mr. F. D. Nash has been appointed to succeed Mr. MacKearly at Watertown.

Mr. W. W. Murphy, traffic chief of the



A GROUP OF TELEGRAPH AND TELEPHONE OFFICIALS.

From left to right: S. M. Williams, special agent, Western Union; F. A. Pickernell, assistant to president, American Telephone and Telegraph Company; Belvidere Brooks, general manager and E. J. Hall, chairman of executive committee, Western Union; W. T. Gentry, president, Southern Bell Telephone Company, Atlanta.

RESIGNATIONS AND APPOINTMENTS.

Mr. Maurice J. Walshe, manager of the office at White River Junction, Vt., has been appointed an inspector with headquarters at New Haven. Mr. Walshe has been connected with the office at White River Junction for over twenty years, for the past eight years of that time as manager.

Mr. James Mahar has been appointed manager of the office at White River Junction, vice Mr. Walshe.

Mr. G. R. Calvert, manager of the Asheville, N. C., office has been advanced to the manager-ship of the Birmingham, Ala., office, vice E. E. Williams, promoted.

Atlanta, Ga., office for the past two years has been appointed manager at Chattanooga, Tenn., vice L. P. Taber, resigned. Mr. Murphy entered the telegraph service twelve years ago at the age of fourteen as manager of the office at Warm Springs, Va. He has risen rapidly having held responsible positions in Virginia, North Carolina and Georgia and is one of the most energetic members of the profession in the south. Before leaving Atlanta he was presented by his associates with a pair of gold cuff buttons set with diamonds.

Mr. A. A. Patterson, wire chief at Toledo, has been appointed manager at Bay City, Mich., vice Mr. T. J. Cooper who has resigned after a service of forty years at that place.

W. R. Chapman, Western Union Superintendent at St. Louis.

William R. Chapman, who has been appointed superintendent of the Western Union Telegraph Company at St. Louis, is another Canadian-born telegrapher who has come to the front in his chosen profession. Mr. Chapman was born at Brighton, Ontario, June 14, 1864. He entered the telegraph service with the Dominion Telegraph



W. R. CHAPMAN,
Superintendent, Western Union Telegraph Company, St. Louis.

Company at his native place in 1878. In 1880 he went to Toronto and entered the employ of the Canada Mutual Telegraph Company. He remained there until 1882, when he came to the United States. During the next three years he served the Mutual Union and American Rapid Telegraph companies at Buffalo, N. Y., and the Western Union Telegraph Company at Chicago, and Jacksonville, Ill., and La Crosse, Wis. Mr. Chapman became a first-class operator and in 1885 was given a chance to show his executive ability by being appointed to the management of the La Crosse office. His record at this place was so satisfactory that in 1904, when there was a vacancy in the managership of the St. Paul office he was appointed to the more important post, where he has been located until his present promotion.

E. E. Williams, Assistant Superintendent Western Union Telegraph Company, at Atlanta.

Mr. E. E. Williams, manager of the Western Union Telegraph Company at Birmingham, Ala., who has been appointed assistant superintendent of the same company at Atlanta, Ga., was born at Wilson, N. C., September 4, 1859. He entered the telegraph service in 1872 and was employed in various capacities by the Atlantic and Pacific, American Union, Southern and Western Union Telegraph Companies until 1889 when he became manager for the last named company at

Birmingham. This position he has held continuously until his present advancement. During this time Mr. Williams has made a reputa-



E. E. WILLIAMS,
Assistant Superintendent, Western Union Telegraph Company, Atlanta.

tion for himself as one of the most progressive and wide awake managers in the south and has repeatedly declined offers of managerships in larger cities. His present promotion is but a fitting reward for the many years of loyal and efficient service which he has rendered to his employing interests. Mr. Williams is a brother of Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va.

C. A. Crane, Manager, Western Union Telegraph Company, St. Paul.

Mr. Charles A. Crane, who has been appointed manager of the St. Paul office of the Western Union Telegraph Company to succeed W. R.



C. A. CRANE,
Manager, Western Union Telegraph Company, St. Paul.

Chapman, promoted to the superintendency at St. Louis is one of the younger men in the profession who by reason of natural ability coupled with energy and perseverance are rapidly coming to the front. Mr. Crane was born in 1873 at Exira, Iowa. In 1885 he entered the telegraph service at Carson, Iowa as messenger. He has thus come to his present responsible position by way of the same path which most of those prominent in the telegraph today have followed. In 1902 Mr. Crane was made manager of the Duluth office and there his record has been such that when the vacancy in the managership of the St. Paul office occurred he was the logical candidate for the position.

Mr. E. Cox, Chief Operator, Postal Telegraph-Cable Company, San Francisco.

Mr. Elmer Cox, whose appointment as chief operator of the San Francisco office of the Postal Telegraph-Cable Company was briefly mentioned in our April 16th issue is one of the most wide awake and enterprising telegraphers in the west and his promotion to the position he now occupies is well deserved. Mr. Cox was born at Savannah, Mo., August 21, 1876, and entered the telegraph service September 1, 1892, at



E. COX,

Chief Operator, Postal Telegraph-Cable Company, San Francisco.

Oakley, Kan., as operator for the Union Pacific Railroad. He was afterward employed by the Wabash Railroad, by the Postal Telegraph-Cable Company at Springfield, Ills., and by the Western Union Telegraph Company at Dallas, Tex. October 7, 1903, he joined the forces of the Postal at Denver and in May of the next year he became night chief operator. On April 1, 1905, he was again promoted, this time to the position of assistant chief operator, days. He was appointed chief operator December 17, 1906, and served in that capacity until his transfer to San Francisco as previously noted.

The Cable.

John Oldham, agent for the Western Telegraph Company at Buenos Ayres, Argentina,

died April 18. Mr. Oldham has represented the Western Telegraph and other cable companies in Argentina and Uruguay for many years and was one of the best informed men, telegraphically, in those countries.

The bill which has been passed in the Canadian House of Commons to place all matters pertaining to cable traffic in the Dominion under the jurisdiction of the Railway Commission has been referred in the Senate to the Railway Committee. Before being passed the various companies involved were given a hearing in order to present any objections which they had to the proposed measure.

All of the telegraph and cable companies were represented at the hearing and as a result of their presentation of their objections to the measure passed by the House of Commons the Senate Committee has decided to amend the bill so that the Railway Commission will not be given jurisdiction over rates.

Municipal Electricians.

Fire Commissioner Rhinelander Waldo, of New York, has recommended that \$2,000,000 be appropriated for a new fire alarm system.

Plans are being considered at Passaic, N. J., for installing a police patrol flashlight system and four additional fire alarm circuits.

Mr. J. Elliot Smith, formerly superintendent of fire alarm telegraph in New York, but for many years past living in retirement at Portland, Me., was in New York recently and took occasion to call on many of his old friends.

Plans are being considered in Pittsburg for providing all of the policemen and firemen with portable telephone sets of a compact type easily carried, which may be connected, by means of a cord and plug, with a wire leading to headquarters. The stations at which connection could be made would be located at frequent intervals throughout the city.

Plans are being made to make the fifteenth annual convention of the International Association of Municipal Electricians, which meets at Rochester, N. Y., September 6, 7, 8 and 9, one of the most interesting gatherings ever held by that association. Mr. Frank P. Foster, of Corning, N. Y., secretary, urges all members to make arrangements to attend.

Patent, No. 955,056, for a combined telephone and fire-alarm or kindred service system, has been granted to William W. Dean, of Chicago, Ill. In combination with a telephone line are auxiliary signaling apparatus adapted to send signaling currents of high frequency over the line, and an alarm signal-receiving apparatus including a relay of high self-induction and a condenser of small capacity in the bridge of the line, both adjusted so as to be substantially resonant to the signaling currents, but impassable for steady currents or low-frequency alternating currents and opaque to voice currents.

Radio-Telegraphy.

"La Prensa," the principal daily newspaper of Buenos Ayres, has arranged to install a wireless telegraph station in its office.

Arrangements have been made by the British Admiralty for the filling of half of the vacancies in the naval wireless service by employees of the Post Office telegraph system.

Dr. A. E. Kennelly of Harvard University delivered an address recently before the Schenectady section of the American Institute of Electrical Engineers upon the subject of wireless telegraphy and telephony.

Announcement has been made of the re-establishment of trans-Atlantic wireless service by the Marconi Company by the completion of the repairs to their station at Glacé Bay, N. S., which was badly damaged by fire last August.

Colonel C. C. Wilson, president of the United Wireless Telegraph Company has turned into the treasury of the company, stock of a par value of \$3,000,000, which he held and other officials have turned in \$1,000,000 more of stock, thus reducing the outstanding common stock of the company from \$15,000,000 to \$11,000,000.

A patent, No. 952,403, for wireless telegraph receiving apparatus, has been secured by Clifford D. Babcock, of New York. Comprises a sensitive element, a direct-connected syntonizer, an inductively connected syntonizer, a switch for connecting at will either of the syntonizers, a circuit passing through the sensitive element and connected to the switch, and means for reversing the current through the element.

Patent, No. 954,619, for an instrument for detecting electric oscillations, has been granted to J. A. Fleming, of London, England. An electric glow lamp carrying a metal plate or cylinder on an insulator terminal constituting a rectifier, one electrode being composed of tungsten and one element of carbon.

With the completion of a wireless installation at Washington Harbor, Isle Royale, Lake Superior, that lake is covered by a chain of stations so that no vessel will ever be more than 100 miles from a shore installation. The other stations in the chain are at Port Arthur, Grand Marais, Duluth, Calumet and Marquette.

At a recent meeting of the Physical Society of London, Dr. W. H. Eccles explained a method of investigating detectors with special reference to the relations between the energy given to the detector in the form of electrical vibrations and the energy delivered by the detector as direct current to the circuit of the receiving instrument. The detector being examined is placed in a circuit containing inductance and capacity which is secondary to a primary circuit. A known amount of energy is delivered to the detector circuit and the response of the detector is measured by comparing the sound in its telephone with the sound produced in the same telephone by interrupting a measurable direct current.

Patent, No. 955,101, for spark gap apparatus, has been taken out by W. Penkert, of Brunswick, Germany. A shaft carrying a plurality of discs is rapidly rotated between electric terminals, leaving a thin layer of dielectric liquid between the terminals.

At the annual meeting of the Marconi Wireless Telegraph Company of America, held in Jersey City, April 18, it was voted to reduce the capital stock of the company from \$6,500,000 to \$1,625,000 by reducing the par value of the shares from \$100 to \$25. Two new directors were elected, Edward Young and George S. De Sousa.

In a paper upon "Experimental Tests of the Radiation Law for Wireless Oscillators" presented before the Wireless Institute of New York, April 6, Professor M. I. Pupin, of Columbia University, called attention to the advantages of employing sustained rather than damped oscillations and discussed the difficulties encountered in obtaining sustained oscillations except by means of alternators.

The headquarters of Mr. M. Musgrave, superintendent of the electrical department of the United Fruit Company have been transferred from Port Limon, Costa Rica to New Orleans, La. The United Fruit Company have equipped all their vessels with wireless telegraph installations and a chain of shore stations are maintained for the purpose of facilitating the business of the company and keeping in communication with their vessels at all times.

Wireless played a prominent part in the rescue on April 13 of the passengers and crew, consisting of ninety-five persons, of the North Pacific Steamship Company's steamer Santa Clara. The vessel was bound from Eureka to San Francisco. In leaving the harbor she ran aground but soon got off, however, and proceeded on her way. She began to leak so badly that the captain turned about to go back to Eureka but before he had reached the harbor the water put out the fires thus rendering the vessel helpless. Wireless signals of distress were sent out and a tug soon came to the rescue and took off all of the passengers and crew from the sinking ship.

Patent, No. 954,640, for an apparatus for wireless telegraphy, awarded to G. Marconi, of London, England, consists of a transmitter in which two parallel discs are rapidly rotated in opposite directions and carry studs and the discharge takes place between them. Another patent, No. 954,641, for wireless telegraphy, granted to Mr. Marconi, is for duplex wireless telegraphy in which the aerial is rapidly and successfully connected to the transmitting and receiving circuits and synchronism between the instruments at the two stations is avoided by arranging the operative periods of the transmitting apparatus considerably shorter than those of the receiving apparatus. Makes use of the transmitter of 954,640.

The Telephone.

The Michigan and Indiana Independent Telephone Associations will hold joint annual meetings at South Bend, Ind., May 11 and 12.

At the annual meeting of the Tri-State Telephone and Telegraph Company held recently at Augusta, Me., it was voted to increase the capital stock from \$6,000,000 to \$10,000,000.

The annual report of the English Post Office telephone system shows that at the end of 1909 they had 60,091 telephones connected in London an increase of 7,669 during the past year.

A special meeting of the stockholders of the New England Telephone and Telegraph Company will be held May 2 to vote upon a proposition to increase the number of directors.

Mr. Charles G. DuBois, comptroller of the American Telephone and Telegraph Company, has been elected an assistant to the president in addition to his duties as comptroller.

Mr. W. G. Olwin, manager of the Interstate Telephone and Telegraph Company at Peoria, Ill. has resigned to engage in other business. He has been succeeded by Mr. C. F. Hixon.

The Missouri and Kansas Telephone Company has purchased the plant of the Wichita, Kans., Independent Telephone Company, the transfer involves 4,300 telephones, 10,000 miles of wire and 60 miles of toll line.

It is reported that the demand for telephone service in Japan is increasing so rapidly that the Department of Communications is having difficulty in making installations as fast as desired. Over 3,000 new connections have been made during the past few months.

At a meeting of the stockholders of the Indianapolis Telephone Company and the New Long Distance Telephone Company held at Indianapolis, April 13, F. W. Stevens and F. H. McKnight of the firm of J. P. Morgan and Company, New York, were elected directors. The following officers were elected: William Fortune, president; Louis Hollweg, vice-president; Charles S. Norton, secretary and treasurer.

At a meeting of the Armour Institute Branch of the American Institute of Electrical Engineers held in Chicago, April 7. Mr. Arthur Bessey Smith discussed the "Automatic Telephone from the Commercial Standpoint." Mr. Smith after explaining the conditions of service which the telephone user of to-day expects, spoke of what he considered the mistaken attitude on the part of some telephone designers who assume that the subscriber is unwilling to share in the work of establishing connection with the party called. On the contrary he said that the average subscriber will gladly assist in any operation which will expedite his service.

Mr. Eugene V. R. Thayer has been elected a director of the American Telephone and Telegraph Company, vice Nathaniel Thayer, resigned.

Other directors elected to increase the number on the board from eighteen to twenty-five are Thomas B. Bailey, Harry H. Grigham, George L. Green, Henry L. Higginson, George Willis Pierce, Frank E. Warner and Robert Winsor.

The gross revenue of the associated operating companies of the American Telephone and Telegraph Company for the months of January and February amounted to \$26,039,253, an increase of \$2,704,052 over the corresponding months last year. The income of the American Telephone and Telegraph Company for the first three months of 1910 was \$8,889,351 an increase of \$1,285,055 over the same period in 1909.

The Home Telephone and Telegraph Company, of Portland, Ore., has asked that a receiver be appointed for the Puget Sound Telephone Company and the Northwestern Long Distance Telephone Company which operate in Seattle and Tacoma. The Portland Company alleges that it has claims against the other companies amounting to \$250,000 and that because of their heavy bonded indebtedness they are unable to pay fixed charges.

Plans are well under way and rates have been announced for the new automatic telephone system which will be installed in Chicago by the receivers of the Illinois Tunnel Company. According to the present announcement the maximum rates which will be charged will be \$84 and \$50 per year respectively for business and residence telephones. Business telephones only will be installed at first and the maximum rates will not go into effect until 20,000 telephones are in service.

Maryland Public Service Commission.

Telegraph and telephone companies in Maryland, as well as other public service corporations, have been placed under the jurisdiction of a Public Service Commission by a law recently passed by the Legislature of that State.

The Commission has power to determine rates to be charged by each public corporation. The rates are required by the act itself to be just and reasonable, and the Commission is vested with full powers to conduct investigations in order to enable it to ascertain what rates in the case of each particular public service corporation are just and reasonable.

The Commission is given power to enforce its orders in various ways provided by the act. Power also is given it, whenever it may deem it desirable to do so, to value the property of any public service corporation, but such valuation shall be so made that, as far as possible, it shall not affect the value of bonds heretofore issued by such corporation.

The annual convention of the American Institute of Electrical Engineers will be held June 27, 28, 29 and 30 at Jefferson, N. H., in the White Mountain district.

The Hughes' Printing Telegraph System.

Since the question of printing telegraphs is one which is attracting much attention at the present time the following brief description of the Hughes printing telegraph system abstracted from "The Hughes' and Baudot Telegraphs," by Arthur Crotch, may be of interest. While this system has never been used in this country it is quite extensively employed by several European government telegraph administrations. The receiving instrument consists essentially of a revolving inked wheel having the letters of the alphabet raised on its periphery and a paper tape upon which the characters are printed. When a current impulse is received, the tape is raised into momentary contact with the wheel and that letter printed which is opposite the paper at the time. By the rotation of the type-wheel every letter of the alphabet in turn is brought opposite the slip; the currents sent must therefore be so timed as to raise the slip when the required letter is opposite. At the sending end a contact lever when depressed makes the necessary connection between the battery and the line, and this lever is actuated by keys through the intermediation of another piece of apparatus which determines the exact time at which the signal shall be sent. In each complete instrument the means both of sending and receiving are included. When the apparatus is sending, its receiving portion is invariably actuated also so as to give the operator a check on his sending.

The electrical action of the instrument is limited to the releasing of the armature of a magnet; the reverse of the conditions usually met with in such apparatus. All of the rest of the work of printing, moving forward, the tape, and replacing the armature is effected mechanically.

A compound permanent magnet of horseshoe form is so fixed that its poles are flush with the upper surface of the instrument table or base. Over each pole is placed a soft iron fitting terminating in a cylindrical piece which serves as a core for the magnet coil wound upon it. The poles of the permanent magnet are thus transferred to the free ends of the soft iron coils and we have a powerful horseshoe magnet with coils placed on its extremities. If a current passes through the coils it will, according to its direction, increase or diminish the existing polarity. The armature of the magnet has two strong springs attached to it in such a way as to pull it away from the magnet. The tension which these springs exert may be varied by means of suitable set screws. This tension is so adjusted that when no current is flowing in the magnet coils the pull of the magnet is just sufficient to hold the armature against the pull of the springs. The incoming currents pass through the coils in such a direction as to weaken the attraction of the magnet and the armature is immediately pulled upward by the springs. The

upward movement of the armature operates a lever which by means of a suitable mechanism allows an axle bearing three cams to make one revolution. One of these cams causes the paper slip to be brought in contact with the type wheel, another causes the paper to be moved forward at the same time and at the same rate of speed at which the type wheel is revolving so that a clear impression will be made on the paper and the third cam corrects any slight deviation from synchronism between the sending and the receiving apparatus. While this is being done a fourth cam automatically brings the armature back into contact with the pole pieces of the magnet. This action of replacing the armature would, if the coils were left in circuit, create in them a momentary current, the direction of which would be such as to weaken the magnet and thus cause the armature to be again released. To avoid this the circuit of the coils is automatically broken while the armature is being replaced.

The keyboard which operates the sending apparatus consists of a set of twenty-eight levers mounted at the front of the instrument. The levers are pivoted beneath the table plate and their front ends form a kind of pianoforte keyboard on which fourteen white alternate regularly with fourteen black keys. Twenty-six of these form the letters of the alphabet, one of the extra keys is a space key and when the second extra key is depressed the other keys will form figures, punctuation marks, etc. A horizontal circular brass plate having twenty-eight slots cut radially near its circumference is mounted back of the keyboard. In each of these slots a steel pin works, whose lower end rests on the back end of one of the keyboard levers. When any key is depressed the back rises and pushes up its pin so that the head of the latter is above the surface of the pin plate. A vertical shaft rises above the centre of the pin plate having at its lower end a horizontal fitting which revolves with the shaft. A rocking piece is pivoted on this fitting so that normally it just clears the pin plate. When one of the key pins rises above the pin plate and this rocking piece in the course of its revolution comes in contact with it, the outer end of the rocking piece is tilted upward and the inner end correspondingly lowered. This lowering of the inner end of the rocking piece draws down one end of a contact arm the other end of which makes a contact which sends current to the line. At the same time a projection on the contact arm strikes off the armature of the magnet thus actuating the receiving apparatus. This is done in preference to sending the line current through the magnet coils of the home instrument. Means is provided to prevent a failure to send the signal by reason of the key being released too soon and also to prevent the same signal being sent twice by reason of the key being held down too long.

The vertical shaft has on it a bevel gear which

fits into another bevel gear of the same size mounted on the type wheel axle. Thus the fitting and rocker on the lower end of the shaft are kept continually revolving over the pin plate at the same rate of speed as the type wheel.

The type wheel carries the letters of the alphabet and two blank spaces alternating with the figures and punctuation marks used. When printing letters the type wheel always moves the distance between two letters or some multiple of that distance between each successive signal. When, however, it is desired to print a figure or punctuation mark the extra blank key previously mentioned is depressed and this automatically causes the type wheel to be moved forward one-half of the distance between two letters so that a figure or punctuation mark will come in contact with the paper slip, when it is raised in the usual way.

Means is also provided to stop the revolution of the type wheel or bring it to zero in order to synchronize the apparatus with that at the distant station.

To equalize the variation in the speed of the apparatus which would naturally result from the fact that more power is required to drive it when the operation of printing or sending is being performed than during the time between the signals when the machine is running light a governor is provided. This is of the fly ball type. The two arms which carry the balls revolve inside of a steel ring. Opposite this ring the arms each carry a brush. When the machine is turning at the proper speed these brushes just clear the inner surface of the ring. When the speed increases the balls and the arms which carry them fly outward and the brushes rub against the steel ring and the resulting friction acts as a brake and keeps the speed down to the proper limit. The speed at which the instrument usually runs is from 100 to 125 revolutions of the type wheel per minute.

Electric motors are used for driving the apparatus and a variable resistance is inserted in the motor circuit which permits very close adjustment of the speed. When the machine is at rest an auxiliary circuit is thrown in, which rings a bell, as soon as the distant station sends a signal and thus releases the armature of the magnet. To synchronize the two sets of apparatus, one operator presses his space key repeatedly, so as to send an impulse to the line with each revolution. If the two are not running in synchronism this will print some character on the paper slip at the other end. The operator there then adjusts his apparatus until at each impulse received the slip is opposite the blank space on the type wheel. He then knows that the two are nearly in synchronism, but as there is a correction at each impulse for slight deviations he cuts out his receiving apparatus and allows the type wheel to make several revolutions. If his instrument was slightly out of accord with the other the variation will now be multiplied by the number of revolutions

which he allows the type wheel to make without recording and hence will be apparent as soon as he throws the receiving apparatus back into operation. The adjustment is usually made so that the type wheel will make ten revolutions without correction and not fall out of synchronism with the other set.

For mechanical and electrical reasons, after one key has been depressed the next one which can be utilized in the same revolution of the type-wheel is the fifth one from it; that is, a maximum of five letters can be made in one revolution of the typewheel. Thus different words depending upon the order of their letters may take different numbers of revolutions. For example, the word "taint," containing five letters, can be sent in two revolutions, while the word "added," also containing five letters, would require five revolutions.

This system is worked duplex successfully either by the bridge or differential method. It is used in circuits from London to Rome with repeaters at Paris and Lyons, from London to Vienna with four repeaters and from London to Berlin, with repeaters at North Walsham and Emden. The Hughes printing telegraph, which is an American invention has never been thought suitable for use in the United States because of the fact that it prints the message on a tape. In European countries where it is used the paper slip is cut into short strips and pasted on message blanks. In this country, however, under the conditions of competition which obtain the delay which such an operation would cause is considered to be a serious obstacle to the successful use of this system.

Bill Introduced for Recognition of Military Telegraphers.

A bill for the purpose of granting relief to those who served in the United States Military Telegraph Corps during the Civil War has been introduced in the House of Representatives by Representative Taylor of Ohio, and referred to the Committee on Invalid Pensions. The proposed measure reads as follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that in the administration of the pension laws and the laws governing the National Home for Disabled Volunteer Soldiers, or any branch thereof, any person who served ninety days or more as a military telegraph operator during the Civil War, and who has received, or is entitled to receive, a certificate of honorable service in the Military Telegraph Corps of the Army of the United States, as provided for in an act entitled 'An act for the relief of telegraph operators who served in the war of the rebellion,' shall be held and considered to have been mustered into the United States military service at the date of employment in said Military Telegraph Corps, and to have been honorably discharged therefrom at the date their employment ceased: Provided that no pension shall accrue prior to the passage of this act."

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May 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Progress in the Telegraph.

The announcement made by the Western Union Telegraph Company that the present dividend rate will not be increased until the working conditions, etc., of employees are improved has aroused new interest in the rank and file of the service. The men now realize that their superior officials have an interest in their welfare which rises above any desire to make the company pay the highest possible dividends.

In every organization there are men inclined to lend a ready ear to the professional agitator. There are others who are only too ready to become disgruntled because improvements are not made immediately or to their particular liking. The hasty and the unthinking are prone to criticize and condemn before the ink is dry.

With large corporations whose ramifications extend over vast territory, with thousands of employees and millions of customers, with contractual relationships interwoven in the nation's business fabric, any important changes necessarily take time and consideration in the perfec-

tion of details before they can be put fully into effect.

The present management of the Western Union is composed almost entirely of men who have worked their way up from the ranks. Hence they naturally have an interest in the welfare of those who are following in their footsteps, engaged in the very same duties which they themselves at one time performed. It is scarcely reasonable to presume that they will delay improvements or attempt to keep the force from receiving just rewards.

The success of an administration, whether military, political or commercial, depends to a great extent on the hearty co-operation and loyal support of its organized army of workers. The public judges an administration like that of the telegraph not so much by the dollars and cents of dividends as by the efficiency of service and the potentiality of its operating forces. There can be no lasting efficient organization which is not based upon the two great fundamentals of success: Wisdom of administration, and co-operation of employees.

We believe that the next year or two will bring about great advances in the uses of the telegraph by the public. In the business world it will steadily supplant the slower mails for correspondence. In the social world, the envelope of the telegraph message will no longer be regarded as bearing unexpected tidings of unpleasant news, but will become the welcome messenger of electric greetings from friends far and near. In every path of our American life communication by wire is on the increase. The service must expand to meet the demand, and particularly in the telegraph every member of the organization is bound to have the opportunities of progress.

The Return to Wheatstone Operation.

The first result of the introduction of the night letter telegram service in the method of handling the business is the return of the Western Union Telegraph Company to the use of the Wheatstone system to handle the large amount of matter which must be transmitted over the wires. This system is now being used between New York and Chicago where the business is naturally heaviest and is being placed in service between other large traffic centres. Messages received at any terminal point, destined to other offices, are pasted on blanks and the sending operator reads the matter direct from the Wheatstone tape. In this way no time is lost and the operators are thus being educated to readily read the tape on which the messages are printed in Morse characters, the American alphabet being used with the exception of the substitution of the reversed figure 7, two dots and two dashes, for the letter I.

The value of the Wheatstone for handling a large volume of business in a short time has long been fully appreciated but the unavoidable delay incident to the translation of the tape has

heretofore prevented its general utilization in this country for the day business in which every minute counts. For the night traffic however which will not be delivered until the next morning, this objection does not apply. Hence it would seem that the Wheatstone is likely to prove of great value to the telegraph officials in solving the problem of how to handle the enormous traffic which is developing. It is very likely, however, that as the men become familiar with this class of service as good or better time can be made in sending messages by the Wheatstone than by the present method. It takes only about half the time to perforate a message that it does to send it by hand. The messages when thus prepared are transmitted over the wire at a speed of from 100 to 300 words per minute. As the tapes can be translated, after the operator becomes familiar with the work, at typewriter speed, it is apparent that excellent time can be made on all classes of service.

It is a singular coincidence that the English telegraph administration is at the present time returning to the use of the Wheatstone system after abandoning it several years ago.

To Raise the Standard of Operators.

For the purpose of increasing the efficiency of the telegraph personnel at least one of the companies has decided to increase the pay given to check boys and girls in order to make these positions sufficiently attractive to induce graduates of grammar schools and high schools to take up this work. Before being accepted all applicants for such positions will be required to pass examinations showing their ability to read and write and that they are perfectly familiar with the English language as well as the possessors of a good knowledge of grammar, geography and arithmetic. Those who so desire, being given an opportunity to learn telegraphy, this action ought to result in attracting to the profession many of the most intelligent of the younger generation and thus in the course of time raise the general standard of efficiency of the service.

Dinner of the Magnetic Club.

The annual spring dinner of the Magnetic Club, which was held at the Hotel St. Denis, New York, April 19, was well attended about one hundred being present. Contrary to the usual custom there were no speeches made. After dinner had been served President C. P. Bruch called upon two past presidents who were present, E. H. Johnson and W. J. Dealy for a few remarks, and both gentlemen expressed their pleasure at being present on that occasion and also their appreciation of the honor of having been president at one time of such a flourishing organization. The remainder of the evening was spent in enjoying a program of high class vaudeville arranged for by the entertainment committee of which Mr. Theodore L. Cuyler, Jr. is chairman. Those present agreed that the 1910 spring dinner of the

Magnetic Club was one of the most enjoyable ever held by that organization and united with President Bruch in the hope that the club might prosper for many years to come.

Among those present were:

Boston, Mass.:—L. L. Howell, C. A. Richardson and A. L. Edgecomb.

Buffalo, N. Y.:—H. D. Reynolds.

Baltimore, Md.:—V. J. Albert.

Harrisburg, Pa.:—C. E. Diehl.

Philadelphia, Pa.:—C. E. Bagley, A. E. Zintl and J. A. McNichol.

Washington, D. C.:—F. B. Travis.

New York:—E. S. Butterfield, J. R. Beard, C. A. Benton, C. P. Bruch, E. B. Bruch, C. M. Chapman, J. Costelloe, T. L. Cuyler, Jr., J. J. Cochran, M. R. Cockey, J. J. Cardona, W. J. Dealy, J. Davison, H. E. Dunham, F. W. Daly, T. J. Donovan, A. P. Eckert, G. W. Fleming, J. H. Flood, W. D. Francis, W. Finley, T. E. Fleming, H. S. Griffin, G. H. Gibbons, T. E. Heffren, J. Hennessy, P. A. Hickey, W. S. Hallett, T. J. Howlett, F. E. d'Humy, E. H. Johnson, E. Kimmey, F. J. Kernan, H. Kitt, C. F. Leonard, C. A. Lane, J. J. McCormack, R. H. Miller, E. F. Maher, F. E. McKiernan, P. Mallett, J. P. McBurney, J. A. Manning, W. H. Mathews, J. McNeill, J. J. McDermott, D. F. Mallen, J. P. O'Donohue, S. E. Ostrom, M. J. O'Leary, M. J. Pike, F. Pearce, E. B. Pillsbury, C. F. Pearce, W. F. Regan, E. Reynolds, C. A. Randall, M. W. Rayens, C. Shirley, F. A. Scheffler, J. F. Shugrue, W. Scrivens, W. Scarborough, P. J. Tracy, E. P. Tully, J. B. Taltavall, G. H. Tamlyn, D. Underhill, J. J. Whalen, H. Wiese, J. Western and H. Zweifel.

American Telephone and Telegraph Company Will Not Issue New Stock This Year.

In a circular-letter sent out to stockholders of the American Telephone and Telegraph Company recently, President Theodore N. Vail made the following statement in regard to the placing on the market of the additional stock which that company has been authorized to issue:

"It will not be possible for the company to offer any new stock to shareholders during the current year, as the cash resources available are sufficient for all current ordinary expenditures this year and well into the next year and will also leave a margin sufficient for all possible extraordinary expenditure.

"The work of reorganizing and readjusting the territorial lines of associated companies to conform more closely to commercial and geographical lines and bring together the naturally independent territory will be continued and some adjustment will be made through the exchange of shares of this company for shares of the associated companies. For this purpose the company now has in its treasury of its present stock issue sufficient to meet all its demands in the near future."

Possible Results of Adoption of Night Letter-Telegraph Service.

BY WALTER P. PHILLIPS.

In my opinion the adoption of the night letter rate will eventually very greatly increase the amount of night telegraphing. How rapidly this increase will take place depends altogether on how responsive the public is. While there can be no doubt that everyone who does any telegraphing at all will be glad to avail himself of the night letter privilege, it is one of the uncertainties that time alone can determine, how long the average citizen will require to get his eyes open to this new advantage that is his for the taking.

If it had occurred to someone and it had been feasible to make this bid for a part of the enormous mail business of the country twenty years ago, it would have resulted, by this time, in a phenomenal expansion of the business. Whether it will require another twenty years for the people who use the telegraph to sufficiently awaken to the situation to an extent that will keep the wires busy at night and possibly lead to the introduction of automatic machinery to dispose of the greatly augmented business, that is a conundrum than one man can guess about as well as another.

The lamp by which our feet are guided, according to Patrick Henry, is the lamp of experience and by that we have been taught that as the press rate by wire and cable has been reduced the amount of matter handled has been constantly on the increase until its proportions are now colossal. We naturally reason from this that night letters will increase in popularity and, in due course, the number of them will grow into overwhelming dimensions just as special delivery letters and many other time saving devices which, starting slowly, have come now to be so universally utilized that those who are between twenty-five and thirty-five years of age usually express surprise when they hear from their elders that we did not always have the numberless conveniences with which the present and preceding generations have been familiar from their youth up.

When the Broadway cable cars were introduced I remarked to an eminent lawyer that it was surprising we had depended so long on horse drawn cars when the cable cars could have been used any time these fifty years. He replied: "My boy, it took vain man just three hundred years to put a back on a stool and make a chair of it. What can you expect of him when it comes to replacing horse cars by those drawn by cable?"

Three hundred years is a long while, and before that length of time has elapsed nothing short of the nearest approach we can make to instantaneous communication will answer the world's purposes and in the meantime it is only a question of a little time, in my judgment, when nothing will go by mail that can be sent by wire, provided the cost of transmission is placed within reach of the multitude and the tendency seems to be strongly in the direction of improving and lowering the price of communication by wire.

A Tribute to Jacob Levin.

As an indication of the way in which the people of Atlanta have come to regard Mr. Jacob Levin during his incumbency at that point, of the office of general superintendent of the southern division of the Western Union Telegraph Company, from which he has recently retired, we print the following editorial comment from one of the Atlanta papers:

"The resignation of Mr. Jacob Levin as general superintendent of the southern division of the Western Union Telegraph Company brings keen regret to thousands of people in this city and section who have come to value him so highly as an official and to honor him so deeply as a man.

"We are sure that we voice a universal feeling when we say that no official in this territory has ever served the telegraph company more faithfully or efficiently than has Mr. Levin. During his residence of seven years in Atlanta he has discharged every duty of his complex and exacting office to the credit of his company and the cordial satisfaction of the public at large. A man of smaller calibre or of less incisive intellect would often have floundered and failed in face of difficulties he has brilliantly mastered. His work has been pre-eminent creative. He has brought to bear upon the administration of this vast business a constructive originality as well as energy and steadfastness. In many particulars he has done the hard labor of a pioneer, so that the perfection of the telegraph system in the South to-day is largely the fruit of his skill and intelligence.

"Mr. Levin has made scores and hundreds of warm friendships since he came to Atlanta. From the outset, his competency and obligingness appealed to business men everywhere. And in the course of years their confidence deepened into a personal esteem for him. He has become their friend for whom they will always cherish a sincere regard.

"We wish him high fortune and bespeak for him eminent success, whatever line of business he may pursue. We trust that he will continue to make this city his home, for his presence and personality are a credit to any community in which he may live."

Two young would-be telegraphers walked into an electrical store recently and handing the salesman a telegraph instrument requested that it be repaired. When asked what seemed to be the trouble, neither appeared to know, but finally one of them ventured his opinion "that the ohms were broken and needed fixing."

Much has been said from time to time in regard to the government of this country taking over the telegraph and telephone systems and operating them in connection with the post office as is done in foreign countries. This order of things appears to be reversed, however, as by their night letter plan the telegraph companies seem to be engaged in taking business away from the post office.

Telephone Officials Dine Telegraph Executives.

About forty-five telephone officials gave a dinner on Monday evening April 18 at the Hotel Astor, New York to fifteen of the higher officials of the Western Union Telegraph Company. The dinner was held for the purpose of giving the telephone and telegraph executives a chance to get better acquainted with each other and at the same time give them an opportunity to discuss informally the relations now existing between the two interests.

Mr. Union N. Bethell president of the New York Telephone Company, presided over the gathering and after the dinner called for remarks from the following Western Union officials: E. J. Hall, chairman of the executive committee; R. C. Clowry, president; T. F. Clark, vice-president, H. D. Estabrook, solicitor and S. M. Williams, special agent.

Mr. Hall outlined the future relationship of the telephone and the telegraph and showed how by working in harmonious co-operation with each other they would afford greater facilities and added conveniences to the public.

President Clowry's remarks were of a reminiscent nature recalling past days in the telegraph service.

Mr. Thomas F. Clark, spoke on the subject of "The Decadence of the Metropolis." He said, in the beginning, that perhaps this subject might seem foreign to the occasion and to the purposes of the telegraph and telephone companies, but that it really has a close relation to the development of electrical communication. He first reminded the company of the position of the ancient metropolis or mother city. It was the seat of Government whence issued all the laws of the nation, for the blind, uncomplaining obedience of the people. The institutions of learning were there, the powers of religion were centered there. Every form of extravagance grew under the favor of the court, and the more exquisite manners became, the more lavish was the extravagance of the ruling classes and their imitators. All these conditions drew upon the resources of the people, whose tribute was made in obedience to superstitious ignorance. Mr. Clark sketched the course of events up to the frenzied assault of Paris on Metropolitanism in the French Revolution, and passed on to the resulting desire of the people for knowledge in the consciousness of their newly found power, making the picture of the ripeness of the conditions for the magic touch of the electric current. The progress was slow because of great physical obstacles, but patience, energy and skill overcame them all. To-day public opinion is formed in no one particular centre, but is the outcome of individual daily interest in the affairs of the world, from which flows an independent judgment subject to no dictation of any kind.

Mr. Clark referred to the press transmission of the telegraph company and dwelt upon three

branches of the service that had been fruitful of great incidental benefits. The commercial news service, he said, had been, and is, a greater boon to the country than most people realized. It emancipated the farmer, north, south, east and west, from the trammels of the factor who before could do as he chose with the produce consigned to him. After that he laid stress upon the value of the transmission of the weather reports for the government. With the stimulus to individual effort and the banishment of collective indifference, not only are the growing crops protected, but mental alertness takes the place of vanished apathy. For the daily time service he also claimed the advantage of incalculable economy, through the harmonizing of the hour. To all of these departments of the service he attributed the incidental national benefit of the making of men and of character, the truth of which is shown by the intelligent verdict that is rendered by the country at large in great crises. The metropolis no longer governs except in fashion or art or literature; it asks now for the opinion of the man in the street, on the farm, in the mines, with a deference as great as the arrogance of its ancient dictation.

Mr. Clark also passed on to the social side of electrical transmission, which, although begun by the telegraph has been extended and amplified by the telephone. He declared that dumb, unsocial men and women, the victims of hopeless solitude, have been inspired as with a new life by means of the spread of the human voice from neighbor to neighbor in the most out of the way places.

"Now, all these things have not been done," he said, "by accident. They have been done by the highest intellectual endeavor, consciously or unconsciously. The joy of the inventor, limited by the final form of the efficient thing created, has been followed by the farseeing wisdom of the man of affairs, and he in turn, has been aided by the technical expert, the practical line builder, and the competent and zealous operator—all have made their contributions to the results I have tried to indicate. But I want to impress upon your minds as forcibly as I can, that the foundation and compelling power behind the achievements that we take pride in administering has been imagination. The men in whose brains have originated the great schemes that have moved the human race forward and made the last century the most marvelous in all history have been first and foremost, men of imagination. In the story of the telegraph there were two particularly striking examples of this. Have you ever thought of the courageous dream that impelled the early managers of the telegraph to send their expeditions to the unexplored wilds of British Columbia and Alaska to work towards the cruel waters of the Behring Sea, there to meet a similar expedition that had blazed the path of the civilizing current through the bleak wastes of Siberia? At the same time another set of men were work-

ing against discouragement and failure, but with ultimate success, in obedience to their imaginations to tie the two shores of the Atlantic ocean together, with the slender thread that their ships spun from day to day like busy spiders of the sea. Imagination made these great things possible in the early days, and has gone on with each successive development in the business and in none more so than in the telephone field, with its widespread and intimate wonders of efficiency. Imagination has been behind it all, and in the personality of Mr. Vail. I think I may say with your concurrence, it is behind the great plans of to-day to make the combined service of the telegraph and telephone more efficient than ever, both inherently and incidentally."

Mr. Estabrook said in part:

"When Jonah was swallowed by the whale, those who witnessed the absorption must have said good bye to Jonah. But we have Jonah's word for it that the whale never touched him; that so far from being an annihilation it was to be Jonah redivivus; and we know that centuries afterward the incident was used to symbolize a resurrection!

"Now it was lucky for humanity and the commerce of the world that as an embryo the telephone was not engorged by the telegraph, but was left to evolve along natural lines and to develop its natural genius and, incidentally, the genius of him who by a sort of affinity—perhaps I should say consanguinity, for he was related to Morse, the inventor of the telegraph—had linked his own destiny to the destiny of a colossal enterprise, and who lives to find himself a Colossus indeed; for to-day he bestrides them both, the telegraph and the telephone, and like a charioteer of the sun reins in these 'sightless couriers of the air.'

"In the beginning there was competition between them, poignant if not acrimonious; that sort of competition which always precedes a readjustment. There is no doubt but that the telephone greatly modified the uses of the telegraph, until finally it defined its jurisdiction and the radius of its influence. To-day the telegraph and the telephone complement each other, and in my opinion the recent document which affects to prescribe their relationship is only tentative. It is at most a sort of switchboard 'fuse' which soon or late is bound to become short-circuited and so weld these great bodies into a homogeneous unit. Human laws may hinder and delay, but they can not prevent this consummation."

Mr. Williams discussed public opinion in so far as it concerns public service corporations.

For the telephone company, Mr. T. D. Lockwood of Boston gave an interesting account of some of the trials and tribulations of the telephone people in the early days of that industry. The rules for using the early type of instruments were often misread and misinterpreted and much confusion resulted in the attempts of subscribers to use their telephones. In addition to this there

were no text books and no guides of past experience to go by.

Mr. B. E. Sunny, of Chicago, vice-president of the American Telephone and Telegraph Company and president of the Chicago Telephone Company also spoke of the new relations existing between the two interests.

Mr. Angus S. Hibbard, general manager of the Chicago Telephone Company had composed, upon popular songs of the day, some parodies relating to the telephone and telegraph, which were very amusing.

The officials of the Western Union Telegraph Company who were present were: E. J. Hall, chairman of the executive committee; R. C. Clowry, president; T. F. Clark, J. B. Van Every, and G. W. E. Atkins, vice-presidents; B. Brooks, general manager; J. C. Willever, secretary; A. R. Brewer, treasurer; Rush Taggart and H. D. Estabrook, solicitors; W. E. Athearn, engineer of equipment; R. E. Chetwood, engineer of construction; A. G. Saylor, general superintendent of the eastern division; E. Y. Gallaher, auditor, and S. M. Williams, special agent.

The telephone officials present were: Theodore N. Vail, H. B. Thayer, U. N. Bethell, B. E. Sunny, G. V. Leverett, C. G. Du Bois, F. A. Pickernell, J. D. Ellsworth, C. R. Bangs, A. S. Hibbard, E. T. Holmes, J. J. Carty, B. Gherardi, K. W. Waterson, E. F. Bloom, C. H. Wilson, H. S. Brooks, F. A. Stevenson, J. L. R. Van Meter, J. S. Wiley, E. W. Moister, W. S. Gifford, F. G. Nelson, C. D. M. Cole, T. D. Lockwood, H. F. Thurber, Ford Huntington, W. D. Sargent, J. A. Stewart, E. A. Gurnee, Waldron Hoppins, E. F. Sherwood, R. M. Ferris, J. S. McCulloh, Walter Brown, Alex. Cameron, C. T. Russell, M. Eggleston, A. E. Holcomb, and Colonel Hunt Chipley.

The Western Electric Company was represented by: H. A. Halligan, C. E. Scribner, F. H. Wilkins, Gerard Swope, A. L. Salt, R. H. Gregory, and J. W. Johnston.

The R. W. Martin Fund.

Contributions to the Robert W. Martin fund having ceased some time ago, the entire amount collected has now been exhausted. In a recent letter to us acknowledging the receipt of a check Mrs. Martin said:

"I wish to thank you and all of our friends very much. Mr. Martin is failing all the time, mentally, of course, and he grows more like a child each week. He especially enjoys my reading to him from Telegraph and Telephone Age words of good cheer from friends of long ago."

The total amount collected as recorded in our March 1 issue was \$618.25. Since that time no contributions have been received. In our February 1 issue we made note of the payment of \$466 to Mrs. Martin. Since then we have sent her the following amounts: February 28, \$60; March 28, \$60; April 28, \$32.25, making a total of \$618.25 thus closing the account.

The Military Telegrapher in the Civil War.

PART XXXVIII.

Captain Thomas B. A. David, who is now living in retirement at Pittsburg, and is a highly respected citizen of that place, was during a greater part of the Civil War a prominent member of the United States Military Telegraph Corps, being in charge of construction and operating forces in that branch of the army. In a letter written to Colonel William R. Plum, historian of that organization, in 1878, Captain David gave the following account of the part which he played in the great conflict.

"My army experience was characterized by so few of the severe trials endured by others in the United States Military Telegraph service that I reluctantly attempt to reduce to writing what remains in my memory of that eventful period in our history, nor could I persuade myself to do so, were it not that my part, although devoid of many of the hardships and heroic events which others have to record, is nevertheless a link in the history of that important branch of the service.

The breaking out of the war found me at Wheeling, Va., where I had resided some six years, and knew therefore some of the vicissitudes incident to men holding anti-slavery views in a slave-holding state. Being one of the few who voted for Abraham Lincoln, and holding the position of manager of the telegraph office, I became, immediately after the election of Mr. Lincoln, an object of disfavor on the one hand and on the other hand a source of some comfort to the few Republicans throughout the western part of the state.

"My entry into the service may really be said to have been in April, 1861. Early in that month I received a letter from Anson Stager stating that Mr. William H. Seward, secretary of state, was exceedingly anxious that any information touching the movements of the Confederates encamped at Harper's Ferry should be communicated to him, and asking me to keep a sharp watch of messages passing over the wires on the line of the Baltimore and Ohio Railroad. Subsequently I was directed to visit Cumberland and arrange cipher communication with the operator there, Mr. George M. Deetz.

"The firing upon Fort Sumpter developed the real honest sentiments of the people of Western Virginia and showed that the Unionists were in the majority. Steps were presently taken to secure money and arms in order to form and equip military companies, there being no state organization except that at Richmond, which was under Confederate control. Colonel B. F. Kelly was placed in command of the First Regiment, and on Sunday, May 26, 1861, he took possession of the telegraph office at Wheeling. Some very amusing and very greatly exaggerated reports were circulated about this seizure.

"I was then ordered by Colonel Stager to take charge of the telegraph on the line of the Baltimore

and Ohio Railroad proper from Wheeling to Grafton and Cumberland, Mr. W. G. Fuller, of Marietta, having been given charge of the lines on the north-western branch between Grafton and Parkersburg.

"The troops moved eastward from Wheeling on Monday, May 27, to a point on the line of the railroad, near Mannington, where a small Confederate force under William Thompson, of Wheeling, had been encamped a few days before and who on leaving had burned the bridge. I followed on the night train and, arriving at headquarters at 4 a. m., was ordered by Colonel Kelly to proceed at once to Fairmont and open communication by wire. I started with a squad of recruits filled with a sense of great danger to be apprehended. I soon discovered that the greatest danger laid in the awkward squad that accompanied me for one moment I was liable to be run through with a bayonet, and at another to be pierced with a ball from the premature discharge of one of their guns.

"We reached Fairmont about 9 a. m. on the twenty-eighth. The instruments had been carried off, but I had an extra set with me and we were soon in communication with division headquarters. Before leaving Wheeling I had procured a form of oath to be administered to operators, requiring in addition to loyalty a promise not to divulge the contents of any messages. Delivering a copy to a justice of the peace, I had him swear into the service two or three operators who happened to be at Fairmont. It was the custom at that time to bring into town, or to headquarters, anyone suspected of disloyalty and require them to 'take the oath.' I learned some time afterward that this judicial functionary had been requiring all brought before him to subscribe to the telegraphers' oath.

"A temporary bridge having been constructed, Colonel Kelly moved forward to Grafton on the thirtieth of May and found that the Confederates had vacated the town the day before, taking the telegraph instruments with them. I proceeded the same day by special car, as far as Rowlesburg, and cut the connection east by Colonel Kelly's order and returned to Grafton that night.

"Here we rested awaiting the division moving from Parkersburg. There was no telegraphic communication and great anxiety was felt concerning its safety. General T. A. Morris having arrived he assumed command, and by his order I was directed to open up communication with the troops coming from Parkersburg. I started immediately on an engine. The telegraph line was soon put in operation and a junction formed with the troops.

"We were joined shortly after by Colonel Anson Stager, who became an inspiration to the service. The remainder of June was spent in the preparation for a movement away from the line of railroad. July to the advance moved from Clarksburg, W. Va., and then began, I believe, the first effort to follow an army with a telegraph line. W. G. Fuller commenced the construction of the line and when about

eight miles from Clarksburg I took charge of the work by Colonel Stager's order and Mr. Fuller returned to Clarksburg to supervise matters there. I continued with the construction gang until the line was completed to Beverly and Huttonville. It was subsequently continued a few miles further to the top of Cheat Mountain under the personal supervision of one of my aides, Mr. E. B. Bryant, who remained with the troops at that point until the following spring, and then only gave up when crippled by rheumatism. The line was a crude affair. The work was done by inexperienced men detailed from the troops. We were frequently delayed waiting for material and reached Buckhannon on the fifth of July. At this point the telegraph was highly complimented by General McClellan's staff, notably by Captain Saxton, quartermaster-in-chief to the army. They openly stated that but for the telegraph line the army would have been detained many days at Buckhannon. In the light of later experience this does not seem at all remarkable, but the proposition to follow the army with the telegraph met with opposition from some of the old army officers, and the acknowledgment of their error was then regarded as an important matter.

"We left Buckhannon, July 8, keeping close up with the army. The battle of Rich Mountain, the first real battle of the war, was fought July 12. We were delayed at this camp two days waiting for material, and suffered much for want of food. Here the Confederates seemed to realize that the Government was in earnest. I had just reached the fortifications the Confederates had occupied the day before, and pitching my tent, 'opened an office.' As some Confederate prisoners were being marched by, catching a glimpse of the wire, one of them exclaimed, 'My God, Jim, there's a telegraph wire,' in a tone that indicated that he at least realized that the Government meant business. Another said, 'And here is an office,' as he espied my tent.

"We reached Beverly, July 15, and opened an office at General McClellan's headquarters with E. B. Bryant as operator. On July 19, General Cox having failed in his movement against Wise in the Kanawha Valley, General McClellan decided to make a movement in that direction and gave me orders to construct the line to Huttonville, and then return to Buckhannon, construct a line to Weston and establish a depot of supplies at the latter place.

"On July 28, having given instructions as to how to proceed with the line beyond Huttonville, and having opened an office at Beverly, I started alone for Buckhannon, by Colonel Stager's order. Arriving at that place I found orders from Colonel Stager awaiting me to report at Clarksburg and I went there on horseback the next day. While in camp at Beverly, our line became grounded one night, cutting us off from our base of supplies. With a detail of four cavalymen and a lantern I started in search of the trouble. At a point about ten miles from camp, the wire suddenly turned through the woods and up the mountain side. Leaving my horse in

charge of the guard, I started through the woods and soon found the trouble.

"By Colonel Stager's orders Mr. Fuller was made supervisor of construction and I was appointed superintendent of operators and lines, with headquarters at Clarksburg. This arrangement continued until December, 1861. During this time lines were built from Clarksburg to Gauley Bridge, thence down the Kanawha River to Gallipolis, Ohio. In December I was ordered by Colonel Stager to come to Cleveland, and was then given the choice of going to Kentucky or remaining in full charge in Western Virginia, I chose the latter and returned to that department.

"I had entered the service with a sincere purpose to aid in making the telegraph of the greatest benefit to the Government, and at the least possible expense, and I may justly claim credit for adhering religiously to that purpose. I never coveted position in the public service and never could believe that a Government office entitled one to do otherwise than they would in the conduct of private business.

"The time arrived for the troops to go into winter quarters, the army headquarters were moved to Wheeling, and our work was limited to the actual operation of the lines then erected from Clarksburg to Cheat Mountain, and from Clarksburg to Gauley Bridge, thence down the Kanawha River to Gallipolis and across the country to Hamden Station on the Marietta and Cincinnati Railroad. During this time our men were subject to many trials and hardships, especially the repairmen, who were often in great danger. On the occasion of the line breaking between two places it was never certain that our repairmen would be heard from again, and their report of 'safe' gave a sense of relief that could not well be expressed. We had but one man captured, and that was Alfred Winder, of Indiana. He was stationed at a picket post on the top of Rich Mountain. He and his guard disappeared one night and some weeks after a Richmond paper heralded his arrival at Libby Prison. After a sojourn of some months at that place, he was exchanged.

"The following spring, 1862, departmental changes were made and the mountain department was created and General Fremont was assigned to the command. He at once formed a plan for moving two columns, one up the Kanawha Valley and by way of Lewisburg under General Cox, the other up the New Creek Valley, under his personal command. I was ordered to follow both columns with the telegraph. This was undertaken in face of the warning of my chief from Washington that I must not hope to come up to General Fremont's expectations or requirements, but must be satisfied in doing the best I could. We followed General Cox until he reached Big Sewell Mountain, where he encamped, W. H. Nash, of Gallipolis, one of my aides, being in charge of the lines. We followed General Fremont until Stonewall Jackson attacked him near McDowell, driving him back on Romney. General Cox subsequently fell back to a point near Gauley Bridge and the line was taken down.

"Shortly after this, in July, 1862, I received notice of my appointment as Captain and Assistant Quartermaster and was ordered to report at Washington. I was then informed of the purpose of commissioning superintendents of military telegraph. July 29, 1862, I received the following order to go to St. Louis: 'You will proceed to reorganize the whole department of the Mississippi to meet the new order of things. Reduce the number of employes where practicable and remove all inefficient men whenever found. You will, no doubt, find much work to do, but I rely on your experience and perseverance to bring order out of chaos in the quickest time possible.' Leaving the Department of West Virginia temporarily in charge of Charles O. Rowe, I went to St. Louis at once. The plans proposed proved a great task, but with the efficient aid of Robert C. Clowry, whom I placed in charge of the lines in Missouri, and J. C. Van Duzer, to whom I gave charge of the lines in Tennessee and Alabama, I was enabled to get matters systematized by the last of August, when George H. Smith assumed control. I then returned to West Virginia to find the army driven out of the Kanawha Valley and our lines all destroyed. The greater part of the fall was occupied in reconstructing these lines and getting our wires in proper shape.

"Nothing of special importance transpired during the winter. The simple duty of attention to the lines was all that appeared on the surface, but a deep anxiety was constantly felt lest at the important moment our lines should fail, a desire inspired by patriotic motives and professional pride, that the telegraph should be equal to all emergencies was always present. With this in mind, it was my aim to anticipate the demands of the service and the orders of commanding generals, and I do not now recall a single instance where they were required to wait. In all this I was greatly aided by those who were in my department. If less of anxiety rested upon them more of the severe trials were their lot. I cannot speak particularly of any. All strived to do their duty.

"The year 1863 brought only the trouble and annoyance which was the natural fruitage of raids and guerilla warfare. In the early part of 1864 I resigned my commission and accepted a position as district superintendent of the Western Union Telegraph Company."

What Our Friends Say About This Publication.

Mr. F. E. Howell, manager of the Western Union Telegraph Company at Utica, N. Y., in renewing his subscription for another year recently said: "I get more genuine pleasure and information from *Telegraph and Telephone Age* than from any other publication that I subscribe for, and I know of nothing within its sphere but what is treated in a splendid manner."

Mr. J. P. Parmentier, manager for the Western Union Telegraph Company at Green Bay, Wis., in renewing his subscription recently, said, "*Telegraph and Telephone Age* is certainly a fine paper and it is improving all the time."

Mr. L. S. Wild, manager of the Western

Union Telegraph Company, at Butte, Mont., in renewing his subscription to our paper, which he has received for over twenty years, says: "*Telegraph and Telephone Age*, the new name, is up-to-date and carries the right ring, and as for the contents, we old timers find the *Age* indispensable."

Mr. E. A. Patterson, manager for the Western Union Telegraph Company at Saginaw, Mich., in renewing his subscription recently, said: "I would regret to miss a single copy of the *Age* as it is full of interesting and good reading matter which cannot help but be beneficial to the reader."

Mr. A. J. Ostheimer, secretary of the Telefunken Wireless Telegraph Company at Philadelphia, in renewing the company's subscription for another year writes: "We are always pleased to say a good word for your paper so as to procure additional subscriptions if possible. We always read *Telegraph and Telephone Age* with interest."

Mr. J. J. Dunne, manager of the Postal Telegraph-Cable Company, Seattle, Wash., in renewing his subscription recently said: "A great many things are happening in the telegraph business in these days, and the only way to keep properly informed concerning these matters is to read your valuable paper. You can always count upon me as a subscriber."

Mr. Samuel S. Bogart vice-president of the United Wireless Telegraph Company of New York, in renewing his subscription for another year, and, by the way, Mr. Bogart has been a subscriber since the paper was established, in 1883, writes: "*Telegraph and Telephone Age* is necessary for my mental development. It is an educator and a habit with me."

Mr. A. W. Orton, of Rome, N. Y., an old time and military telegrapher, but for many years past identified with other interests, in renewing his subscription recently said: "You do not know how much of personal interest I find in your paper and it is a pleasure for me to keep in touch with the advancement and reminiscences of the profession of my past life."

Mr. Robert Morrell, general superintendent of the West India and Panama Telegraph Company, Limited, with headquarters at St. Thomas, D. W. I., in renewing his subscription for another year says, "*Telegraph and Telephone Age* is a most readable and useful journal and frequently I find mention of many old cable employes of this company and their whereabouts, which otherwise I could not possibly hear about."

Mr. Francis W. Jones, formerly and for many years electrical engineer of the Postal Telegraph-Cable Company of New York, in renewing his subscription for another year writes:

"The continuance of an intelligent and unbiased publication, of up-to-date articles that are useful alike to telegraph and telephone owners and employes, besides the liberal allotment of space devoted to the personal and professional interests of those who are or have been active in the service, will surely maintain your subscription list on a satisfactory footing and prove very gratifying to your many friends."

Mr. J. A. Scrymser on the South American Cables.

Mr. James A. Scrymser, of New York, president of the Mexican and of the Central and South American Telegraph Companies, who is on a pleasure trip to various points in South America was, while at Buenos Ayres, interviewed by a representative of the leading daily paper of that city in regard to the cable situation in South America. When questioned concerning the importance and future of the direct cable between Argentine and Europe and also his ideas in respect to the strategic merits of the existing cables and projects, Mr. Scrymser stated that in regard to the Argentine European cable via Ascension he was of the opinion that the increase in facilities of communication always led to increase of traffic and judging the future by the past, one could believe that based on the future of the Argentine Republic, new telegraph facilities would be necessary to meet the requirements of commerce.

As to the strategic importance of submarine cables he said that he believed that a large portion of the cables which have been laid in the ocean have been almost entirely laid for strategic purposes, for example, owing to the acquisition of the Marshall Islands in the Pacific, Germany laid the cables which connected those islands with Yap, Guam and the city of Shanghai in order to put Berlin in direct communication, via St. Petersburg, with its naval stations in the Pacific, cutting out England which controls the Cape of Good Hope, India and the Mediterranean cables. In like manner France and Germany have laid cables to their possessions in Africa and have projected additional lines to some important points in South America.

In speaking of the history of the South American cables, Mr. Scrymser related that in 1866 he promoted the cable between the United States and the Island of Cuba which was afterward extended to the West Indies and the Isthmus of Panama.

In 1870, he proposed laying another telegraph cable from the Isthmus of Panama to Valparaiso, Chile, but it was impossible to raise the entire capital because capitalists at that time were of the opinion that the inhabitants of the South American republics were likely to be molested by Spain and they would not use a cable which passed through Cuba. Ten years later this spirit of hostility against Spain having disappeared and Mexico having revealed its commercial importance, he was induced to promote the telegraph lines from Galveston to South America and later the direct cable between New York and Colon.

Since then it has also been necessary to duplicate the cables from the Gulf of Mexico to Valparaiso and the land lines from Valparaiso to Buenos Ayres, all of which has been done without the aid or co-operation of any government.

Mr. Scrymser said that it was only his unlimited faith in Argentine to the south and Mexico to the north, added to a promising future for the inter-

mediate countries, which induced him and his associates to undertake these enterprises. These represent an expense of \$15,000,000 and the laying of about 14,000 miles of telegraph cable. During twenty-eight years this work has been a subject of continuous vigilance resulting in the systems working with great regularity. On his present trip he will be able to visit the different telegraph stations of importance on his company's lines and judge personally of the results of his own work.

In 1880 the tariff for telegrams between Buenos Ayres and London was \$7.00 per word, and Buenos Ayres and New York counted as two words each. The increase of facilities and competition has improved the service and reduced rates at the present time to \$1.00 per word.

The Central and South American Telegraph Company has facilities for handling a large increase of traffic and Mr. Scrymser in conclusion said that it would be their policy to reduce the present tariffs as soon as the increase of traffic justifies a reduction.

Canadian Telegraph Companies Adopt Night Letter Telegraph Service.

It was announced April 12 by both the Canadian Pacific Railway's Telegraph and the Great North Western Telegraph Company that, beginning April 13, they would inaugurate what is known as the "night lettergram service."

The announcement of the Canadian Pacific, says:

"The charge for a night lettergram of fifty words or less will be the regular day rate for ten words, and one-fifth of this rate will be charged for each additional ten words or less. Messages must be written in plain English, code or cipher is prohibited. Lettergrams may be accepted either prepaid or collect under usual regulations, and will be taken at counter or over telephone, or collected on call any time up to midnight, but, as in the case of other night telegrams, will not be put on the wires until night, and when wires are clear of full-paid day business.

"Night lettergrams will be delivered free the next morning, within one-half mile of the company's office in towns of 5,000 population or less, and within one mile of such offices in other cities or towns. Beyond these limits, the company will, without liability, at sender's request, and at his expense, endeavor to contract for him for such delivery at a reasonable price."

The Great North Western Telegraph Company has put into effect the same reduction as the Canadian Pacific. The rate applies to messages to the two companies' connections in the United States.

The testimony of progressive operators is that Telegraph and Telephone Age is so thoroughly comprehensive in character as to make it absolutely indispensable to those who would keep informed. Its technical articles are of high practical value. Write for a free sample copy.

TALKING AND TELEGRAPHING SIMULTANEOUSLY OVER THE SAME LINE.*

The Composite Ringer.

BY N. C. KISSELL.

Special apparatus and circuits are necessary for signaling between telephone stations on a composite line without interfering with the "Morse" instruments. The device for accomplishing this, which is ordinarily used, comprises several instruments wired together to form what is collectively designated by the name "composite ringer." This provides for sending out on the line signaling current of too high a frequency to operate telegraph relays, and for the operation of a signal by this current when the apparatus is at the "incoming" end of a toll line. Composite circuits are not wired permanently into a toll line, but are arranged so that

for outgoing and incoming signals. When the operator rings from the switchboard end of the circuit, the low frequency ringing current passes over wire 1, through contacts on relay B, wire 2, through condenser 3, relay D, wire 4, contacts on relay B and back to generator.

The relay D is designed to operate on low frequency alternating currents.

The armature is a piece of soft iron sufficiently massive to possess considerable mechanical inertia. A light flexible spring is attached to the armature and makes contact with a stud when the armature is drawn up. As this spring extends above the armature, and is very flexible, it will make contact with the stud before the armature is fully drawn up; also it will not break contact until the armature has dropped a considerable distance. This construction will allow the armature to flutter in a given range without breaking contact between the spring

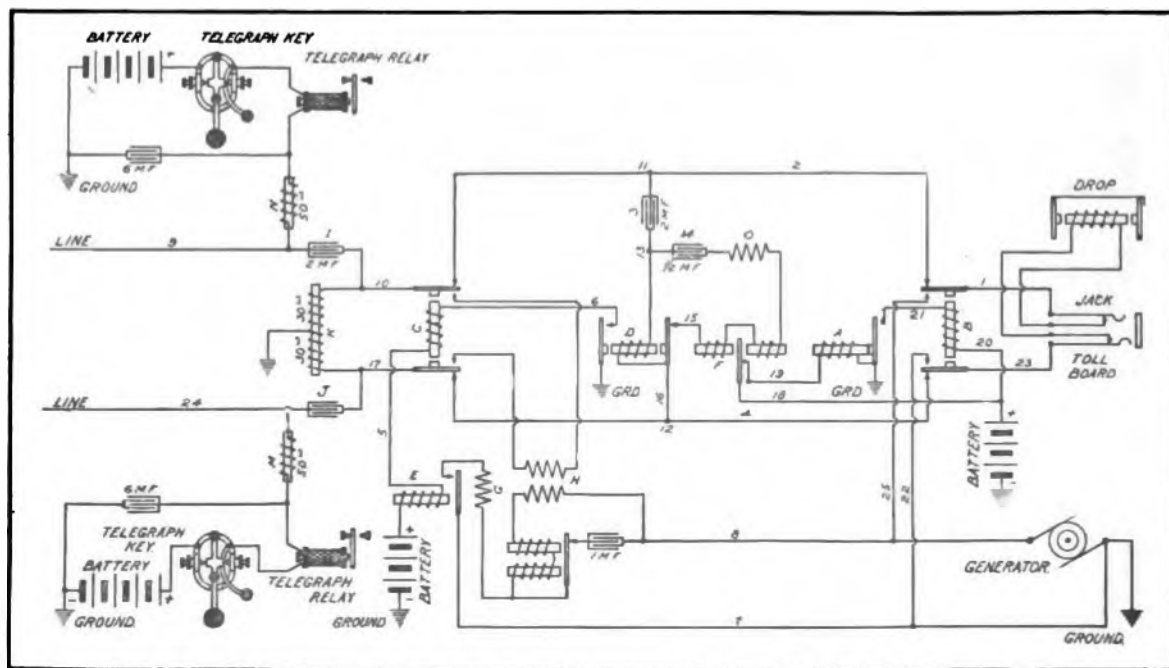


Figure 1.—Circuit of composite ringer, which makes it possible to signal between telephone exchanges without affecting telegraph instruments on a composited toll line. All apparatus required for telephone and telegraph work at one end of a line is shown in this circuit.

they can be placed in any line, so that in case the line upon which they are being operated becomes in trouble they can be shifted to a line in good working condition. It is therefore necessary to so wire them, that the operator at the telephone switchboard may ring on all the lines in the same manner, whether they are composited or not. As the generator ordinarily used to ring on telephone lines gives out current at a comparatively low frequency, the action of the composite ringer will be to replace this low frequency ringing current with one of high frequency which will not interfere with the telegraph instruments. The action of the composite circuit shown in Figure 1 is worth studying step by step

and the stud. When an alternating current is passed through the coil the armature is drawn up, making contact with the stud before its movement stops. The ringing current being of low frequency, the armature is fully drawn up, however, before the current ceases and starts to flow in the opposite direction. The instant current ceases the armature starts to drop down, but is so massive that a fraction of time elapses before it starts to drop. It only drops a little before current is back in the coil again, remagnetizing the core in the opposite direction and causing it to again exert a pull on the armature. This will cause the armature to flutter in a certain range, but the contacts do not make and break owing to the flexibility of the spring contact.

*Article reprinted from the American Telephone Journal.

When the armature is at rest its weight closes the two contacts and when it is drawn up these open by means of the resiliency of the spring. When the operator rings through relay *D* the latter therefore opens one circuit and closes another at the same time. It opens the circuit through relay *F*, and closes one starting from 24 volt battery, relay *E*, wire 5, relay *C*, wire 6, relay contact on *D*, to ground, through which it flows back to battery. This energizes relays *E* and *C*, causing them to draw up their armatures. When the contacts on relay *E* are closed alternating current from the generator at a given instant passes over wire 7, relay contacts, through a non-inductive resistance *G* then through the coils of the interrupter, primary of a small transformer *H* back to generator over wire 8. This causes the armature of the interrupter to make and break contact, thereby inducing in the secondary of the transformer *H* a high frequency current which passes to the composite circuit through contacts on relay *C*. This current, being of very high frequency, will pass through condensers *I* and *J*, and out over the line, being prevented from short circuiting itself by the high impedance of coil *K*, and also from passing back through the "Morse" instruments and ground by the coils *M* and *N*. If any of this current should pass through the coils *M* and *N* into the "Morse" relays, it would be so small and alternate so rapidly that it would not affect their armatures on account of their mechanical inertia and the inertia of the spring attached to them. To summarize this whole action, when the operator rings on the circuit the low frequency current from the exchange generator is replaced by one of high frequency which passes over the line.

Coming in over the line wires, the high frequency signaling current encounters the high impedance of coils *M*, *K* and *N*, and so keeps the direct path, passing through condensers *I* and *J* into the composite ringer. At the incoming end this current comes in over line wire 9, through condenser *I*, wire 10, and through contacts on relay *C* to point 11. Here it has two paths offered to it, one of which leads to the toll board through the drop and back to point 12. Whatever current passes through the drop will be so small, however, and will alternate so rapidly, that it will not affect the drop. From point 11 the current passes through condenser 3 to point 13, where two paths are again offered. One is through relay *D* and the other through relay *F*. The small amount of current which passes through *D* will not affect its armature, on account of the inertia of the heavy piece of iron. From point 13, then, the high frequency current which must be considered will pass through condenser 14, resistance *O*, through the high frequency relay *F*, wire 15, contacts on relay *D*, wire 16, contacts on relay *C*, wire 17, condenser *J* to the other line wire 24 and back to the distant station. This current, passing through relay *F*, will set the latter in rapid vibration. This relay consists of an L shaped piece of steel which is permanently magnetized, having both north and south poles. To the long end of this is screwed

a soft iron core wound with insulated wire. To the other end is rigidly fastened one end of a rather heavy reed of steel, the opposite end of which is in front of the soft iron core. In conjunction with this heavy reed is another lighter reed, fastened rigidly at one end, and insulated from the first reed. One end of this rests against the heavy reed near its top, and makes electrical connection with it. When an alternating current of high frequency is passed through the coil the heavier reed will be set into vibration, and in turn will cause the lighter reed to vibrate violently, thereby making and breaking the contact between the two reeds. Referring to Figure 1, a circuit is normally made, starting from 24 volt battery and passing through wire 18, the reed contacts on relay *F*, wire 19, through relay *A* to ground and back to battery. This current causes the armature on relay *A* to be held up all the time normally; but when the reeds on relay *F* are set into vibration, the making and breaking of the circuit causes the relay *A* to release its armature, thereby completing a circuit starting from 24 volt battery, wire 20, relay *B*, wire 21, relay contacts on *A* to ground back to battery. This causes the armatures on relay *B* to draw up, making a circuit from exchange generator through wire 22, contacts on relay *B*, wire 23, into the toll board, returning over wire contacts on relay *B* and wire 25 back to the generator. This rings down the drop. To summarize, then, the action of a pair of composite ringers is to substitute for the low frequency current from the board a high frequency current which passes over the line, and at the incoming end, cause a low frequency current to pass to the toll board. This circuit is used commercially every day and is very successful, giving so little trouble that it may be properly said to work perfectly.

The Man Who Never Wins.

1. The hind-sighted man—
Never sees opportunity till it passes.
2. The back-boneless man—
Always has to ask somebody's advice.
3. The "only" honest man—
Must have the control.
4. The spendthrift—
Never has anything to invest.
Always afraid somebody will rob him.
5. The unsuccessful man—
Knows other people's business better than his own.
6. The conceited man—
Knows where all the best things are without being told.
7. The modern Shylock—
Believes in nothing but the "pound of flesh."
8. The narrow-gauged man—
Refuses to listen to anything "out of his line."
9. The unfortunate man—
Has a friend who invested and lost.
Do you know any of them?—Express Gazette.

Telegraph and Telephone Age is headquarters for all electrical books. Write for catalogue.

Telephone Train Despatching.*

BY J. B. SHELDON, OMAHA.

Superintendent of Telegraph of the Union Pacific Railroad.

(Concluded from page 287, April 16 issue.)

The magnet operates the selector mechanism, which is merely a special modification of the ordinary ratchet and pawl principle. The essential features of the selector are a step-up selector wheel and a time wheel which normally is held at the top of an inclined track. The operation of the selector magnet allows the wheel to roll down the track. If the magnet is operated rapidly, the wheel does not get clear down before being pushed back again. A small pin on the side of the pawl engaging the selector wheel normally opposes the selector wheel teeth near their outer points. When the time wheel rolls to the bottom of the track however, the pawl is allowed to drop to the bottom of the tooth. Some of the teeth on the selector wheels are formed so that they will effectually engage with the pawl only when the latter is in normal position while others will engage only while the pawl is at the bottom position; thus innumerable combinations can be made which will respond to certain combinations of rapid impulses with intervals between. The correct combination of impulses and intervals, steps the selector wheel clear around so that a contact is made. All other wheels fail to reach the contact position, because, at some point or points in their revolution, the pawls slip out and allow the selector wheels to return home.

The despatcher, by giving a selector key a quarter turn, sets a train of gears in motion as the key returns, which delivers to the line a succession of impulses and intervals corresponding to the particular arrangement of teeth in the particular way-station selector wheel it is desired to operate. For instance, the despatcher may throw key 1421. That starts a mechanism similar to a messenger call box, which impresses at regular intervals on the telephone line direct current impulses in the following order 1-4-2-1. There is on the line one selector corresponding to this combination, and it alone will step its wheel clear around so that contact is made and the bell rung. On all of the others, the pawl will have slipped out at some point of revolution so as to cause the wheels to return home.

A special winding, consisting of a few turns of wire, placed on the selector magnet, is included in the local bell circuit to produce the "answer-back" feature previously mentioned. The operation of the bell through these turns, induces an alternating current in the selector winding, which flows out on the line and is heard as a distinctive noise by the despatcher. Thus, the despatcher is always certain whether or not the

way-station bell has rung, as he can get this noise in no other way than by the operation of the bell.

Each selector requires approximately one hundredth of an ampere at forty-six volts to operate it. The ordinary voltage from this battery is necessarily very high at points near the despatchers office, where the battery is located, compared with the voltage at the other end of the line. To equalize this disparity in current flow at the different offices, variable resistances are inserted in series with the selector magnets at way-stations, so that each selector on the line gets approximately the same current. The values of these resistances are high for stations near the despatchers office, and taper off gradually to zero at the other end of the line. Two cells of dry battery are required in the local circuit to operate the selector bell at each way station.

TEST PANELS AND SWITCHES.

Test panels are installed at testing offices, usually located about twenty miles apart, for use in testing for trouble in the telephone circuit and the patching in of part of the auxiliary circuit when necessary to do so on account of trouble in the regular circuit. In this way, either wire forming the circuit, or both, can be readily opened or grounded, the office cut out or local telephone and selector equipment transferred from and to the regular or auxiliary circuits, by the manipulation of plugs and cords that form part of the equipment. The numbers of the wires are indicated on designation strips on each side of the panels and the jacks, with which line and instrument connections are made by use of the cords and plugs, are all numbered. Thus it is a simple matter for the despatcher, or wire chief, who does the testing, to indicate to testing offices just what manipulations are required to secure the desired results.

At other stations, where test panels are not located, double-pole double-throw switches are installed for switching the telephone and selector apparatus from and to the regular or auxiliary circuit, according to which may be in use. When the switch is thrown down the apparatus is on the regular circuit, and when thrown up, it is on the auxiliary circuit. The switch is turned straight out, instead of either clear down or up, in cutting out the local telephone and selector apparatus.

Framed copies of instructions for manipulation of test panels and switches are placed in the offices.

PORTABLE SETS.

Portable telephone sets are supplied for the private cars of officials and for wrecking cars, which can be readily connected with the line by means of a light jointed rod, along which wires are attached that lead to the instrument. For emergency service, these sets are very valuable.

LISTENING SETS.

Some of the officials have also been provided

*Paper read before Omaha Railway Club March 9.

with pocket listening sets, which consist of a small hand receiver with associated condenser, that are used for listening in on the despatchers circuit at stations, without making use of the regular station set and thus bothering the operator in his work.

PROTECTORS.

A protector is installed at each office to guard the telephone and selector apparatus from damage, and the users thereof from injury, on account of lightning or other high electrical discharges that may come in on the line. The protector consists of carbon blocks, three in all, the middle one being grounded, and the other two, with which the line wires are connected, being separated from it by a short gap, across which high potential discharges. These protectors, on account of the air gap, are self-clearing, so that they do not ordinarily require attention after electrical discharges pass through them. In time, however, carbon dust is likely to form in the gap and cause the line to become noisy or grounded. The protectors should be examined and cleaned occasionally by passing a piece of paper between the carbons.

OPERATIONS.

In transmitting or repeating an order by telephone, the names of stations will be pronounced and then spelled out; the time will be spelled out and the numerals pronounced; train and engine numbers will be pronounced plainly and figures duplicated, naming each figure separately as per examples. The word "Oh" should be used for ciphers.

Example 1:

No. 1 (o-n-e) Eng. 17 (1-7) meet No. 56 (5-6) Eng. 1600 (1-6-9-0) at Paxton (P-a-x-t-o-n).

Example 2:

No. 2 (t-w-o) Eng. 18 (1-8) has right over No. 9 (n-i-n-e) Eng. 110 (1-1-0) Julesburg (J-u-l-e-s-b-u-r-g) to Paxton (P-a-x-t-o-n).

Example 3:

No. 53 (5-3) Eng. 1901 (1-9-0-1) run t-w-e-n-t-y 20 mins late Paxton (P-a-x-t-o-n) to Roscoe (R-o-s-c-o-e) and wait at Ogallala (O-g-a-l-l-a-l-a) until t-e-n t-e-n 10:10 a. m., for extra 1688 (1-6-8-8).

The figures and names in brackets in the examples are for purpose of showing the manner of duplication and are to be omitted in writing regular orders.

The rules and regulations of the Transportation Department governing the movement of trains must be complied with. In addition thereto, the following instructions must also be observed:

When desiring to communicate with despatcher, take down receiver and listen. If line is not busy, press key and name your station. If despatcher is ready, he will say "despatcher." It will happen frequently that two or more stations will come in on circuit at same time, each giving the name of their station before de-

spatcher has had time to answer. In such cases, when despatcher is ready, he will speak the name of the station he wants first, following it with the word "despatcher." This to save time and annoyance.

Speak slowly and distinctly into the transmitter, with lips close to mouthpiece, without raising the voice.

In answering call, press transmitter key and speak the name of your station.

In reporting trains, first speak name of your station, and when through, get despatcher's O. K.

Despatchers will write the train orders in long-hand while transmitting them, to properly regulate the speed.

The transmitter key, which is mounted on table at the left hand, is for the purpose of keeping out noise and unnecessary use of battery, and must not be pressed except while talking.

No objection to wearing head receiver at any time to keep posted.

When placing receiver on hook, see that the face is turned down, to avoid dust settling in it.

All concerned must familiarize themselves with the diagrams and instructions showing the different positions of switches and the changes necessary to be made, when called upon by despatcher, for wire testing, patching and transferring of equipment from one circuit to another in cases of wire interruption.

The telephone apparatus is fully protected from lightning.

The despatching of trains by telephone is, all told, at least one-third more rapid than the use of the telegraph for that purpose. While orders are not transmitted any faster by telephone, as their speed is limited to the ability of the despatcher and operators to write them, their repetition back to the despatcher is expedited very much, and reports from operators to the despatcher of the passing of trains are handled very rapidly in this way. In the matter of calling, great time is saved, as the operators pay much closer attention to the loud ringing of a bell than to the ticking of a telegraph sounder that is feeble in comparison.

This increase in the speed of the work makes it possible in some cases for one set of despatchers to handle a district, where, with the use of the telegraph, extra despatchers, or a full extra set, would be required.

Also, the ability of conductors to talk with the despatcher direct, instead of through an operator, as occasion requires, and to receive orders at places where operators are not on duty continuously, or at all, is a great help to the despatchers and of large benefit to the road.

Direct talk between the despatcher and operators, in connection with the work, has a very good effect on service and discipline, as the personal element involved in the use of the telephone is greater than is possible in the telegraph service, and, as a consequence, better results all round are secured.

The telephone also contributes greatly to ease the work of the despatcher. The quickening of the work gives him more time for figuring out the problems of train movements, which greatly reduces the stress, and the ease of talking, compared with telegraphing, affords much relief.

Experience has shown that, expensive as it is to install, the operation of a telephone train despatching circuit can usually be carried on with such economy, altogether, as to make up the cost of it within practically the first year of its use.

CONCLUSION.

Attention has herein been called to railway composite service, or simultaneous telegraphy and telephony on a single grounded wire, but nothing has yet been said about such double service on a pair of wires to form a metallic circuit for telephone purposes.

We have a number of such circuits, some by the use of two existing parallel iron wires, that are transposed for the telephone circuit, but the most valuable are had from our four through copper duplex telegraph circuits between Omaha and Ogden that, by transposing, give us two splendid telephone circuits all the way, that are capable of satisfactory use for long distances. Conversations on these circuits are frequent between Omaha and Cheyenne, 516 miles and talks have been had as far as Rawlins, 690 miles.

The principal use for these telephone circuits, however, is for conversation by officials and the handling of regular messages by telephone operators between district or division terminals.

These circuits are connected with our private branch telephone exchange switchboard at Omaha, through which connections can be made with any of the telephones in our exchange, or through the city, for conversational purposes.

For the message business, roomy, ventilated and nearly noise-proof booths are provided for the operators. These operators handle messages by telephone that would otherwise be put upon the telegraph. They take them directly on typewriter as transmitted and the speed of the service is approximately three times that of the telegraph. Both day and night service in this way is maintained at most of the ten division and district terminal points between Omaha and Ogden.

Although the duplex telegraph circuits on these four wires, making eight telegraph circuits in all, are worked for long distances, one as far as from Omaha to San Francisco and another the distance between Omaha and Salt Lake City, with repeaters approximately every 500 miles, we divide up the telephone service generally into five separate circuits on each pair of wires, thus giving us in all on these four through wires a total of eight telegraph and ten telephone circuits.

These circuits are kept practically in constant operation for telegraph service, and during the day, especially, are quite busy with telephone communications; they care for a volume of approximately 120,000 telegraph messages and con-

versations and telephone messages equal to a telephone message service of about 80,000 messages per month, or a total of in the neighborhood of 200,000 messages by both classes of service on these four wires per month.

This further shows the availability of the telephone service for railroad work and the more extensive place it is rapidly taking in the world of electrical communication.

Telephone Despatching on the Great Northern.

The Great Northern Railway, which at the present time is using the telephone to despatch its trains on divisions covering approximately 2,100 miles of its line, is now planning a further extension of this system.

Orders have recently been placed for telephone train despatching apparatus to be installed on six more divisions, viz: Fergus Falls, Breckenridge, Northern, Dakota, Saint Cloud and Cascade divisions, covering a total of approximately 1,900 miles. As these divisions are among the most important and busiest of the whole railway, thirteen despatchers being required to handle the large amount of traffic, it can easily be seen that this method of train despatching has taken a firm hold upon the Great Northern Railway officials.

Two hundred and ninety stations will be equipped for the new class of service. Telephones will be placed at sidings and at stations which are not open during the whole twenty-four hours, three hundred and fifty telephones being required for this purpose. While the train crews in this way can reach the despatcher at any time, the important fact is that the despatcher can get in touch with the train crews waiting at any siding, thus enabling him to give orders, prevent congestion, and keep the traffic moving.

When the proposed equipment has been installed, the telephone train despatching system of the Great Northern Railway will extend over the entire main line from Minneapolis and Superior to Seattle and Vancouver, and, it is believed, will cover the longest continuous stretch of track of any railroad in this country.

The Cerebotani Typewriter Transmitter.

Tests have been made recently by the French telegraph department of a telegraph typewriter, the invention of Professor Cerebotani. The apparatus prints the message at both the receiving and the transmitting ends, and is operated by an ordinary typewriter keyboard. It is claimed that it can be worked on an ordinary telephone line without interfering with the telephonic transmission. It is said that the device may be operated at twice the speed of Morse hand operation.

The combined length of the telephone and telegraph lines of Switzerland is 14,717 miles. There are 2,255 telegraph offices, which, in 1908, handled 4,942,000 telegrams. There are 60,494 telephone subscribers in Switzerland, and in the combined telegraph and telephone service there are 4,544 employees.

The Possibilities of Machine Telegraphy.

BY MR. LOUIS DE GOLL, BALTIMORE.

President, Rowland Telegraphic Company.

The two salient causes for the advent of the night letter telegraph are the need of it by the public and the economical advantage of the use of the plant at night.

There has been a traditional skepticism as to what the public would do in the way of telegraphing at night. The recent experiments have dissipated the doubt and point to sweeping economies. The maintenance of the plant has been a charge solely upon the day traffic. If the interest, depreciation and maintenance are shared by a night traffic the day rates may be materially reduced.

The intense use of the plant in this way must be closely related to its operation by an unskilled class, that is to machine telegraphy. Machines pay in handling a large traffic. A skilled class must be raised up to manage them, so that that unskilled class may operate them. The plant operated at a reduced cost, tariffs may be reduced to invite the desired traffic.

Machine telegraphy is, at this stage, most readily applicable to the trunk lines, and it is these that carry every telegram (on the average) once in its passage.

Perhaps the chief reason for the backwardness of machine telegraphy has been the absence of a committal of the administration to its commercial development. And yet the cost of perfecting a machine system cannot but be insignificant as compared with the operating profits to be expected from it. We must not at first look for the perfect machine but for the valuable idea in the machine. The staff must understand that it is to be made a "go," as the machine can be evolved to perfection only in commercial practice.

Any comprehensive improvement of the telegraph must take place first in the United States and by a private company bringing to that special development technical methods abreast of the problems involved; European telegraphs are involved with the political administration and deprived of the initiative for such a work.

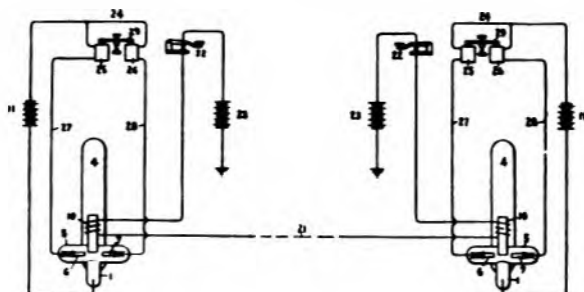
Our people have been educated to avoid the telegraph, the rates being the chief deterrent. The telegraph will be developed like the telephone and become similarly indispensable in daily routine.

Machine telegraphy has already been sufficiently used commercially to prove the efficiency of the operators, the increased capacity of the wires and the reduced cost of handling. Its commercial development now seems imminent as the service it can render becomes daily more evident.

A Mercury Arc Relay.

The patent No. 953,361 for a mercury arc relay granted recently to Mr. J. B. Taylor of Schenectady, which was recorded in our previous

issue, describes a form of relay entirely different from anything heretofore used. It is designed to be employed in connection with any circuit where it is desired to reproduce or repeat in a second circuit an electrical impulse or oscillation impressed upon the first. Its field of usefulness hence, would include telephone, telegraph and signaling systems. The invention consists essentially of a device comprising two anodes and a cathode in an evacuated receptacle containing a body of mercury, a source of current and means for causing the division of the current between the two anodes to vary in accordance with the indications desired, whereby a translating device in circuit with these anodes will be caused to respond. The current deflecting means used is an



Mercury Arc Relay Applied to Telegraph Use.

electromagnet whose poles are arranged to produce a flux across the mercury arc set up between the anodes and the cathode. By varying the current energizing said electromagnet the flux will be varied, and the result is a corresponding variation in the circuit of the receiving instrument. If the electromagnet is in circuit with a telephone transmitter, and the receiving instrument is a telephone receiver, the relay will transmit spoken or other sounds.

The illustration given herewith shows the way in which this relay may be used with telegraph systems. The coils of the electromagnets 10 are in series with the line 21 and with the keys 22 and batteries 23. The sounders 24 are in circuit with the anodes, each sounder having preferably two coils 25 and 26 located respectively in the two anode leads 27, 28, and differentially wound so that the balanced currents in said leads will not affect the armature 29. But any unbalancing of the potentials of the two anodes by the closing of either of the keys, will cause one or the other of said coils to attract the armature.

A Relay with Double Adjustment.

The main line relay recently patented by Mr. H. E. Powell, of Oakland, Cal., as mentioned briefly in our April 16 issue, is designed to utilize the power of weak currents arriving over long sluggishly working lines. It is provided with two adjustments, one to accommodate the nearby offices while the other adjustment permits the recording of signals from the distant offices. The form of relay provided by Mr. Powell also serves as a sounder.



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The Railroad.

Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railroad, St. Louis, has been elected president of the St. Louis Railway Club.

Mr. W. S. Fender has been appointed an assistant superintendent of telegraph of the Southern Pacific, with headquarters at San Francisco. He will have charge of the telephone equipment and such portions of the telegraph service as may be assigned to him.

Mr. Frank M. Ewing, assistant manager in the telegraph office of the Pennsylvania Railroad at Williamsport, Pa., was a recent New York visitor. Mr. Ewing has been making quite extensive experiments with wireless telegraphy and the distant control of lights and other electrical devices by wireless and has secured some very satisfactory results. Mr. Ewing has delivered many lectures upon this subject in Williamsport and vicinity.

The Virginian Railway will soon place in service telephone despatching equipment on its division from Roanoke to Deepwater and has ordered similar apparatus for the other two divisions of its road from Norfolk to Roanoke. The length of these two divisions is approximately 250 miles and the despatcher will be located at Victoria near the center of the line. Thirty-one stations will be equipped for selective calling and twenty-seven other stations will be provided with telephones but no selectors.

The Norfolk and Southern Railway is making preparations to install a telephone train despatching system on its main line from Norfolk to Washington, N. C. It is expected that the new apparatus will be placed in service early in the summer. The length of this circuit is 136 miles with twenty stations and eight siding telephone sets will be installed at various places along the line. Portable sets will also be provided for the use of the train crews. The system will be so arranged that the despatcher can call all stations either individually or collectively.

The plans for the annual convention of the Association of Railway Telegraph Superintendents which will be held at Los Angeles, June 20 to 25, at the Hotel Alexandria, are now nearing completion. The western members of the Association have decided to go by way of the Santa Fe system, taking their train No. 1, leaving Chicago at 10 p. m. Tuesday, June 14, and Kansas City at 11:30 a. m. the next day. The western committee have arranged with the Santa Fe to handle the party in a body on that train and to give them a day at the Grand Canyon reaching Los Angeles, Monday morning, June 20, at 8:30. This much of the itinerary has been decided upon. It has been proposed that the eastern members connect with this train at Chicago or any other point en route. It has also been suggested that the party return by way of the Southern Pacific, stopping off at San Francisco, Salt Lake City and Denver on the return trip.

Mr. J. J. Ross, superintendent of telegraph of the Michigan Central Railroad, Detroit, was a recent New York visitor coming here in the interest of the service.

At a recent meeting of the Frisco Railroad Club, held at St. Louis, Mr. H. D. Teed, superintendent of telegraph of that system gave an address upon "The Telephone versus the Telegraph."

The Train Despatchers' Association of America will hold its annual convention at Spokane, Wash., June 21. Mr. John F. Mackie, 7042 Stewart Avenue, Chicago, is secretary and treasurer of the Association.

Mr. A. T. Hollenbeck Superintendent of Telegraph of the Chicago Great Western

Mr. Avenel Thalberg Hollenbeck, whose appointment as superintendent of telegraph of the Chicago Great Western Railroad was announced in our April 16 issue was born at Fairmount, Ill., October 12, 1867. He entered the telegraph



A. T. HOLLENBECK, CHICAGO.

Superintendent of Telegraph, Chicago Great Western Railroad.

service in May 1888 as operator for the North American Telegraph Company at Fond Du Lac, Minnesota. After a year and a half in commercial work he entered the railway field as operator for the Chicago Great Western then called the Chicago, St. Paul and Kansas City. During the next three years he occupied the positions of cashier, wire chief and manager in the telegraph service of that railroad. In 1893 he was made chief clerk in the telegraph department which position he held until his recent advancement.

Probably the only telegraph messenger boy in the country who delivers messages with an automobile is Albert Hartman, who is employed by the Postal Telegraph-Cable Company at Allentown, Pa. Some time ago a clothing store in Allentown conducted a contest for boys giving an automobile as a reward. This messenger won the machine and now makes good use of his prize in his daily work.

Portable Wireless Sets for Automobiles.

As a result of extensive tests which have been conducted for them recently, by Dr. Lee DeForest, the Chalmers Motor Company has decided to equip several of its cars with portable wireless sets for the Glidden Tour which will be conducted next August. Dr. DeForest has made tests both with the wireless telegraph and the wireless telephone but the results so far obtained with the latter have not been sufficiently satisfactory to justify its use during the coming



Figure 1.

tour. With the telegraph, however, the results of the tests have proven that it may be of great service to the tourists.

In the early part of March, successful tests were made between a car in Central Park, New York, and the Terminal Building at Park Avenue and 42nd Street where Dr. DeForest maintains his experimental laboratory. The distance involved varied from one and one-half to three miles in the trial from a moving car, while the experiments with the portable field stations showed that this type of apparatus would be able to carry on certain communication up to fifty miles.

Figure 1 shows the receiving and sending stations used on moving automobiles, the receiving apparatus consisting of a seven foot aerial in connection through a loose coupling with a variable and a fixed condenser, the audion, telephone receivers and a high and low voltage battery. The sending set comprises two storage cells, a novel mechanical interrupter capable of 12,000 variations a second, a ten inch spark coil, two leyden jars and a three and one-half inch radiotone discharger. This apparatus which

worked successfully up to three miles, the farthest distance tried, would probably operate for several miles further. The ground was secured by drawing between the rear wheels a bicycle tubing frame supported on four small wheels mounted on roller bearings, the middle space being occupied by three eight-inch steel wheels with slide bearings arranged so as to allow the weight of the wheels to keep them in contact all of the time, by gravity, with the road. On the macadamized roads of the park this system of grounding worked fairly well although on the sandy roads of New Jersey, where the subsequent tests were made, a great deal of difficulty was experienced in properly maintaining the ground. The spraying of water over the contact wheels by means of a small rubber tube leading up into the car partially overcame this trouble and no doubt subsequent experiments will provide a suitable way of securing a satisfactory ground contact although it is true that probably for some time to come the speed of moving cars must be considerably limited for successful wireless work, the cars in the tests not exceeding twelve miles an hour.

Field stations which can be put up in five minutes can be operated more successfully, and



Figure 2.

the same apparatus used in the automobile by stopping the machine and securing a proper ground has a range of about ten miles.

Two crystal detectors were used in the tests, namely, the perikon and radion, but neither of them worked as reliably as the audion.

The field sending station uses a 100-foot aerial secured at one end to a spreader attached to a forty-eight foot bamboo telescope mast and

leading down diagonally to the top of a twelve foot mast about ninety feet away and thence back to the wireless apparatus about midway between the two poles.

Figure 2 shows the field apparatus used in the earlier tests. The last set used embraces additional condensers, storage cells and audion receiving accessories. The box upon which the operator is sitting contains the interrupter, spark coil and discharger.

In the coming tour it is proposed to send two scout cars ahead of the regular contestants, each one of which will carry the complete field set of greater range than those which every car can carry. Points where the telegraphic facilities are poor or are lacking will be picked out, and the two cars will arrange to be at these points just ahead of the pilot car, one station being set up at the next point ahead while the other is taking care of the telegraphic business of the tour. In this way one of the two field stations will be in operation all of the time. The moving stations will send messages constantly to these two stations and will be able to receive their replies.

The Metropolitan Clock.

One of the most remarkable clocks in the world is the one recently installed by the Self Winding Clock Company in the tower of the Metropolitan Building in New York, the highest building in the world and which rises seven hundred feet above the street level. The clock is placed three hundred and forty-six feet above the sidewalk and the dials, of which there are four, are twenty-six feet, three inches in diameter. This makes it the highest clock in the world and only three others have larger dials. It is operated entirely by electricity, its action being strictly automatic. The numerals which mark the hours are four feet high. They are made of white wire glass which shows black in the day time but at night they are illuminated by strong lights placed behind them while the dials are dark. The hands are also illuminated by lights placed within them. By this arrangement it is possible to decipher the time at a greater distance at night than during the day. The minute hands are seventeen feet long and weigh over one thousand pounds each while the hour hands are thirteen feet four inches long and weigh seven hundred pounds each. One would naturally expect that a heavy and cumbersome mechanism would be required to operate such a large clock, but the machinery for operating each dial is contained in a steel chamber behind it which is only $14\frac{1}{2}$ x 25 x 34 inches in size.

The striking apparatus of the clock includes a chime of four bells which are located at the top of the tower two hundred and sixty-nine feet above the dial faces. The notes are G, F, E flat and B flat and the bells weigh 1,500, 2,000, 3,000 and 7,000 pounds respectively. It is said

that the note of the large bell, upon which the hours are struck, has been heard at a distance of fifteen miles. At night the announcing of the hours is done by a series of electric flashes from a great gilded lantern which crowns the summit of the tower. As soon as darkness comes the bells are silenced automatically. A white light is seen in the lantern throughout the night. Ten seconds before the quarter hour this disappears and a red flash is seen, one flash for the first quarter, two for the half hour and three for the three quarters. The full number of the hour is told by an equal number of red flashes.

The mechanism which accomplishes all of this is controlled by a master clock in a case of carved mahogany which is located in the director's room of the insurance company on the second floor of the building. This operates and regulates not only the tower clock but a complete system of time keeping throughout the building which includes one hundred office clocks. The correctness of the time of this system is insured by the fact that the master clock is connected with a time service wire of the Western Union Telegraph Company, which keeps it absolutely accurate. It is said, however, that the operating mechanism is so finely constructed and adjusted that it would not vary over five seconds per month.

Trade Notes.

The business of the Western Electric Company continues to show a decided improvement over last year, the sales for March being about forty per cent. larger than those for March, 1909.

The Electric Storage Battery Company of Philadelphia, has recently issued two illustrated bulletins describing an installation of their chloride accumulators in the mills of the Indiana Steel Company at Gary, Ind. and the application of their chloride accumulators and oxide batteries for lighting and other purposes on board yachts and motor boats.

The Western Electric Company has recently issued bulletin No. 1,005, which is the third of a series of nine bulletins on telephone exchange apparatus which is to be issued. This bulletin is entitled "Branch Exchange Switchboards of Lamp Signal and Magnetic Signal Types." It describes the types of branch exchange equipments which have been designed for use in business establishments, factories, schools and places where a modern private telephone system is required.

New Edition of Cable Directory Issued.

The thirteenth annual edition of the International Cable Directory of the World, which is issued by the International Cable Directory Company of New York in conjunction with the Western Union Telegraphic Code, is just off the press. As usual, the publishers bring matters relating to the government of telegrams and cables right up-to-date and present a large mass of material which is of interest to all who use the wires.

QUESTIONS TO BE ANSWERED.

[In studying any book it is difficult for most students to pick out the facts contained in the text and arrange them in his mind so that they have a particular meaning to him. To aid the student who is desirous of securing a thorough knowledge of the technical side of the telegraph we have decided to publish in each issue a list of questions, the answers to which may be found in that popular telegraphic text-book, Jones' Diagrams. It will be most profitable to the student after carefully studying the subject matter to which each list of questions applies to try to see if he can answer them without referring to the book. If he masters the text so that he can answer any of these without consulting his book he will then be able to take up more intelligently the subjects which follow.]

CHAPTER I.

What conception has the average mind of the nature of electricity?

What is the scientists idea of the related phenomena of heat, light, and electricity?

How is the sun's energy transmitted to us through the ether?

How do scientists account for the various ways in which the energy of ether waves is made manifest?

How does the author define electricity?

Why is there said to be a "current" in the conductor when electrical energy is being transmitted from one point to another?

What causes earth currents?

What are some of the influences which disturb the normal electrical equilibrium of the earth's surface?

What is the essential condition necessary for the manifestation of the phenomenon known as electricity?

Why is not natural electricity available for practical purposes?

What property of an electric current enables us at all times to detect its presence in a conductor?

How may the magnetizing effect of a feeble current be increased?

What happens when a circuit is broken?

How is the magnetizing power of an electric current made use of in telegraphy?

Why is soft, annealed iron the only metal suitable for an electromagnet which is to be used for telegraphic purposes?

What determines the amount of heat developed in a conductor in which a current of electricity is flowing?

How is the heating effect of an electric current in a conductor made use of for electric lighting?

What is the distinction between a conductor and an insulator?

What medium offers the least resistance to the flow of the magnetic lines of force set up by an electric current?

Why is part of a telegraph relay or sounder made of iron and part of brass?

Annual Report of Telegraphers' Aid Society.

The annual report of the New York Telegraphers' Aid Society, for the year ending March 6, 1910, is as follows:

Balance on hand March 6, 1909.....	\$22,908.85
Receipts:	
From dues.....	\$5,708.00
" Initiation fees	75.00
" Interest	1,160.83
	<u>6,943.83</u>
Total.....	\$29,852.68
Disbursements:	
Sick benefits	\$3,242.05
Death "	1,000.00
Expenses	709.61
	<u>\$4,951.66</u>
Balance on hand March 6, 1910.....	24,901.02
Total.....	\$29,852.68

Summary:	
Receipts	\$6,943.83
Disbursements	4,951.66
Gain for year	\$1,992.17

Relief Fund.	
Balance on hand March 6, 1909.....	\$4,336.32
Receipts	1,297.71
	<u>\$5,634.03</u>
Disbursements	675.36
Balance on hand March 6, 1910.....	4,958.67
Total.....	\$5,634.03

Annual Convention of Associated Press.

The eleventh annual convention of the Associated Press was held in New York April 26, 27. The past year has been a most prosperous one for this organization and twenty-five in new members have been added to its list. Now that Mr. Melville E. Stone, general manager, who has been on a trip around the world which has occupied the past six months has returned to his office in New York, Mr. Charles S. Diehl, assistant general manager, who has directed the organization during Mr. Stone's absence, will return to his headquarters at Chicago. The following officers were elected: President, Frank B. Noyes; first vice-president, R. M. Johnston; second vice-president, Frank P. MacLennan; secretary, Melville E. Stone; assistant secretary, Charles S. Diehl; treasurer, J. R. Youatt.

There is a lively interest manifested by members of the profession in the various large cities in the eastern division of the Western Union Telegraph Company in the matter of increased electrical knowledge. As an evidence of this it is only necessary to state that nearly 500 copies of Swoope's "Lessons in Practical Electricity" have been purchased during the past month and are being daily studied by members of the various electrical societies. In addition to these it should be mentioned that the sales of Jones' "Diagrams," Thom and Jones' "Telegraphic Connections," Maver and Davis' "Quadruplex" and other works have also been unusually heavy since the formation of the schools in the different cities.

Obituary.

George Griffiths Steel, publicity manager of the Bell Telephone Company of Pennsylvania and controlled companies, and managing editor of the Telephone News, died April 11, at Pittsburg.

Benjamin F. Wright, for the past twenty-five years an operator in the employ of the Western Union Telegraph Company at St. Paul, died in that city April 6.

George J. Frankel, who occupied the position of superintendent of the Western Union Telegraph Company at St. Louis until April 1, died at San Antonio, Tex., April 19, aged fifty-three years. Mr. Frankel entered the telegraph service in his native town San Antonio as messenger at the age of fifteen. Subsequently he was employed as clerk and operator at Dallas and Houston and as manager at Jefferson, Marshall and El Paso, Tex. After a year spent as train despatcher on the Texas and Pacific Railway he returned to Western Union employ and soon after became chief clerk to Superintendent T. P. Cook at St. Louis. May 1, 1897 he was made assistant superintendent and in 1902 when Mr. Cook became general superintendent at Chicago Mr. Frankel succeeded to the superintendency. Although he had been in poor health for some time past, having been attacked by tuberculosis, he stuck to his post until he was relieved April 1, as previously mentioned.

Emory Cobb, a forty-niner of the telegraph, died at Kankakee, Ill., April 15, as the result of injuries received by being kicked by a horse. Mr. Cobb was born at Dryden, N. Y. August 20, 1831. He went to Ithaca to learn telegraphy and in 1848 became an operator on the line of the Erie and Michigan Telegraph Company at Fredonia, N. Y. Later he went to Chicago and took a prominent part in the formation of the Western Union Telegraph Company becoming its first superintendent at that point. He occupied this post during the war but in 1865 his health failing he was compelled to retire for a year's rest. He then went into business at Kankakee and has been one of the leading citizens of that place since that time. Among his other business activities he was largely interested in building the lines of the Northwestern Telegraph Company in Wisconsin and Minnesota, now a part of the Western Union system. While he was superintendent at Chicago, Mr. Cobb conceived the idea of sending money by telegraph. The officials of the company did not at that time, see the value of the scheme, but Mr. Cobb organized a money transfer system on his own account, which he afterward turned over to the company. Mr. Cobb was an intimate friend of President Lincoln and had charge of all of the telegraphic arrangements at the Wigwam in Chicago when he was first nominated for the presidency. He also accompanied Mr. Lincoln as far as Cincinnati on his trip from Springfield, Ill. to Washington to be inaugurated. As an evidence of the esteem in which he was held in Kankakee, all of the business places of that city were closed at three

o'clock for fifteen minutes while Mr. Cobb's funeral was being held.

Robert Redman, an old time telegrapher, died at Pittsburg April 10 aged fifty-eight years. Mr. Redman was at one time assistant superintendent of construction for the Western Union Telegraph Company and was afterward connected with the construction department of the Pittsburg and Allegheny Telephone Company.

William Arnoux, a forty-niner of the telegraph, died at Passaic, N. J., April 23, aged eighty-five years. In 1848, Mr. Arnoux issued in his own handwriting one of the first tariff books ever used in connection with the telegraph. For the past fifty years he was attached to the offices of the secretary and general attorney of the company.

Charles J. Osborn, an old time telegrapher and for fifty-five years connected with the Associated Press, died at St. Louis April 18 aged eighty-four years. Mr. Osborn was born at Utica, N. Y. and learned telegraphy in Pittsburg in 1847. He afterward went into newspaper work and in 1855 became correspondent for the Associated Press at St. Louis. This position he held until 1902, when he retired from active work though he has since been connected with the St. Louis office in an advisory capacity.

LETTERS FROM OUR AGENTS.**PHILADELPHIA, WESTERN UNION.**

Spring house cleaning under the direction of chief operator F. R. Webb, is now in progress here. The office has been thoroughly cleaned, all the desks scoured, all ink stains removed and a coat of varnish is being put on, which makes everything in the office look bright and cheerful. The switchboard, under the manipulations of Messrs. Chas. M. Pennypacker and H. Schwartz has also assumed the appearance of being new. Recent changes are: D. A. Gifford and C. R. Hulse, have resigned; James Lindskey has been transferred to the Hotel Walton; arrivals are, David Bryan, Albert B. Kurtz, E. H. Fritz, Alfred B. Cain, Fred Heisman, Louis Neigut, Morris Kunin, Walter I. Smith, Wm. Kalmey, Harvey G. Wolf, Robt. M. Keller, Chas. S. Weed, Wm. E. Lowe; Chas. F. Darr, from New York; S. E. Standifere, from Atlanta, and Michael A. McLaughlin, from Pittsburg.

The tenth annual entertainment, banquet and dance of the Philadelphia Electrical Aid Society was held at Mercantile Hall, on April 20. Over 750 were present and the occasion was thoroughly enjoyed by all.

WASHINGTON, WESTERN UNION.

Mr. F. D. Giles, of the office of General Superintendent A. G. Saylor, New York, was a recent visitor here, coming in the interest of the service.

The wife of Mr. Dennis F. Brown, wire chief in this office, died April 15. Mrs. Brown had been in poor health for some time. Her death, however, was caused by congestion of the lungs. She was a niece of former Postmaster Van Cott of New York.

CHICAGO, POSTAL.

Mr. F. N. Roberts, formerly chief operator of this office who has been transferred to a position with headquarters at New York, was, before leaving this city, presented with a handsome diamond stud as evidence of the esteem of his co-workers.

Mr. T. N. Powers, who has been appointed Mr. Roberts' successor as chief operator, was born December 6, 1872, and entered the telegraph service in 1886 for the Western Union, casting his lot with the Postal in 1892. He is well qualified to fill the responsible position he has now assumed.

Mr. Powers was agreeably surprised on reaching his office April 7, the day on which he took up his new duties, by beautiful floral desk decorations that were provided by his friends and associates in this office.

Mr. B. D. Seymour, eastern division quad chief, has been appointed wire chief of the eastern division to succeed Mr. Powers. Mr. Seymour was born at Homer, Mich., October 8, 1870. He entered the service as messenger boy at Marshall, Mich., in 1886, and has worked his way up through the various grades to his present position.

Mr. H. H. Dengler, quad chief in the overland division, has been transferred to the eastern division to succeed Mr. Seymour. Mr. Dengler was born at Ann Arbor, Mich., July 8, 1865, and entered the telegraph service in 1882 as messenger at that point. He has since served at various places as operator and manager for both the Western Union and Postal companies and in this office as wire chief and quad chief. He is assisted in his new position by Mr. A. C. Johnson.

Mr. G. A. Redman has been transferred from assistant quad chief, nights, to assist in the overland division, days.

OTHER NEW YORK NEWS.

Twenty-five years ago, in August, 1885, Mr. Charles P. Bruch, then secretary of the Telegraphers' Mutual Benefit Association, attended, as the representative of his association, a convention of the mutual benefit societies held in Boston. Thirty one societies were represented at that convention but only two of them, the Telegraphers' Mutual Benefit Association and the Ancient Order of United Workmen, Grand Lodge of New York, reported to the New York State Insurance Department in 1909. All of the other associations appear to have gone out of existence, except the Fidelity Mutual, which turned into an "old line" company and is still doing business. There can be no better evidence than this that the Telegraphers' Mutual Benefit Association has been well and conservatively managed on sound business principles."

Assessment No. 507 has been levied by the Telegraphers' Mutual Benefit Association to meet claims arising from the deaths of Jennie Wetmore, at Houlton, Me.; Ellis W. Rhivers,

at San Francisco, Cal.; Charles H. Schermerhorn, at Plainfield, N. J.; Millard F. Parkhurst, at Plattsburg, N. Y., and William S. Wood, at Chicago, Ill.

New Page Printing Ticker Company Organized.

The Interurban Telegraph News Company of Atlantic City has been organized with a capital of \$1,000,000 for the purpose of operating telegraphic news tickers in Philadelphia, Pittsburg, Scranton, Harrisburg, Trenton, Wilkes Barre and other cities. The incorporators are Richard H. Robertson, Russell L. Browne, and Coleman H. Watkins, all of Atlantic City. The system to be used is the invention of Dr. G. A. Cardwell the well-known inventor of New York. Wires of independent telephone companies will be utilized for transmitting the news, the system to be employed not interfering in any way with the use of the wires for telephonic purposes at the same time.

Every telegrapher can own a home. The Serial Building Loan and Savings Institution of 195 Broadway, New York, was organized for the purpose of assisting telegraphers to buy homes and encourage them to save systematically. During the twenty-five years of its existence it has aided over eleven hundred persons to secure homes and is now assisting many others. Write for particulars.

Wanted—Address of telegraph operator who wants railroad work in country, \$55. Address "Relief," care Telegraph and Telephone Age.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

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I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEY-BOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

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Columbia, Pa. R. F. D. No 1.

Telegraph and Telephone Age

No. 10.

NEW YORK, MAY 16, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons in Electrical Measurements. Joint Resistance.

PART II.

The fact that the joint resistance of any two or more wires connected in parallel is always less than the actual resistance of any one of them singly seems to perplex a great many students. They cannot understand why the resistance should be less when obviously more resisting material is added.

The trouble is they do not quite grasp the true meaning of the words "joint resistance" as applied to electric circuits.

If the student will substitute the word "facilities" for "resistances" in connection with a conductor or number of them he will get the correct meaning.

For instance, a dynamo cannot furnish any current until we provide some facility for its conveyance. A wire attached to such a machine will furnish such facility notwithstanding it offers a certain amount of resistance.

Let us assume that it offers 100 ohms resistance, and absorbs one ampere of current. Now connect a second wire possessing the same amount of resistance to the same dynamo also. There will then actually be 200 ohms of resisting material connected with the machine, but as

the latter now finds two facilities for creating current, instead of one, the dynamo finds itself able to furnish just twice as much current as it did when but one wire was connected.

In other words the two conductors, although actually possessing a total resistance to the amount of 200 ohms, create a combination circuit which draws from the dynamo exactly the same volume of current that one single wire would which possessed but 50 ohms. Hence the joint resistance of a number of wires joined to one source of current, really refers to the facilities they offer for absorbing current, and the measure of such combined facilities is represented by the resistance of one single wire which with the same source of current will absorb exactly the same total volume of current as the group. The resistance of the single conductor which will do this is called the joint resistance of the two or more wires so combined. For example, if one wire alone possessing 100 ohms resistance draws one ampere of current, two similar wires will absorb two amperes. A 50 ohm wire alone will also take just two amperes, hence the joint resistance of 100 and 100 is 50 ohms. Three similar wires will absorb three amperes. So will one wire of 33 1-3 ohms, hence 33 1-3 is the joint resistance of 100, 100, and 100. The joint resistance of four such wires would be twenty-five ohms, because a wire of that length would carry exactly four amperes of current. Hence the rule for determining the joint resistance of several wires each of which possesses the same amount of resistance is, divide the resistance of one wire by the total number of such wires. Thus four wires of 100 ohms each would give a joint resistance of 25 ohms because $\frac{1}{4} = 25$.

When the joint resistance of two or more wires possessing different values of resistance is desired and the figure or figures representing the same are so small that the operation will not require too much figuring, it may be determined by what is called the "reciprocal method," in which the first object is to ascertain the conductance of the circuits. The word conductance in this case really means the "facilities offered" for absorbing current, in contra-distinction to the actual material resistance of the conductors themselves.

For instance, if we have say three wires in parallel possessing resistance of two, four and six ohms, respectively, the conductance will be equal to the reciprocals of those figures. Thus $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{6}$ are the reciprocals of 2, 4 and 6. The total conductance of the circuit will equal the sum of the separate conductances.

To work out an example by this method observe the following rough rule:

Multiply the denominators of the reciprocals together in order to obtain a common denomina-

tor for the group. Then add together the numerals of the reduced fractions and place the sum over the figures representing the common denominator for the latter's numerator. The final fraction thus obtained will represent the total conductance of the circuits in parallel.

Example: Three wires possess 2, 4 and 6 ohms resistance respectively. If placed in parallel what will be their joint resistance?

Now the reciprocals are $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{6}$. Thus $2 \times 4 \times 6 = 48$, the common denominator. $\frac{1}{2} = \frac{24}{48}$, $\frac{1}{4} = \frac{12}{48}$, $\frac{1}{6} = \frac{8}{48}$.

Adding these numerals together and placing the sum over the common denominator we find we have in fractional form $\frac{44}{48}$ or $\frac{11}{12}$, which represents the total conductance of the circuit.

This really means that we have the equivalent of 11 wires in parallel, each of which possesses exactly 12 ohms. Hence the joint resistance of the group must be equal to the resistance of one wire divided by the number of such wires in the circuit. Thus $\frac{11}{12} = 1.09+$ ohms, the joint resistance of 2, 4 and 6.

To ascertain the total volume of current divide the electromotive force of the source of current in volts, by the joint resistance of the circuit, or 1.09 ohms.

If it is then desired to ascertain the volume of current which flows through each of the three wires it would merely be necessary to divide the total volume drawn from the machine by the sum of the three numerators of the enlarged fractions representing the three respective wires or by 44 and multiply this quotient by each numerator separately.

Then 24 times the quotient obtained will show how much current the two ohm wire will take; 12 times the quotient will be what the four ohm wire absorbs, while the six ohm wire will take the remainder or 8 times this quotient.

(To be Continued).

Recent Telegraph and Telephone Patents.

A patent, No. 955,134, for a selective locking-key, has been granted to John F. Cadell, of Baltimore, Md.

A patent, No. 955,302, for a telephone signal-bell, has been issued to Herman L. Wuerffel, of Maywood, Ill.

A patent, No. 955,335, for a bridging-telephone system, has been secured by Henry F. Joeckel, of Clayton, Ill.

A patent, No. 955,472, for a combined telephone and protective alarm system, has been awarded to James G. Nolen, of Chicago, Ill.

A patent, No. 955,633, for a telephone system, has been taken out by Merritt S. Conner, of Oakdene, Hale, England.

A patent, No. 955,676, for a telegraph sounder, has been granted to G. F. Oehmen, of New York. A vertical solenoid, a straight vertical core movably mounted and means carried by the core for producing signals.

A patent, No. 955,685, for a telephone transmitter, has been issued to G. N. Quinby, Jr., of North Providence, R. I.

A patent, No. 955,716, for a telephone transmitter, has been secured by Pietro Stragiotti, of Hurley, Wis.

A patent No. 955,921, for a telephone receiver, has been awarded to H. R. Stuart and E. O. Kizer, of Wheeling, W. Va.

A patent, No. 955,923, for a telephone, has been taken out by W. H. Thompson, of Wheeling, W. Va.

A patent, No. 956,171, for telephonic apparatus, has been granted to T. C. Rafferty, of Philadelphia, Pa.

A patent, No. 956,228, for long-distance telephonic apparatus, has been issued to V. Tardieu, of Arles, France.

A patent, No. 956,251, for telephone apparatus, has been secured by D. H. Wilson, of Chicago, Ill.

A patent, No. 956,484, for a telephone exchange system, has been awarded to E. E. Clement, of Washington, D. C.

The following patents have expired:

A patent, No. 495,030, for a means for telegraphing, held by William H. Fahrney, of Chicago, Ill.

A patent, No. 495,087, for central-office apparatus and circuit for telephone-exchanges, held by Edward J. Hall, of Morristown, N. J.

A patent, No. 495,090, for granulated material for transmitting telephones, held by William W. Jacques, of Newton, Mass.

Patents, Nos. 495,179, for a system for protecting telephone apparatus from lightning and, 495,180, for a telephone-gage, held by John J. Carty, of New York.

Patent No. 496,513, for vibratory telegraphy, issued to Stephen D. Field, of Stockbridge, Mass.

Patent No. 496,549, for a printing-telegraph instrument, issued to Alexander H. Wirsching, of Brooklyn, N. Y.

Patent No. 496,602, for electric signaling apparatus, issued to Stephen D. Field, of Stockbridge, Mass.

Personal.

Mr. Stephen D. Field, the well known electrical engineer and inventor of Stockbridge, Mass., was a recent New York visitor.

Mr. T. Commerford Martin, who was well known for so many years as editor of *Electrical World*, is securing excellent results in his efforts for the up-building of the National Electric Light Association of which he became secretary last September. The twenty-fifth annual convention of that association, which meets in St. Louis, May 23-28, and for which Mr. Martin is actively engaged in making arrangements, promises to be one of the greatest gatherings of electrical men ever held.

Mr. Charles A. Tinker, formerly general superintendent of the eastern division of the Western Union Telegraph Company, New York, who has been spending the winter months in Mexico, has returned to his home in Brooklyn.

Mr. A. W. Orton, a well known old-time and military telegrapher, has been elected president of the Rome Box and Lumber Company of Rome, N. Y. Mr. Orton has lately secured a large interest in this company and is now devoting his time to re-organizing and extending the business.

Mr. T. Thorne Baker, the English inventor who has developed a system of transmitting photographs by wire, is spending some time in this country. Mr. Baker is here for the purpose of demonstrating the operation of his system for sending pictures either by wire or wireless.

Mr. Ernst Halling, assistant manager of the government telegraph office at Stockholm, Sweden, is spending some time in this country, making a study of our telegraph systems as regards their organization, management, bookkeeping, etc. Mr. Halling will return to Sweden about June 15.

Mr. A. B. Banker, formerly of the Postal Telegraph-Cable Company in New York, but for several years past connected with Paul Smith's in the Adirondacks, was in New York recently, coming here on business connected with the hotel interests with which he is identified. While in the city Mr. Banker took occasion to call on many of his old friends.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. W. I. Capen of New York, general superintendent of plant and Mr. C. M. Baker, superintendent of construction of the western division, Chicago, are supervising the construction of the new line which is being built from Salt Lake City to Reno, Nev.

Mr. W. P. S. Hawk has now assumed the superintendency of the sixth district, western division at Chicago, his transfer to that position having been announced in our April 16 issue. Superintendents J. A. Forehand of Seattle and W. C. Black of Denver, have taken charge of the lines of the eighth district over which Mr. Hawk formerly presided.

Mr. Edward J. Nally, vice-president and general manager of the company has announced that on June 1 his company will increase the wages of its telegraph operators in all important offices, the offices to be classified according to their comparative importance. The increases will be selective and will run from five—and in some cases as high as twenty-five per cent.

Careful examination and full inquiry will be made as to the merits of each individual operator, ability to be the first requisite; years, experience and other special fitness will count in each man's favor and all will be graded accordingly. Efficient and deserving operators will receive pay commensurate with the value of the

work that they are able to perform and less experienced and new operators will have greater opportunity to demonstrate their fitness for advancement in pay or promotion in other ways.

It is the company's intention, by continued fair dealing with employees, to retain and attract to its service the most skillful and reliable operators.

The "Postal Telegraph" for May, bears on its front cover a splendid likeness of Professor Morse. On the first inside page is a picture of the original Morse telegraph set while on the opposite page a picture of modern apparatus shows the striking contrast between the crude instruments employed originally and those in general use to-day. The leading article in the book is an excellent biographical sketch of Thomas A. Edison, written by Elbert Hubbard, editor of "The Fra" and "The Phillistine." A noticeable feature of the section devoted to tariff changes is the addition of over 300 points in New York State to which messages will be delivered, the telephone being made use of to reach a majority of these places.

RESIGNATIONS AND APPOINTMENTS.

Mr. G. A. Probert, manager at Pueblo, Col., has been appointed manager at Colorado Springs vice Mr. A. G. Barks, resigned to engage in other business. Mr. Leslie Van Arsdale of Pueblo, has been appointed to the position vacated by Mr. Probert.

Mr. C. H. Jett has been appointed chief operator of the Denver office vice Mr. E. Cox transferred to a similar position at San Francisco.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. B. Brooks, general manager, and Mr. W. N. Fashbaugh, in charge of the traffic, left New York, May 9, in the company's car, Morse, for an extended tour of inspection, which will take them as far as the Pacific Coast. The itinerary includes El Paso, Texas; Los Angeles, San Francisco, Portland, Seattle, Salt Lake City and Denver. Mr. Brooks expects to return to New York about June 5.

Recent executive office visitors included Theodore P. Cook, general superintendent of the western division, Chicago, accompanied by his secretary, M. T. Cook; B. F. Dillon, general superintendent of the southern division, Atlanta, Ga., and wife; J. C. Nelson, superintendent at Omaha, Nebr.; J. S. Calvert, superintendent at Richmond, Va.

Mr. J. McRobie, general superintendent of the American District Telegraph Company, Chicago, Ill., was a recent New York visitor, coming here on company business.

Mr. C. H. Bristol, general superintendent of construction, has returned from a trip to Salt Lake City and other western points, where he was supervising the construction of new copper wires to the Pacific coast.

Mr. S. R. Crowder, electrician of the southern division at Atlanta, Ga., has been transferred to the office of W. E. Athearn, engineer of equipment. Mr. Crowder's duties consist in preparing plans for new offices, and any extensive changes in existing offices.

Mr. J. E. Jenkins, formerly inspector at New Haven, has been transferred to the New York main office of the company, as assistant to Mr. R. H. Morris, electrician.

A rearrangement of the executive offices is now being made. Several of the departments will be located on the fourth floor, which was previously occupied by Mr. George J. Gould. The Gould offices have been moved from this building to 165 Broadway.

The rooms in the main building, known as 195 Broadway, will be renumbered, each floor beginning with an even hundred.

E. J. Hall, chairman of the executive committee, will occupy room 400; S. M. Williams, special agent, room, 401; Colonel Robert C. Clowry, president, and F. J. Scherrer, assistant secretary of the company, room 402; Belvidere Brooks, general manager, rooms 403 and 404; John C. Willever, secretary, rooms 405, 406, 407 and 408. Room 409 is reserved for out-of-town officials of the company visiting in New York. The legal department remains in its old quarters on the fourth floor.

The fifth floor will be occupied as follows: G. W. E. Atkins, vice-president, rooms 500 and 501; Thomas F. Clark, vice-president, room 502; W. N. Fashbaugh, who has charge of the traffic, will occupy rooms 503 and 504; W. E. Athearn, engineer of equipment, rooms 505 and 506; R. E. Chetwood, engineer of construction, 507 and 508; C. H. Bristol, general superintendent of construction, and G. F. Sworthfiger, assistant general superintendent of construction, will occupy room 509. A. G. Saylor, general superintendent of the eastern division, and staff will remain in rooms 510, 511, 512, 513, 514 and 515. The agent of the building, Mr. A. O. Wallis, will occupy room 518.

The entire sixth floor, with the exception of the meeting room of the board of directors and executive committee, and room 602, which will be occupied by Vice-President J. B. Van Every, has been assigned to Mr. E. Y. Gallaher, auditor.

On the second floor rooms 202 and 203 will be occupied by the tax attorney's department. Mr. W. J. Dealy, superintendent of the commercial news department, will occupy room 204.

Arrangements are being made for the construction of one new copper wire between Chicago and Salt Lake, two new wires between Salt Lake and San Francisco, and one between Salt Lake and Portland, Ore.

RESIGNATIONS AND APPOINTMENTS.

Mr. P. E. Jones, of Portsmouth, Ohio, has been appointed manager at Springfield, Ohio, vice Mr. George R. Carter, who has resigned to become secretary of the Elk's home in that city.

Mr. A. H. Kohlhaas, manager of the office at Calumet, Mich., has been appointed manager at Miles City, Mont. Mr. John Gerhne has been appointed to succeed Mr. Kohlhaas at Calumet.

Mr. O. T. Welch, manager of the office at Council Bluffs, Ia., has been appointed manager at Lincoln, Neb., vice C. B. Horton, appointed assistant superintendent at Omaha. Mr. George Nicoll, formerly manager at Council Bluffs, but for the past two years chief clerk in the office of Superintendent Nelson, at Omaha, has been appointed to succeed Mr. Welch.

J. M. Stephens, Western Union Superintendent at Atlanta.

Mr. J. M. Stephens, who has been re-appointed to the position of superintendent of the Western Union Telegraph Company at Atlanta, Ga., is one of the best-known telegraph executives in the South, having been born in Canton, Ga., November 11, 1848, and having been employed in that section of the country during his entire telegraphic career. He entered the service at Kingston, Ga., in 1863, as



J. M. STEPHENS,
Superintendent, Western Union Telegraph Company, Atlanta, Ga.

messenger. Between then and 1867 he held various positions as an agent, operator and train despatcher on the Western and Atlantic Railroad. In the latter year he joined the forces of the Western Union, at Atlanta, as operator, and has resided in that city since that time. He displayed such ability that he was made manager of the Atlanta office, and in 1892, when there was a vacancy in the superintendency at that point, he was advanced to that post. This position he held until 1905, when he retired. Since then he has devoted all of his time to his extensive business interests in Atlanta. The reappointment of Mr. Stephens brings back to the service one of the most capable officials ever connected with the telegraph and the Western Union Telegraph Company is to be congratulated upon securing his acceptance of the position.

A. A. Patterson, Manager Western Union Telegraph Company, Bay City, Mich.

Mr. A. A. Patterson recently appointed manager of the Bay City, Mich., office of the Western Union Telegraph Company, was born in that city in 1882. He entered the telegraph service in his native town in 1897 as messenger. While thus employed he made such good use of his opportunities to learn telegraphy that the next year he became an operator. He was employed in Washington, D. C., for a short time in 1902, but soon returned to Bay City to accept



A. A. PATTERSON,
Manager Western Union Telegraph Company, Bay City, Mich.

a position as press operator. While serving in that capacity he copied the report for one year without a break. He was thus employed until 1907 when he became repeater chief in the Western Union office at Toledo. In March 1908 he went to Bay City to relieve Manager Cooper while the latter was enjoying a vacation abroad. Returning to Toledo in June of the same year he became wire chief in the Toledo office, which position he held until his present advancement. Mr. Patterson has throughout his entire career been a close student of the technical side of the telegraph operation as well as of the business features and consequently is well qualified to discharge the duties of the responsible position which he has now assumed.

W. W. Murphy, Western Union Manager at Chattanooga.

Mr. W. W. Murphy, who has been appointed manager of the Chattanooga office of the Western Union Telegraph Company as announced in our May 1 issue, is one of the youngest telegraph managers in the country to hold such an important position. It goes without saying that this is because Mr. Murphy has made the most of his opportunities to acquire a thorough knowledge of the telegraph business since he first entered the service at the age of

fourteen only twelve years ago. During the past two years, while holding the position of traffic chief at Atlanta, Mr. Murphy has made



W. W. MURPHY,
Manager Western Union Telegraph Company, Chattanooga, Tenn.

a host of friends in that city who are sorry to have him leave but all of whom unite in congratulating him upon his promotion to the more responsible position.

The Cable.

Mr. George Gray Ward, vice-president and general manager of the Commercial Cable Company, accompanied by Mrs. Ward, sailed for England, May 14, on the steamer Baltic.

Mr. W. Fenn, manager of the Direct United States Cable Company, London, has been spending a few days in New York after visiting the other stations of his company on this side of the Atlantic. Mr. Fenn, accompanied by his family, sailed for Liverpool, May 14, on the steamer Baltic.

The prohibition against the use of telegraphic codes in Turkey has been removed. Messages in cipher, however, will not be transmitted over the government lines.

The Brazilian Government has purchased a cable tug for use in repairing submarine cables in Rio Janeiro Bay. The new boat, which is ninety feet in length, and of 150 tons burden, will be equipped to repair cables up to a depth of 150 feet.

What is known as the Raymond-Barker system of inductive signaling was tried recently on the steamer Buccaneer while making a splice on an Atlantic cable off the coast of Ireland. Very satisfactory results were obtained, messages being exchanged between the ship and shore while the operation was in progress, and after it was completed until the cable was released. The distance between the ship and shore was sixty-six miles and the device would easily have operated a distance of one hundred miles.

It is expected that the new cable which is being laid by the Western Telegraph Company, between Ascension Island and Buenos Ayres, will be opened for business about May 25. The completion of this work involves the construction of about fifty miles of land line.

The new three-core cable which the Canadian Pacific Railway's Telegraph will lay between Vancouver, B. C., and Nanaimo is now on its way from England to Victoria, B. C., and will be laid sometime in June by the cable steamer *Restorer* of the Commercial Cable Company. The new cable is forty-five miles long.

The facilities of the trans-Atlantic cable companies were taxed to their utmost capacity for several days following the death of King Edward. Because of the general popularity of the late monarch the newspapers in this country made use of all the information concerning him that they could secure and as a result the cable traffic was enormous. Some of the papers received several thousand words in a single message.

Municipal Electricians.

Mr. Thomas Monaghan has been appointed superintendent of fire alarm telegraphs at Holyoke, Mass., vice Mr. John Castle resigned.

Plans have been completed for the new \$30,000 fireproof building which will be erected at Oakland, Cal., as headquarters for the fire alarm and police telegraph systems.

Mr. R. A. Smith, city electrician of Norfolk, Va., has just completed the installation of twelve new fire alarm boxes in that city.

Of 709 fire alarms answered in Houston, Texas, during the past year, 506 came by telephone and 203 came through the fire alarm system.

Bids have been received for placing underground fire alarm telegraph wires in certain sections of Brooklyn. Deputy Fire Commissioner A. J. O'Keefe of Brooklyn has asked for an appropriation of \$275,000 for this purpose and for the installation of about 200 new fire alarm boxes.

Mr. Frank P. Foster, of Corning, N. Y., secretary of the International Association of Municipal Electricians is busily engaged in preparing the plans for the fifteenth annual convention of that body, which meets at Convention Hall, Rochester, N. Y., September 6, 7, 8 and 9. An interesting and instructive program is being arranged for and it is hoped that there may be a large attendance.

An electrical typewriting telegraph system has been installed in Berlin for the use of the police department. From the central station at police headquarters messages may be transmitted simultaneously to all of 200 receiving stations distributed throughout the city and its suburbs. It is said that on an average 150 telegrams of thirty words each are sent each day from the central station, though on some days this number is doubled.

Willis H. Moore Upon Telegraph Weather Bulletin Service.

Mr. Willis H. Moore, chief of the United States Weather Bureau, took occasion recently to comment most favorably upon the telegraph service of this country for transmitting weather reports as compared with that of foreign countries. Mr. Moore stated that he had visited the meteorological bureaus of other countries, but had never found that they receive anywhere near as efficient telegraph service as given in the United States.

"When foreign meteorologists come here," said Mr. Moore, "they are amazed to find that through the efficiency of our service and the mutually helpful co-operation that exists between the operators and our observers we are able to gather the reports from our stations and deliver them at one hundred different important points in from forty to sixty minutes from the time that the messages are filed at the different stations. In Europe I have seen the reports straying in ten hours after the observations were taken, in fact, not reaching any central point in time to have the map constructed before the weather had arrived. From this it can be seen what it means to the Weather Bureau and the great commercial industries whose interests are so intimately related to the weather to have the character of service that we are now receiving and always have received."

Annual Reunion of Old Time and Military Telegraphers.

President William J. Lloyd, of the Old Time Telegraphers' and Historical Association, is busily engaged in preparing the plans for the twenty-ninth annual gathering of that body and the Society of the United States Military Telegraph Corps, which convenes in Chicago, September 8, 9 and 10. The headquarters of this reunion will be at the Auditorium Hotel and not at the Hotel La Salle as previously announced. President Lloyd is to be congratulated upon the selection of this fine centrally located hotel facing the lake. He and Colonel William Bender Wilson, president of the Society of the United States Military Telegraph Corps, will soon announce the various committees who will assist in arranging for the coming gathering. Mr. F. J. Scherrer, assistant secretary of the Western Union Telegraph Company, New York, is secretary of the Old Timer's Association, and David Homer Bates, 658 Broadway, New York, is secretary of the Military Telegrapher's Society.

The R. W. Martin Fund.

Since the report given in our May 1 issue, we have received \$5.00 from Mr. J. McRobie, general superintendent of the American District Telegraph Company, Chicago, to be applied to the fund for the assistance of the old time and military telegrapher, Robert W. Martin. This makes a total of \$623.25, which has been collected and turned over to Mrs. Martin.

The Telephone.

Mr. H. H. Brown, of Beaumont, Tex., has been appointed manager of the Southwestern Telegraph and Telephone Company, at Houston, vice Mr. E. G. Evans, resigned.

Mr. Morris Ruberg of the repeater department of the American Telephone and Telegraph Company, Philadelphia, was a recent New York visitor.

The stockholders of the Missouri and Kansas Telephone Company have voted to increase the capital stock of that company from \$5,000,000 to \$20,000,000.

Mr. F. W. Morris, superintendent of construction of the Bell Telephone Company of Missouri, has been appointed acting superintendent of plant to succeed to the duties of Mr. F. R. Mott, general superintendent, who has resigned.

The Elson Telephone Merger Bill allowing the consolidation of telephone companies in Ohio, which was passed recently in the House of Representatives of that state was defeated in the Senate.

The Iowa Telephone Company has voted to increase its capital stock from \$4,000,000 to \$10,000,000. At the end of 1909 this company had a total of 350,451 stations, an increase of 67,366 during the past year.

According to the annual report of the New England Telephone and Telegraph Company the number of stations belonging to that company December 31, 1909, was 263,583, an increase of 21,985 during the year. Including other companies whose lines connect with them the system of the New England company embraces 337,021 stations. The net revenue of the company for the year showed an increase of \$623,537 over 1908.

In addition to the new London-Paris telephone cable which is being laid between Dover and Cape Grisnez, preparations are being made for laying another telephone cable across the Channel to Belgium. The continental telephone cables have been so successful that the demand for their use has far exceeded anything that was anticipated. The new cable will contain four wires, giving two complete circuits, and will be laid between St. Margaret's Bay, Dover, and La Panne, near Ostend.

At a meeting of the stockholders of the New England Telephone and Telegraph Company, held in Boston, May 2, General Thomas Sherwin, who has been president of that company for the past twenty-five years, retired and was elected chairman of the board of directors. Mr. Jasper N. Keller, vice-president, was elected to succeed Mr. Sherwin, and Francis A. Houston, general manager, was made a vice-president. Mr. Keller and Mr. F. D. Fletcher were also elected directors of the company to succeed Mr. B. Jones and W. S. Hutchinson. It was voted to increase the number of directors from twelve to fifteen. The three new directors will be elected later.

It is now possible to communicate by telephone between Liverpool, England and Paris, Lyons, Brussels and other points in France and Belgium. When the loaded submarine telephone cable which will soon be laid across the English Channel is completed, this service will be greatly improved.

That the use of the telephone along the Pacific coast is increasing rapidly is indicated by a statement of the Pacific Telephone and Telegraph Company which shows between January and March an increase of over two per cent. in the total number of stations in service. The increase in San Francisco during that period was over three per cent. and 2,384 new contracts were taken in that city during March.

Mr. Frank B. Knight, the well known old-time and military telegrapher, now connected with the Southwestern Telegraph and Telephone Company, at Dallas, Texas, recently delivered an after dinner speech by telephone to a gathering of advertising men at Fort Worth. Each of the eighty-five guests at the dinner were provided with a desk telephone and at the appointed time, Mr. Knight, seated in his office thirty-five miles away, rang a small bell upon each instrument. The diners then placed the receivers to their ears and listened to Mr. Knight's address.

The American Telephone and Telegraph Company has applied to the State Good Roads Commission of Maryland for permission to lay underground conduits along the road between Baltimore and Wilmington, Del. This action is part of a plan to eventually establish an underground connection between Boston and Washington. The chief object of this is to prevent the recurrence of such a condition as existed on March 4, 1909, the day of President Taft's inauguration, when Washington was almost entirely cut off from communication with other parts of the country owing to a severe sleet storm breaking down the overhead wires.

Mr. H. P. Buehler, formerly general manager of the Central District and Printing Telegraph Company, Pittsburg, who was recently appointed auditor of the Bell Telephone Company of Pennsylvania at Philadelphia was before leaving for his new post, the guest of honor at a luncheon given by his former associates. Mr. A. C. Terry, district manager of the American Telephone and Telegraph Company at Pittsburg acted as toastmaster. Among others present were D. Leet Wilson, D. F. Henry, M. C. Rorty, J. H. Boeggeman, Springer H. Moore, F. T. Ewing, D. L. Thomas, J. A. Connell and D. J. Murphy.

An important amendment has been added to the Administration railroad bill, which has been passed in the House of Representatives and is now under consideration in the United States Senate. By this amendment the bill declares that the telegraph and telephone companies are common carriers thus placing them on the same footing as railroad and steamship companies and subject to the control of the Interstate Commerce Commission.

Radio-Telegraphy.

The Japanese Government has been making experiments in wireless telegraphy with a view of establishing a wireless service between Japan and Hawaii.

A mast 200 feet high for the aerial of a wireless station has been erected at New London, Conn., and the other equipment will soon be installed.

At a meeting of the Wireless Institute of New York, held May 4, Mr. Stanley M. Hills presented a paper on "High Insulators" in which he made a comparison of high insulators as to electrical resistance, resistance to heat, chemicals, etc.

The bill of Senator Frye of Maine, requiring ocean-going vessels carrying fifty persons or more to be equipped with wireless apparatus having a range of at least 100 miles, has passed the Senate.

A patent, No. 956,165, for electrical space communication, has been secured by G. W. Pickard, of Amesbury, Mass. Makes use of a plurality of conductor stations separated from the local stations with loaded line conductors connecting the conductor stations with the local stations.

Mr. C. C. Galbraith, vice-president of the United Wireless Telegraph Company has returned from a trip to England where he has made arrangements with the British postal authorities to have messages of his company from liners at sea transmitted to their destination through the government land stations.

Wireless stations will be on the lookout for atmospheric disturbances on May 18 when the tail of Halley's comet reaches its nearest point to the earth. Professor O. C. Wendell of the Harvard Observatory, however, believes that there is little probability of any interruption to the wireless service.

Because of the large number of amateur wireless installations the Chicago Board of Underwriters has issued a special circular relating to the wiring of wireless telegraph apparatus. All interior wiring must conform to the rules of the National Board of Fire Underwriters and certain additional requirements must be complied with concerning the grounding of the aerial and the provision of a lightning arrester for the same.

In a recent number of a French publication, there is described a new form of electrolytic detector which it is claimed possesses a high degree of sensibility. This detector consists of a small glass vessel containing in the bottom mercury in which pure tin has been dissolved. Above this amalgam there is a solution of sulphuric acid in water and the upper electrode is the same as that ordinarily used in this class of detectors.

There are two vacancies for the position of wireless engineer in the Government service in the Philippines at a salary of \$2,000 per year. A civil service examination will be held June 1 to secure candidates for these positions. At the same time an examination will be held to fill three vacancies in the position of wireless telegraph operator in the Philippines at a salary of \$1,200.

Contracts have been awarded to the Australian Wireless Telegraph Company for the construction of two high power wireless stations at Sydney, New South Wales and Fremantle, Western Australia. These are to be part of the chain of stations which will be established to connect the various British possessions in the Pacific and will have a guaranteed range of 1,000 miles.

The Continental Wireless Telephone and Telegraph Company has been incorporated with an authorized capital of \$5,000,000 for the purpose of operating a wireless service on the Great Lakes. It is said that the new concern has been formed by a consolidation of the Clark Wireless Telegraph and Telephone Company, the Pacific Wireless Telegraph Company, the Massie Wireless Telegraph Company and the Collins Wireless Telegraph Company.

At a recent meeting of the International Society of Electricians at Paris M. Tosi, who is one of the inventors of the Bellini-Tosi system of directive wireless telegraphy described some experiments made with that system at a station which has been established at Boulogne, France. It has been contended by some that the carrying distance of directive aerials is less than that of ordinary antennae for the same amount of power. M. Tosi, however, showed by his experiments that such was not the case but that the directive aerial has a greater carrying distance than the usual vertical antennae.

The Senate Committee on Commerce gave a hearing recently on the Depew bill regulating the use of wireless installations at which the amateurs were represented by W. E. D. Stokes Jr., president of the Junior Wireless Association and George Eltz. The United Wireless Company, the National Electric Signaling Company and the Marconi Wireless Company were also represented as well as the Government. As a result of the hearing the requirement for a license fee was eliminated from the bill and registration substituted. In the bill as reported to the Senate certain wave lengths are reserved for government use to protect important messages or distress calls. The Secretary of Commerce and Labor is authorized to make the necessary regulations to govern the use of wireless instruments. It is said that the private companies object to the bill because they believe that it confers too much authority on the Secretary of Commerce and Labor.

Storage Battery Practice.*

BY R. C. HULL.

When two plates consisting of peroxide of lead and pure lead respectively are immersed in a solution of sulphuric acid and connected externally by an electrical conductor, a current will flow from one plate to the other, and at the same time the composition of all the materials will change. When a current is passed through this combination in the opposite direction, it will tend to restore it to the original compositions. This combination is known as a storage battery. There are other combinations which fill these conditions, but on account of independent chemical reactions which occur, none have so far proved commercially successful.

The original lead storage battery was formed by passing an electric current through a lead couple immersed in dilute sulphuric acid. This current formed an oxide of lead on one of the plates, the other plates being unaffected. When these plates were connected by an electrical conductor the current would flow from one to the other. By frequent applications of current in alternate directions it was found that the oxide film was increased and a greater capacity could be obtained. With this as a basis numerous methods were adopted to increase the surface of the plates, and thereby their capacity; some of these methods consisting in cutting ribs, grooves, etc., the object being to obtain the greatest surface for the smallest weight of material. The storage battery evolved on these principles was known as the Planté type, named after the discoverer of the principle, Gaston Planté. Some time later Faure conceived the idea of making up a battery by pasting the active material on frames or grids. The active material of the positive plate was peroxide of lead, and of the negative plate was of some chemical composition, generally an oxide of lead, which was later treated to remove the oxygen, leaving a pure, spongy lead. This type of battery has a large capacity for its weight, and is extensively used to-day in automobile and other service where small weight is the great desideratum.

The chemical changes involved between discharge and charge are rather complicated, but the final states are as follows:

When lead is fully charged the active material on the positive plate is peroxide of lead (PbO_2), the negative plate is pure lead (Pb), and the solution is sulphuric acid (H_2SO_4), and water (H_2O). If the battery were completely discharged the active material on both plates would be of the same character (PbSO_4), the sulphur-oxide radical coming from the acid and reducing the density of the electrolyte.

The development of the storage battery in commercial use was attended by many difficulties,

and the evolution of the positive and negative plates now most extensively used was an interesting one.

It was found that the Planté type of positive plate could be surfaced to have an extremely high capacity at first, but when made of pure lead its life was comparatively short. Lead is a ductile material, practically inelastic, and any distortion of the plate due to changes in volume between the various stages of charge and discharge were non-corrective, the consequence being the well-known phenomenon of buckling. On the other hand, the Brush plate, non-homogeneous, would disintegrate, especially upon high charges and discharges. It was finally realized that in any positive plate a certain amount of the metal was necessary for mechanical support, and as a conductor of current, and it was decided to make this portion of the plate of a more rigid character. On this principle the Manchester plate was developed. This plate consists of a stiff lead-antimony alloy non-corrodible grid pierced by a number of circular holes slightly tapering to the centre, and in these holes are forced by hydraulic pressure spirals of pure lead tape corrugated to obtain surface. When the plate is formed—that is to say, when the surface of the pure lead is changed to lead oxide, the spiral button naturally expands and makes a tight connection to the grid. Any pressure in the plate is in a lateral direction, and the plate is so proportioned that this pressure only results in better contact, the amount of material not being great enough to affect the grid.

Another feature of the plate is that the electrolyte has free passage from one side to the other, thus doing away with the disastrous buckling and distortion due to unequal work on opposite sides of the plate, as is inherent to plates built up from solid sheets and retaining what is known as a central web, which is used in this latter form of plate for support and conductivity.

This unequal work can be best understood if we imagine a battery made up of a positive plate with a negative plate on either side. If this positive plate be of pure lead the change in its chemical condition is apt to distort it slightly. If we send an electrical current through the circuit composed of the two negatives and the positive, it is evident that the electricity will have two paths to travel. Now if through distortion or other reasons there is slight difference in distance between the positive and the two negatives, there will naturally be a flow of current greater to one side of the plate than to the other. If the plate has a central web, this unequal flow of current cannot be equalized, but results in one side of the plate being more highly formed than the other, causing further tendency to distortion. If, however, there is free passage from one side of the plate to the other, it is evident that the only effect of this unequal current would be formation deeper into the plate

*Extracts from a paper read before the Engineers Club of Central Pennsylvania.

from the direction of the greater proportion of current.

In order to avoid the disastrous results that accrue from the use of a plate with a central web, still another type of positive plate has been devised. This consists of a cast or rolled plate of pure lead having free conduction of the electrolyte from one side to the other. A certain portion of the plate is left solid, forming a grid for mechanical support and conductivity. A successful plate of this type is the Tudor plate, which is used by the Tudor Company, of Germany. The manufacture of this type of plate requires the greatest amount of care and experience to avoid buckling or distortion, due to growth or expansion in charging, which effects have been shown to be non-corrective on account of inelasticity of pure lead.

The pure lead negative is not subject to the buckling or distortion effects of the positive on account of the small difference in volume of the active material from full charge to full discharge. It was found, however, that no matter how great a surface was given to the plate, in a very short time this surface was largely decreased on account of the fact that the active material tends to crystallize in a solid mass. For this reason efforts were made to find a spongy material that would hold to its original composition. One of the most successful types of negative plates evolved on this line was the chloride negative, which consisted of a lead grid filled with sections of chloride of lead, this chloride being reduced into a spongy lead. This plate was in service for many years, and there are plants in service at the present time with the chloride negative that were installed nearly ten years ago. The chloride buttons were mechanically self-supporting, and it was realized that if there could be obtained a method of supporting a still more porous and spongy material that the capacity of the negative could be largely increased. On this basis was developed what is known as the box negative, which consists of a grid enclosing a number of sections of litharge or spongy lead oxide. On the outside of the grid are cast perforated lead sheets forming boxes holding the active material in position. The active material consists of the spongy, porous composition most necessary to the chemical requirements of the negative plate. It will be noted that the Manchester positive, the plate most in use to-day is an evolution of the Planté type, and that the box negative is an evolution of the Faure type, and inasmuch as the strength of a chain is only that of its weakest link, both of these plates are practically of equal importance in the storage battery.

In the design of a storage battery the greatest consideration must be given to its rigidity and ability to stand neglect and bad treatment. It is often placed in an out-of-the-way position, and necessarily cannot receive the constant attention and the intelligent supervision that can be given to it in a laboratory. From its nature, it is often-

times used as a reserve, and when it is needed it is needed badly, and is discharged oftentimes far beyond its rated capacity. It is the aim, therefore, of every manufacturer to make his product of a sufficiently rigid nature, capable of standing the strain and abuses incident to practical service.

In the application of the storage battery many problems are encountered, the great majority of them being those of current or voltage regulation. The basis upon which the engineer has to work is that with electrolyte of a density of 1.200 degrees, specific gravity 1.2, the difference in potential between the positive, or oxidized plate, and the negative or pure lead plate, is about 2.08 volts. When the cell is discharged this voltage will drop on account of polarization and internal resistance, and for the same reason the voltage will rise on charge. The amount of voltage change depends on the current put through the cell, and its percentage of discharge or charge. In regulating work this voltage change amounts to about 10 per cent. on either side. On peak discharge work the difference may be considerably greater, often amounting to as much as 20 per cent.

Where the current variations are slow, as in peak work, the discharge voltage of the battery may be kept practically constant by the introduction of extra cells as the voltage drops. In regulating work, however, the change from charge to discharge of the battery is so rapid that means have to be adopted to steady the voltage automatically. This has resulted in a number of ingenious systems of regulation.

A committee has been appointed by the Postmaster General of England to inquire into the prevalence and causes of telegraphers' cramp, which is so common in that country and to report upon means for its prevention.

A general demand among the people of Ireland for improvements in their telegraph service to England has been brought about in an unexpected way. In the opening debate in Parliament recently, on the Home Rule for Ireland bill, John Redmond, the noted Irish leader spoke for about forty-five minutes. Almost as soon as he had finished despatches giving his speech in full were filed in London by the correspondents of all the Dublin papers, and in the ordinary course of events they ought to have reached Dublin in about an hour. Only a few words got through that night at all, and the end of the speech did not reach Dublin until after five o'clock the next evening. A messenger leaving Westminster after the speech had been finished could have delivered it by hand in Dublin eleven hours earlier than it was delivered by telegraph. As a result of this delay there has been a demand made throughout Ireland for an investigation to see if the telegraph system can not be improved so that such long interruptions can not occur.

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May 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Regulation of the Telegraph and Telephone.

According to present indications the Administration railway bill which is now being considered in Congress will, when finally passed, carry a clause giving the Interstate Commerce Commission jurisdiction over the telegraph and telephone companies. Just what the effect of this will be to the interests concerned is not easy to predict. However, as we have previously contended in these columns, it is not likely that the national body will attempt any regulation which will seriously hamper the efforts of the managements of the various telegraph and telephone companies to improve their services and keep the business on a sound financial footing.

On the other hand there is a strong possibility that the new arrangement may be of great value in promoting a feeling of good will between the public and the companies. The Interstate Commerce Commission has many times proven of service in settling differences of opinion between railroads and those who make use of their facilities. Hundreds of cases are submitted to them

every year which otherwise would have to be carried to the courts or in which the complainant would have no redress whatever. This body is composed of able and unprejudiced men and their decisions are almost invariably accepted as fair and just. As a result the feeling of the public toward these public service corporations is much more friendly than it would be if this means of arbitrating disputes did not exist. There is no reason why the same condition should not prevail if the jurisdiction of this commission is extended to cover the wire operating interests as well. The majority of the higher officials of these companies will not only be willing to have the management of their systems investigated by a national commission whenever such inspection is required but will be glad to assist the investigators by every means in their power.

When a man feels that he has a grievance against a public service corporation and goes to the officials of that company for redress, if they are unable to comply with his desires, it is almost impossible for them to satisfy the complainant that he is receiving justice. If, however, a third party who is known to be entirely unprejudiced can be called in to settle the difference the aggrieved party will generally be satisfied whether the decision is entirely favorable to him or not.

We believe and have frequently asserted that the telegraph is as economically administered as it possibly could be under existing conditions. The rates are as low as they can be and leave a reasonable profit in the handling of messages. There should be little difficulty in proving this fact to a disinterested body of men, hence there is little fear that the Interstate Commerce Commission will require any reduction in rates which conditions do not justify and which the companies would not make themselves as soon as they were able. The fact that the existing rate has the stamp of approval of an unprejudiced commission will go a long way toward convincing the public that it is just and that they are getting full value for their money in service rendered when they send a message.

From another standpoint also this widening of the powers of the Interstate Commerce Commission is most desirable. There is now a bill pending before the Legislature of New York State and which will probably be passed by that body placing the telegraph and telephone companies operating in that State under the control of the Public Service Commission. Similar action has recently been taken in Maryland and attempts are being made in many other states to control these two utilities. There being no uniformity, however, in the action taken in the different states such efforts naturally lead to much confusion and little good can be accomplished in this way. The Public Service Commission of New York as well as similar bodies in other states have without doing the corporate interests

any injustice been of great service to the public in dealing with local problems connected with street railways and other concerns operating only within the state limits. For a business like that of the telegraph and the telephone, however, which is essentially interstate and national in its character the outside control, if any is needed, should logically be in the hands of a national commission.

The Damage Suit Industry.

Attention has been called recently by a publication in one of our Southern cities to the great number of damage suits which are continually being brought against public service corporations, few of which have any just claim as a basis. In commenting upon the condition of affairs the journal in question says:

"Four mental anguish cases were docketed for trial in the Court of Common Pleas during one week recently. These were suits for damages against a telegraph company for failure to deliver telegrams promptly or something of the kind.

Each case was non-suited. That is, each case was thrown out because there was not sufficient evidence for it to go to the jury.

"The telegraph company was put to a large amount of unnecessary expense. They had to prepare for trial in each case, and bring to court a number of witnesses from various parts of the country, some of them their higher salaried employees. The telegraph company had to expend several hundred dollars in each case, and yet each one was so lacking in merit, in the opinion of the presiding judge, that it could not go before a jury.

"It does seem that some way should be devised by which the telegraph companies, and other corporations or individuals, could be protected against impositions of this kind. Some limit or restriction should be set against the filing of useless damage suits.

"The thing ought to be checked because, if for no other reason, the practice of bringing suits upon flimsy excuses tends to work against the plaintiffs in bona fide damage suits. Public sentiment can become so disgusted with the damage suit industry that a legitimate damage suit would be injured by an outraged public feeling."

There is much truth in what this writer says. The telegraph companies, as well as every other public service corporation, have to employ a large amount of legal talent to defend themselves from actions which are brought against them for the most trivial causes. Indeed it would probably surprise most people if they knew how large a part of the companies' earnings have to be expended for this purpose.

The majority of claims having any substantial basis are settled without going to court, which procedure is usually greatly to the advantage of all parties concerned. There are plenty of lawyers, however, who are willing to take up any possible cause for action on the very remote chance of their client

being allowed damages, in which case the attorney will receive a substantial portion of the amount awarded. If they lose, their client pays the expenses and the attorney's only loss is his time.

This is a state of affairs which has grown to a great extent during the past few years, and the number of such actions seems to still be on the increase. The remedy does not seem easy to find. Any legislation dealing with this matter would have to be most carefully prepared in order to strike at the root of the evil and not work an injustice to anyone. There must be a fault, however, somewhere in our system of jurisprudence which allows such a tendency to continue unchecked, and the sooner our lawmakers take cognizance of this and remedy the situation the better it will be for the country at large.

Increase in Night Letter Telegrams.

The public has supported the night letter telegram system so substantially ever since its first introduction that it is now conceded by all interested that this is a feature of the business that has come to stay. As we predicted when it was first put into effect, many uses have been found for the night letter telegram which were not even thought of by the originators. One Chicago concern sent out in one night 1,000 fifty-word telegrams, advertising their products. The results were so satisfactory that it is said they will send out 10,000 more similar telegraph letters in the near future. Many brokers who are accustomed to send out daily market reports to customers throughout the country, are using the night letter telegrams for this purpose. On one night recently two New York business houses sent 4,200 and 4,400 night messages respectively. An Indiana manufacturer discovered one night that a mistake had been made in about fifty invoices which had been mailed that day and he immediately sent out night letters to head off the invoices and correct the mistake. In a telegraph office in a small southern city where one operator would ordinarily handle all of the night business without any difficulty, 500 letter telegrams were filed recently in one night. These are only a few of the instances in which business men are taking advantage of this system for various purposes and there is every indication that the traffic will not only continue to be as large as it is at present, but will steadily increase.

A fine incentive to messenger boys to work for promotion is found in the Houston office of the Postal Telegraph-Cable Company of Texas, of which Mr. J. D. McLelland is manager. The portraits of Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company, and of Mr. S. M. English, president and general manager of the Postal Telegraph-Cable Company of Texas, hang side by side. Under Mr. Nally's picture is inscribed the following: "Started as a messenger in St. Louis in 1875." Under Mr. English's: "Started as a messenger in Mobile, Ala., in 1874." Under both is written: "There is no office in this work too high for a messenger boy to attain."

The Military Telegrapher in the Civil War.

PART XXXIX

Mr. L. W. Wortsman who now resides at Savannah, Ga., served in the Military Telegraph Corps in South Carolina during the latter part of the Civil War. As most of the sketches which we have published of the experiences of military telegraphers have been written by those who served in other sections of the country the following account which Mr. Wortsman has written at our request of his military career will be of especial interest showing as it does to some extent the part played by the telegraph in South Carolina:

"I learned telegraphy in 1861 on the line of the Cuba and West India Telegraph Company using a Bain instrument. I entered the service of the United States Military Telegraph Corps in March 1864, being first employed under Cap-



L. M. WORTSMAN, SAVANNAH, GA.
Member of United States Military Telegraph Corps.

tain L. F. Sheldon at Hilton Head, S. C. Later I was transferred to Beaufort, S. C. I was next ordered to General Schimmelfenig's headquarters on Morris Island and was there made chief operator of the northern district of the department of the south under Captain James R. Gilmore who was superintendent of the military telegraph in that department and who is now living in retirement at Chambersburg, Pa.

"I was at Fort Wagner, S. C., during the bombardment of Charleston. We were under continuous fire and had to do our telegraphing in bomb proofs inside the fort while the 'Swamp Angel' was sending shells into Charleston and the batteries on Johnson Island, Fort Moultrie and Fort Sumpter were returning the fire.

"I was on duty at Fort Wagner when Charleston was evacuated and Captain Bennett and myself were the first to enter that city. We found the city on fire in several places and vessels in the harbor were being blown up. We took possession of the telegraph office and cared for the

operators of whom we found about fifteen. I opened an office temporarily in the citadel until I was transferred to General Hatch's headquarters. An office was then opened on Meeting Street near the Battery and this was the headquarters of the Military Telegraph Corps until all of the lines, etc., were turned over to the telegraph company.

"Soon after I was ordered to superintend the reconstruction of the telegraph lines in the state of South Carolina. I had for this work about one hundred enlisted soldiers besides civilians and a few telegraph linemen. The repair of the lines was no easy task as there was but little railroad left for us to travel on and most of the material had to be transported by wagons. Far the most trying duty, however, was the rebuilding of the line from Charleston toward Savannah, Ga. This ran through low lands and marshes and of a force of forty-five men that were engaged in that work, only about ten escaped an attack of fever. In many cases this proved fatal. I myself was sick for nearly a month. I remained in charge of the lines in the northern district of the department of the south until they were turned over to Mr. J. A. Brenner, superintendent of the American Telegraph Company and later of the Western Union Telegraph Company. Mr. Brenner died about a year ago.

"After my discharge I went to Europe and saw some of the Franco-Prussian War. Returning to the United States in 1871 I joined the forces of the Southern and Atlantic Telegraph Company, superintending the construction of their lines. I was manager of their offices at Savannah, Charleston, Macon and other places. After the consolidation of this company with the Western Union in 1875 I went to New York and worked in the telegraph department of the Pennsylvania Railroad and for the New York Transfer Company. In 1878 I left the telegraph service and moved to Savannah, where I have since resided."

Mr. William H. Wilson, who was one of the younger operators in the military telegraph service in writing in 1878 to Colonel William R. Plum, historian of the United States Military Telegraph Corps gave the following sketch of his military experiences:

"I was born at Marietta, Washington County, Ohio, February 15, 1847, and entered the military telegraph service April 22, 1863, at the age of sixteen. I learned the business while a messenger boy under Henry C. Vincent at first and afterwards under J. Wesley Ellsworth.

"When I first entered the military service I was in Captain T. B. A. David's department and was operator at Camp Piatt, W. Va., nearly all of that summer, only leaving there twice until I returned home that fall.

"During the summer I relieved Mr. G. H. Curtiss, at Gauley Bridge, for a few days and was at Charleston, Brigadier General E. P.

Scammon's headquarters for about a week, during Mr. C. J. Thomas' absence at the front. Returning home I was in a short time ordered by Captain Samuel Bruch at Louisville, Ky., to report to the chief operator at Lexington, Ky., and I did so at once and was ordered by him to report at General Burnside's headquarters.

"I overtook General Burnside at Crab Orchard, Ky., and as there was to be an office established there, I was appointed manager, and held that position until the latter part of December, 1863, when I was relieved by Mr. J. W. Sampson. I again returned home and remained there until May, 1864, when I enlisted as private in an Ohio regiment. Our regiment went direct from Marietta, Ohio, my home, to Harper's Ferry, W. Va., where we did guard duty for a few days and were then sent to the Army of the James. A day or two after arriving at Bermuda Hundred, Va., I was detailed and again entered the military telegraph remaining a day or two at Bermuda Hundred and then going to Major-General B. F. Butler's headquarters.

"I worked there for some weeks and was then sent to the Bermuda 'Front' office relieving Mr. Maynard Huyck. I remained there but a short time when I was ordered to the 'Jones Neck' office relieving Mr. W. S. Logue. Not long after taking charge there the office was moved across the James River to Deep Bottom, General R. S. Foster's headquarters. During the summer I accompanied General W. S. Hancock on a reconnoissance crossing James River at Deep Bottom and advancing several miles in the direction of Richmond but the enemy were too strong for us and after a few days of hard fighting we were obliged to recross the river. I remember the night we fell back very distinctly. I was instructed by General Hancock to take my instrument and go to the river and open an office at the pontoon bridge. I cut out, jumped onto my horse and made for the river. By the time I reached there it was after dark, perhaps eight o'clock, and raining hard. I had no tent but after a search I found an empty hard tack box, then cutting the wire and running it down through the branches of a small sapling and laying the box on its edge and putting my instrument inside to keep it and my paper dry, I soon had an office open. I dug a hole for a ground wire with my pocket knife. It was telegraphing under difficulties as I had to spread a blanket on the ground and lie flat and reach inside the box to copy. However, the office did good service for two or three hours, being in communication with General Grant at City Point and receiving instructions and reporting movements.

"During the summer the colored troops of the 10th and 18th corps were put into a corps by themselves and the command given to Major General G. Weitzel and I was appointed manager at his headquarters where I remained until the 28th of March, 1865. At first I was assisted

by Mr. Edward Mason of Maryland, who died in Augusta, Ga., in 1867, afterwards by Mr. Frank Davis, of Williamsport, Pa., who was detailed from the ranks of a Pennsylvania regiment. The operator at our extreme right in the Army of the James was Mr. John A. Torrance, since known as the 'lightning' operator, at this writing a lawyer and operator in Wheeling, W. Va. Upon the 28th or evening of the 27th of March I heard Mr. Richard O'Brien, our chief operator send him a message to report for duty at the headquarters of the sixth army corps, Army of the Potomac. I persuaded him to let me go in his stead and the next day he came to the twenty-fifth corps and I went to the Army of the Potomac. By this trade, Torrance got into Richmond first and I witnessed the surrender of Lee's army at Appomattox Court House.

"Our force at the sixth corps headquarters consisted of Mr. W. N. Embree, chief operator, John Smith and myself assistants and John Ingle at the signal tower. We accompanied the corps on the march after Lee's retreating army and were eye witnesses of the last battle fought by the Army of the Potomac at Sailors' Run, April 6. After the surrender the corps returned and went into camp near Burkeville Junction, Va., where upon the morning of April 15 I heard of the assassination of President Lincoln. I had been over to the cook tent before breakfast and as the meal was not quite ready, I returned to the office, a tent near General Wright's headquarters. While sitting there I heard a message from General Grant to General Meade announcing the assassination. I copied it, my pen trembling so I could scarcely hold it and then went back to the cook tent and called Embree aside and showed it to him. He thought I was joking but my nervousness and looks convinced him it was anything but a joke. We said nothing of it to any others until it was officially announced in a telegram from General Meade soon afterwards. After remaining at Burkeville the corps was ordered to Danville, Va., and the telegraphers proceeded along the line of the railroad taking charge of the offices, instruments and operators. We had a pleasant time on that march, the country being clear of Confederates we could ride off the line of march as far as we pleased without fear of Libby or Andersonville prisons before us.

"I remained in Danville until about the middle of June when I was ordered to Petersburg where I remained until the military telegraph became a thing of the past.

"I cannot close this without referring briefly to one of my assistants while I was at Deep Bottom, viz: John A. Sheridan of Brooklyn, N. Y., as noble hearted a boy as ever fingered a key, a good operator and genial companion. He was stationed at Burkeville Junction after the surrender and along in July, I think it was, we received a message at Petersburg that he was

very ill. It appears that he had a congestive chill early in the morning and never received one particle of medical attention although the surgeon was sent for several times during the day. Mr. Lester Painter who was with him is my authority for this statement. Towards evening he became unconscious and died at 7 p. m. We had his body brought to Petersburg and embalmed and placed in a metallic case and accompanied by Mr. Painter the remains were forwarded to his widowed mother. John D. Tinney, manager at Petersburg, and myself assisted the surgeon in embalming the remains."

More Facts Regarding the Death of D. B. Lathrop.

Editor Telegraph and Telephone Age:

Since my return from an extended absence in the West, I have read with interest the statements in the "Age" of April 1, regarding D. Brainerd Lathrop and his untimely death at Yorktown. I enclose copy of a letter written by myself at that time which may be of further interest, although you appear to have secured all the facts, and perhaps consider the incident closed and may not care to use it.

In further reference to the subscription for a monument; In reading the statement of Mr. Andrew Schnell in which he says, "He turned the money which he collected, together with the list, over to someone in General Eckert's office at Washington," it recalled to my mind that I had received them from someone while I was in the War Department, but when, or from whom, I cannot remember. Sometime after, however, I wrote to Mr. J. D. Reid, editor of "The Telegrapher," stating the facts and requesting advice as to what disposition should be made of them. I believe he published the letter, but as far as I can now remember, I received no response to the communication, either from himself or anyone interested. I kept the money, and subscription list in the envelope handed me, in my strong box with other valuable papers of my own, when I left Washington in 1872 for Vermont, and thence to Chicago in 1875, thence to Baltimore in 1879, thence to New York in 1882 and thence to Brooklyn in 1883, where I have since resided. I am confident they were still in that box when in May, 1891, I broke up housekeeping and stored all of my household effects, not required for domicile in a suite of rooms at the hotel where I subsequently resided. In packing for removal, I also placed in the box the sets of silver which had been presented to me by my fellow employees in the Washington office, and the Baltimore and Ohio Railroad Telegraph service. In February, 1892, the storehouse, supposed to be fireproof, was burned and everything in store was destroyed. I have searched my records without avail and I do not remember ever having

seen or having had further knowledge of the Lathrop papers after I left Washington, until reading the statement of Mr. Schnell, and I can only account for it by the pressure of duties and other matters involved in the numerous changes in positions and locations herein noted, which wholly engrossed my mind without incident to revive my recollection of them.

Recognizing my personal responsibility for the money involved in accepting its custodianship, I shall gladly contribute an equal amount, which, as near as I can remember was \$50.00, and add to it a further contribution toward the object for which Mr. Schnell states he started the subscription, should surviving members of the United States Military Telegraph Corps desire to renew the effort.

Very truly yours,

Chas. A. Tinker.

Brooklyn, April 30, 1910.

The letter enclosed by Mr. Tinker which was written May 4, 1862, after relating the thrilling scenes incident to the evacuation of Yorktown by the Confederates gives the following account of the death of Operator Lathrop:

"In all the line along our front I have heard of but one casualty in the occupation of the enemy's works, and I am sorry to be obliged to say it befell a member of our corps. Brainerd Lathrop, one of the eight operators who came down on the Steamer 'Commodore,' went out early this morning from General Porter's headquarters, where he has been operating, and strolled into Yorktown with another operator, Smith, who has been with me here until yesterday. As they were passing along a road leading into the town, Lathrop stepped on to one of the torpedoes, which the Confederates laid for murdering our troops, and it exploded, tearing off his left leg near the hip. He lingered till 4 p. m. when he died, unconscious from the moment he was injured. Smith was three feet in advance of him, and was knocked down by the concussion but not injured. Lathrop's body is to be embalmed and sent home to his friends in Springfield, Ohio. His was a sad end. Our troops have been very cautious in taking possession of the town for fear of something 'infernal' there. A man was taken prisoner to-night who acknowledges he helped bury all of the torpedoes. To-morrow he has to go under guard and dig up every one of them and I don't know but he may be made to tread on the last one."

"The Practical Management of Dynamos and Motors," by F. B. Crocker and S. S. Wheeler, as indicated by its title, affords a clear understanding of the use, care and operation of these important adjuncts of the well equipped modern telegraph office. There is a constant demand for this book, for telegraphers find it an invaluable addition to their working library. There are 206 pages, and 90 illustrations; price, \$1. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

For Neutralizing Induction in Telegraph Circuits.

Mr. Minor M. Davis, electrical engineer of the Postal Telegraph-Cable Company, New York, has recently been granted two patents for means for preventing the harmful effects of induction from high tension alternating current transmission systems, upon parallel conductors used for signaling purposes such as telegraphing. The first one of these No. 955,141 consists in placing an idle conductor in close proximity to but insulated from a conductor connected in a signaling circuit so that both of these conductors are subject to the induction from the disturbing source, and are affected to the same extent, but the idle conductor will re-act on the circuit conductor and this re-action is adjusted so as to compensate or neutralize the action of the disturbing source on the circuit conductor. Stated specifically a positive impulse in the disturbing conductor induces a negative impulse in the circuit conductor and the idle conductor, the negative impulse in the idle conductor re-acts tending to generate a positive impulse in the circuit conductor. By varying the constants of the idle conductor that is, the resistance or capacity or both, the impulses from the idle conductor may be made to counteract the disturbing impulses in the circuit conductor.

This scheme is especially applicable to wires in cables which parallel high tension systems. The conductors in the cable consist of two groups arranged parallel and insulated from each other. The wires of one of these groups are used for signaling purposes and the other group of wires which are known as idle conductors and which are substantially like the active conductors are all connected together at each end. At one end they are connected to ground through a variable resistance and at the other end through a variable capacity.

With this arrangement a positive impulse in the high tension line induces a negative impulse in all of the conductors of the cable. If the resistance and capacity of the idle conductors is properly adjusted this negative impulse will be so proportioned in its effect upon the active conductors as to neutralize in that wire the inductive impulse of the disturbing conductor. The idle conductor does not need to be as long as the active wire but by establishing the constants of the idle conductors, that is the resistance, or capacity, of said conductors at a determinable point an effect is produced that is efficient to compensate for the effect of the disturbing cause on the active conductors.

The second patent, No. 955,142 consists in neutralizing induction in parallel conductors by employing as a conductor the metal sheath of the cable inclosing the signaling conductor or conductors and a parallel compensating conductor, subjecting all of these conductors to the same inductive influence, and causing the induced im-

pulses in said compensating conductor to re-act upon the signaling conductor to substantially an equal and opposite extent as compared with the disturbing cause.

Where there are one or more insulated conductors in parallel relation, connected in circuit with signaling apparatus in the ordinary manner, substantially parallel with these conductors, as in the same cable, are one or more compensating conductors; these are connected in a circuit susceptible of conveying induced impulses, and for this purpose there may be used a ground return circuit, or the circuit may include a condenser in series, or otherwise. One coil of a transformer is connected in this circuit and the other coil of the transformer is connected in circuit with a conductor arranged parallel with the disturbing source, at any suitable distance therefrom; for this purpose there may be used a separate conductor or the metal sheath or armor of the cable included in a compensating circuit may be used, and the transformer is so adjusted that the compensating conductors will develop a source of alternating current having an electromotive force efficient to compensate for the inductive effect of the disturbing source. If the disturbing source extends parallel to the circuit conductors for a comparatively long distance there may be one or more compensating conductors arranged substantially parallel with the signal circuit conductors for a much shorter extent but the electromotive force, intensity or current strength is increased, graduated or adjusted so as to compensate and neutralize the effect of the disturbing cause in the circuit conductors.

Cable Repair Steamer, Robert C. Clowry, Placed in Commission.

The new cable repair steamer, "Robert C. Clowry," which was built during the past year for the Western Union Telegraph Company, has recently been completed and placed in commission. The new vessel is one hundred and fifty feet long and has a thirty-two foot beam. She is painted parlor car green with black trimmings and presents an attractive appearance. Her tonnage is 532 and her equipment is such as to enable her to repair ocean cables in any depth found between New York and Nova Scotia.

Captain Olmstead, who commanded the old cable tug "Western Union" for many years, is sailing master of the new vessel, and the electrical equipment is under the supervision of Alexander Kline, who will have charge of the operation of the boat. The cable laying and picking up apparatus and electrical equipment installed is of the latest design. The boat will carry a wireless telegraph outfit and will thus be enabled to keep in touch with the shore at all times while on repairing expeditions.

The builders trial trip took place on March 16 and was satisfactory to all concerned, and the boat is now the property of the Western Union Telegraph Company.

Disturbances to Telegraph Lines Due to Single-Phase Electric Traction.

In a recent number of the *Journal Télégraphique*, published by the International Bureau of the Telegraphic Union at Berne, Switzerland, M. Muller, chief inspecting engineer of the Swiss government railway telegraphs, gives some interesting observations on the effect upon the telegraph lines of introducing single-phase electric traction upon a section of one of the railroads of that country. The voltage used on the high-tension system was 15,000. The wires of the power system and the telegraph lines paralleled each other for a distance of about twenty kilometres and the distance between the two varied from 2.25 to 7.5 metres, averaging about 4.8 metres. When electric traction was first introduced there were nine stations working in series on the line between the two terminal points and the operating current was about ten milliamperes.

The disturbance to the telegraph line began as soon as the high voltage was thrown on to a part of the power system. This consisted of a vibratory movement of the armatures of the relays and these vibrations destroyed the clearness of the signals, they being cut off abruptly. By a close adjustment of the apparatus they were able to obtain on a recording tape a succession of points the frequency of which corresponded to the periodicity of the high-tension system. The amplitude of these vibrations increased as the power line was extended.

The first electric locomotive used was provided with converters which changed the fifty-cycle alternating current to direct current for operating the motors. This system was soon replaced by one which used for its motors fifteen-cycle alternating current. This change which was injurious to the telephone lines because of higher harmonics produced on the line by the induction motors did not produce any appreciable effect in the telegraph circuit. Because of the inertia of the armature the amplitude of the vibrations would naturally be greater when a fifteen-cycle current was flowing in the magnet coils than when one of fifty cycles was flowing therein. However, as the disturbance was caused by an electrostatic effect on a conductor connected to earth, in which case the charging current varies inversely as the frequency the strength of that current was not more than thirty per cent as great, with the fifteen-cycle transmission, as it was with the fifty-cycle system. For that reason the disturbance was not increased when the fifteen-cycle system was put into service.

It was proven by the following facts that the disturbance to the telegraphic service was not caused by magnetic induction or by stray currents, but rather by electrostatic induction:

The disturbance commenced when the voltage was first thrown onto the high tension line and when no current was flowing therein.

It was independent of the position of a train along the line and of the load of the train.

It was most pronounced when one end of the line was not connected to earth; that is, when the telegraph circuit was open.

Foreséeing the impossibility of insuring service when the telegraph wire would be exposed to the electrostatic influence throughout its whole length a second line was built. The instruments connected in series were equally distributed on the two conductors, which were transposed once between each station.

When the high-tension line was thrown into service throughout its entire length the disturbance commenced again stronger than ever. It was at first thought to be due to faulty insulation, but that not being the case it was found necessary to look elsewhere for the trouble. The difficulty was soon discovered to be due to the capacity of a cable in the line about four and a half kilometres in length. When this was cut out and a loop formed around it the trouble immediately ceased. The static charge on the line was 580 volts without the cable and 280 volts with the cable. An ammeter placed in the line before it passed through the cable indicated a current of ten milliamperes. The instruments located near this cable were influenced the most. Under these conditions the only apparent remedy was the connection of the instruments in parallel. To do this it was necessary to change the windings of the magnet coils; to give them instead of 15,000 turns and a resistance of 500 ohms 30,000 turns and a resistance of 10,000 ohms. This high resistance was necessary in order to reduce to reasonable limits the drop of voltage in the line and thus secure an approximate uniformity in the strength of current in the different instruments without changing the strength of the batteries. The currents resulting ranged between three and a half and five milliamperes. When this arrangement had been made the disturbance disappeared entirely. This connection made it possible to discharge the line easily either by condensers or by grounding the neutral point of the relays. The first means was used in the beginning, but was afterward abandoned in favor of the second on account of the condensers being frequently punctured by atmospheric discharges.

The Difference between Success and Failure.

"I have watched the careers of young men by the thousand in this busy city of New York for over thirty years," said the late Dr. Theodore L. Cuyler, "and I find that the chief difference between the successful and the failures lies in the single element of staying power. Permanent success is oftener won by holding on than by sudden dash, however brilliant. The easily discouraged, who are pushed back by a straw, are all the time dropping to the rear, to perish or to be carried along on the stretcher of charity. They who understand and practice Abraham Lincoln's homely maxim of 'pegging away,' have achieved the solidest success."

The Wright Printing Telegraph.

Mr. John E. Wright of New York has been granted a patent, No. 954,489 for a printing telegraph system which includes several improvements over former patents which he held.

The instrument as a whole comprises several mechanisms which may be regarded in a sense as independent instrumentalities co-operating to the one general purpose of the machine. The most important of these are the type-wheel and its immediate accessories; the means for rotating the type wheel; the means for raising and lowering the same; the means for shifting the type-wheel from the position to which it has thus been brought so as to bring the next adjacent character into the printing position; means for printing any character when brought into position; and the means for effecting the various feed movements required in the operation of the machine. The type wheel is in the form of an elongated cylinder having five horizontal rows of characters with ten characters in each row. This is mounted on a vertical triangular, knife edge spindle bearing at its lower end a pinion which meshes with a bevel gear mounted on a horizontal, triangular knife edge driving shaft. The type-wheel carriage is movable laterally but the bevel gear which drives the type-wheel spindle moves on its shaft, along with the carriage and by this means a movement of rotation may be imparted to the type-wheel, no matter what the position of the carriage. The shaft on which the bevel gear is mounted is driven by impulses communicated through a suitable mechanism, from the movement of the armature of a polarized magnet. Each impulse communicated to the driving shaft turns the type-wheel through an angle which includes two adjacent characters. The type-wheel therefore has five positions around its vertical axis, one of which it occupies normally and to any other of which it may be rotated by not more than four impulses of current through the polarized magnet. Thus by each back and forth movement of the armature of the magnet one of a pair of characters will be brought to the printing position. Special means is provided for shifting the type-wheel independently of the driving mechanism for presenting the other character of any given pair at the printing position when it, and not the one normally presented, is to be printed.

The type wheel carriage which is supported on suitable transverse guides engages with and works on a worm or screw so that the rotation of the latter causes the carriage to advance. At the bottom of the type wheel there is a small wheel with star teeth arranged so that each space corresponds to a vertical column of characters. In the plane of this wheel there is a plunger provided with a pointed head that exactly fits into the spaces between its teeth. After the type wheel has been moved to the printing position this plunger is advanced so that its head enters

the adjacent space between the teeth of the small wheel. If the type wheel has not been turned to quite the correct position required for printing the head of the plunger will turn the wheel until the head and notch fit exactly whereupon the desired character will be in the exact printing position and will be firmly held there during the operation of printing.

The type-wheel is supported by a plate or bar which in turn is mounted on a vertical rack bar which meshes with a pinion mounted on the carriage but surrounding and sliding on a triangular knife edge shaft which imparts motion to it. Thus no matter what the position of the carriage a rotation of the shaft on which this pinion is mounted will raise or lower the type-wheel. By a mechanism, similar to that which causes the type-wheel to revolve, the shaft just mentioned is made to revolve and raise the type-wheel one step for each impulse of current which passes through the coils of a magnet. The two mechanisms are so arranged that the operations of turning the type-wheel and raising it may be performed at the same time. The type-wheel is, after each impression, automatically restored to its normal or lowest position.

After each impression made on the paper the carriage is automatically advanced to the next printing position. The operator has the means at his disposal to return the carriage to its starting position to begin a new line at any time he desires. At the same time the paper is automatically carried forward the space necessary for one line.

The main shaft of the instrument is driven preferably by an electric motor which is geared to it with provision for frictional or slipping engagement between the two. The application of the power to the instrumentalities comprising the machine is controlled by the action of electromagnets. The mechanism for causing an impression to be made on the paper is brought into operation by the rotation of the main shaft. A cam upon this together with a series of suitable links causes the printing platen to be thrown forward, with each revolution, carrying the paper with a quick blow against the type-wheel and causing it to receive an impression. This happens every time that the carriage is shifted so in order to leave a blank space between words one of the type spaces on the wheel is left blank. Each complete cycle of operation of the instrument involves a single rotation of the main driving shaft. This is normally locked but at the proper time is released so that by frictional engagement with the source of power it may turn to perform one or more of the functions necessary for the operation of the machine as a whole.

The transmitter is constructed to send out over the line impulses of either positive or negative current of greater or less duration in a certain predetermined order of succession. At the receiving end three magnets are in series with

the main line. Two of these are polarized, one which is affected only by positive impulses brings about the desired adjustment horizontally of the type wheel, the second which is affected only by negative impulses accomplishes the necessary vertical adjustment of the type-wheel. The third magnet which is not polarized is for the purpose of closing a local circuit, a magnet in which releases the locking mechanism of the main line shaft and thus effects the printing and other automatic operations. The magnet in the local circuit is sluggish in its action and as this circuit is alternately opened and closed as impulses are sent over the line the short positive and negative impulses which perform the other operations are not of sufficient duration to keep this circuit closed long enough to operate its magnet. As soon as the impulses cease, however, the local circuit is automatically held closed long enough to operate its magnet and the operation of printing is performed. The same action takes place if the last impulse is prolonged. By the means so far described only one-half of the characters in any row can be brought to the printing position. In order to print any character of a pair adjacent to that which has been brought to the printing position special means is provided for shifting the type-wheel backward a distance equal to the space occupied by one character. The mechanism which operates this is controlled by the tongue of the armature of the third relay in the main line circuit. When in its central position this tongue prevents the wheel from being moved forward the space desired. If, however, the last impulse sent to adjust the type wheel is of longer duration than the usual impulses the armature tongue of the relay is held over to one of its extreme positions long enough to allow the type-wheel shifting mechanism to operate. The order in which all of the operations described will be performed is predetermined by the configuration of the various operating cams. In general, however, the bringing of the type-wheel into position for printing precedes all other operations. This is followed by the release of the main driving shaft the first effect of which, if the last impulse is prolonged, is to shift the type-wheel. The next operation is to lock the type-wheel into the proper position for printing. The next is to throw forward the printing bar or platen. Following this the various parts of the instrument are restored to the positions they normally occupy when not in operation. Last of all the type-wheel carriage is fed forward the space of one letter.

As the type-wheel is restored to its normal or vertical position after each operation or cycle of operations of the machine no special synchronizing device or similar apparatus often employed in printing telegraph systems is necessary.

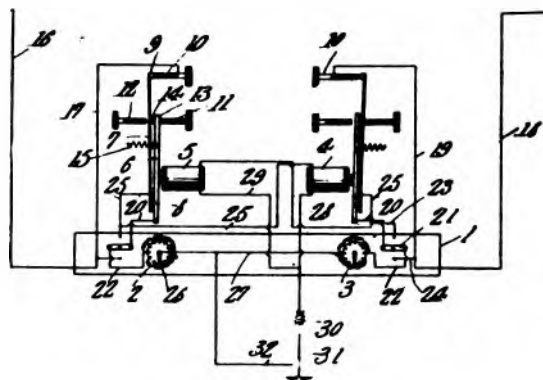
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The Tudor Repeater.

The diagram which we present herewith illustrates the operation of a main line repeater which has been devised by Mr. R. H. Tudor, manager for the Western Union Telegraph Company, at Corinth, Miss.

This repeater is made of two ordinary relays mounted on one base. Enclosed in this base are two adjustable rheostats 2 and 3. The novel feature is the holding of one of these relays in a closed position while the other is in operation. This is done by shifting the main battery current into the artificial lines.

Its operation may be more clearly understood by referring to the diagram and assuming that the western circuit 16 has been opened at some distant station, which opens the relay 4 on the



CONNECTIONS OF TUDOR REPEATER.

right. When the armature of this relay falls back it first comes in electrical contact with the upright spring, and at the same time breaks the eastern circuit at the set-screw 10. The relay 5, however, is still energized and remains in its closed position, its current having been shifted to the ground through the rheostat 3 via the armature and upright spring of relay 4. The upright spring is of course fastened to the armature but insulated from it, and so arranged that it will make electrical contact therewith when the armature falls back. The rheostats should be adjusted to have about the same resistance as the main line wires, so that when the current is being shifted first into the line wire then to the artificial wire the relay through which the current passes will not feel the change but will hold its closed position. A glance at the diagram will show that an operator on the opposite wire can readily break through the repeaters. Owing to the fact that the armature levers have so little friction the repeater can be adjusted to do excellent work on the weakest wire. In fact it will work on any wire that an ordinary relay will work on.

The switch 21 is added for the purpose of cutting the repeaters into single sets.

"Pocket Edition of Diagrams," etc., the latest revised edition, 334 pages and 160 illustrations, published by Telegraph & Telephone Age, contains just the information every telegrapher requires.

The Kitsee Cable Relay.

A test was made recently between New York and Canso, N. S., of a system of cable telegraphy invented by Dr. Isidor Kitsee, of Philadelphia. The essential feature of this system is a relay which operates a local sounder for receiving the messages. Hence it may also be used as an automatic repeater.

At the transmitting station two sets of batteries are used, one of about twice the electromotive force of the other. They are connected in opposition to each other and in series with the cable. The set having the higher electromotive force is provided with a shunt, this shunt being opened or closed by a telegraph key. The key is manipulated in the same way as for telegraphing on land lines. By this arrangement impulses of opposite direction are sent over the line. When the key is closed the higher powered battery is shunted and an impulse from the other set of batteries is sent to the line. When the key is open the high potential battery overcomes the other and sends an impulse to the line of opposite polarity to that sent when the key was closed.

At the receiving station a shunted condenser is inserted in the cable and the cable is then grounded through an impedance. The relay is not connected in series with the cable, but in a shunt around this impedance. Each stop of the line relay is connected to a source of current, one source being in opposition to the other. These sources are joined together and their junction point is connected through a condenser to one terminal of a polarized relay, the second terminal of which is connected to the tongue of the line relay. The polarized relay is made use of to close a local circuit with a sounder.

The line relay consists of a circular yoke of iron to which six cores extending radially inward are secured. Windings upon these cores are connected in series in such a way that opposite poles alternate. The terminals of these windings are brought to suitable binding posts for connection to some source of exciting current.

The coils of the relay of which there are three, are suspended on fine jeweled bearings between the separately excited poles. The tongue of the relay is normally held in a central position between its two stops by the two fine spiral springs. When the key at the opposite end is closed an impulse is sent over the line and the movable coils being given a certain polarity are hence either attracted or repelled by the poles of the separately excited stationary coils, thus throwing the tongue of the relay over to one of its stops and causing it to actuate the local polarized relay, and close the circuit. When the key is opened an impulse of opposite sign to the first is sent over the line, the polarity of the movable coils is reversed, the relay tongue is thrown to its other stop and the polarized relay opens the local circuit. The cable upon which this device was tested is eight hundred miles in length and a speed of from thirty to thirty-five words per minute was attained by the new method of working.

The Passing of the Oldest Railway Station. Editor Telegraph and Telephone Age:

I have been much interested in the article on page 290 of your issue of April 16, under the caption "The Passing of the Oldest Railway Station."

As a youth of sixteen years just starting on my life's work, I was in 1852 or 1853, located at "Turner's" as a telegraph operator in the employ of the New York and Erie Railroad Company for a brief period. I took my meals in the railway dining room inaugurated by Peter Turner, and boylike hugely enjoyed the excitement and turmoil occasioned by the frequent inrush of hungry passengers from the passing trains who were accorded from ten to twenty minutes to refresh the inner man. My home having been in the south where the table servants were exclusively of the African persuasion, I was charmed and interested by the bright eyed and buxom Irish girls that constituted the dining room force at Turner's and being at an impressionable age I speedily lost my heart to several of them.

I became acquainted with Mr. Charles Minot, the general superintendent of the road, in New York City under circumstances that reflected great credit on him and that won for him my everlasting gratitude. He seemed to take quite a fancy to me and encouraged me in my ambition to become a telegrapher, and gave me my first employment as an operator at Piermont, then the eastern terminus of the New York and Erie.

I never before heard of the incident related of Mr. Minot having inaugurated the telegraphic train order system, or if I ever did it has faded entirely from my memory, but it is quite probable that the story is true. Mr. Minot I remember as an enterprising gentleman, and an able railway magnate, and I know he was in favor of the telegraphic train order system long before its formal adoption, but was withheld from carrying out the idea by the prolonged and persistent opposition of the trainmen; an opposition that I was mainly instrumental in overcoming later.

I spent several years on the New York and Erie during the pining infancy of the telegraph, and grew up with the sturdy progeny of Professor Morse's brain until we both reached mature manhood. The middle and latter part of my telegraphic career, however, was spent in the sunny south during and after the little unpleasantness between the states.

C. E. McCluer, Norfolk, Va.

April 22, 1910.

Mr. C. B. Turpin, manager of the Postal Telegraph-Cable Company, Kokomo, Ind. in renewing his subscription writes: "I find the 'Age' better than ever. The electrical articles especially are very interesting and instructive."

How Telegraph Messages Came to be Read by Sound.

Mr. E. J. Edwards, writing recently, tells the following story of how one of the early telegraph operators discovered that he could read messages by sound:

"Ezra Cornell is known in history as the father of Cornell University, as one of the men who helped to build the first telegraph line, and as an ardent organizer of telegraph systems in the early days, being instrumental in the formation of the Western Union Telegraph Company. His son, Alonzo B. Cornell, became ultimately vice-president of the Western Union Telegraph Company and Governor of New York State—high commercial and political honors. Yet he once confessed to me that he felt he should be credited with the additional honor of having been one of those to make the discovery that telegraph messages could be read by ear; and he seemed to take more pride in his part in bringing this about than he did in any of his other achievements.

"I was trained as a telegraph operator," said Mr. Cornell, in telling the story. "I suppose I took to telegraphy naturally because of my father's deep and large interests in the then new mode of communication. Anyway, I learned the Morse key easily, and I was, in fact, very fond of telegraphing from both the practical and the scientific standpoints. I can say without boasting that in my day I was regarded as one of the best operators in all New York State. That was when all messages were received in dots and dashes on tape, and from this tape we transcribed the messages into English. Because of the tape, it was impossible to send messages with anything like the speed of the present day.

"One afternoon, some time in the early fifties, when I was stationed at Albany, N. Y., there was an unusual inrush of newspaper dispatches—I was in charge of the press key—and in the midst of the task of receiving them I found to my consternation that I was out of tape. Before taking my seat before the key I had neglected to replenish the tape reel. There was a bountiful supply of tape in the cellar of the building, but it was a long trip there—there were no elevators in those days—and I knew that to go there I would waste precious time. And there were those anxious newspaper men hanging over my shoulder.

"Suddenly, as I fished about mentally for the quickest way out of my dilemma, this thought popped into my head: 'You don't need any tape. Half the time you don't look at it when the dispatches are coming in before you write them out. You trust to your ears to tell what the instrument says. Why not do so now?' Instantly, I determined to see whether or not I could take the dispatches by sound alone.

"I put my fingers on the key and broke in on New York, whence the dispatches were coming. 'Send rather slowly and very distinctly,' I asked the man at the other end of the wire. He at once began to do so—not without some curiosity as to my rea-

son, I found out later. But I didn't think of that at the time, for I was glowing all over with the knowledge that I could write out the dispatches and write them correctly—for they made sense—by simply listening to the sounds that the key made.

"Thus I continued taking the dispatches to the very end. Then the New York operator called me. 'What are you doing up there?' he asked. 'Why did you want me to send slowly and distinctly?'

"I answered that I had said good-bye to the telegraph tape forever, and told him of the discovery I had made. He was immediately interested. 'Send me slowly and very distinctly fifteen or twenty words, and I'll see whether or not I can do the same thing,' he requested.

"I did so, full of confidence, and a little later there came to me this message: 'I've done it, too. Some of the other boys also say they can. I predict that within a month there won't be an inch of tape used in the New York office.'

"Years later," added Mr. Cornell, "I was told that about the time that I discovered for myself a new and revolutionary method of receiving telegraph messages, the same method was discovered by an operator in the main office in Pittsburg, Pa. I have no doubt that this is true. Sooner or later, the discovery was bound to be made not only in one but several offices. But I have always felt that I was among the first to make the discovery and should be credited with it in telegraphic history."

Peculiarities of Telegraphers.

A journal in one of our western cities in speaking of some of the peculiarities of telegraph operators remarks that Professor S. F. B. Morse is said to have been the first man to whom the appellation "crank" was applied, and though he made the word mean genius, it still clings to the profession. All telegraph operators are not cranks, and they are not all numbered among the geni of the key; but no other profession has been so successful in bringing out the eccentric characteristics of those inclined to be cranky, and few vocations have developed more true genius. Many of the men who made history first made dots and dashes, and today it is difficult to find a group of men engaged in an important undertaking that does not include one or more who started their career at the telegraph key.

Telegraphers are usually high strung, nervous men, and some develop eccentricities that cause them to be considered cranky. There used to be an operator employed by a Washington newspaper who earned the appellation of crank because whistling in the office so affected him that he could not work. His case, however, was not an isolated one; for it is well known that music of any kind has a peculiar effect upon telegraphers. It is said that a small boy whistling a popular air will stop practically every instrument in a telegraph office. Dots and dashes become a meaningless jumble of sounds, and the

operators lose all idea of their meaning. All operators are affected more or less by music; but those who have a natural ear for melody have the hardest time when a band passes the office.

It is not the noise that smothers the sound of the instrument. The din on the field of a sham battle, the hoarse cheering of political conventions and the busy babble of voices in the Stock Exchange have no effect upon him so long as he can hear the tick of the instrument. He will even carry on a conversation while receiving a message, or watch thrilling plays in an exciting baseball game without breaking; but let the plaintive strains of a hand organ float up from the street below and he is all at sea. The reason for this may be found in the fact that there is a kind of musical rhythm in the ticking of Morse characters which is accentuated in a musical ear. The tempo of the air played by the organ or band or whistled by the small boy upsets the rhythm of the ticking instrument, and in his effort to keep the dots and dashes from falling into the swing of the rival music the operator loses their meaning.

Not all operators are affected by music, however, probably because there are some men who have no ear at all for music, and are, therefore, able to keep the dots and dashes in line and prevent them joining in with the band.

The man who beat Joseph P. Gallagher for the message championship of the world in 1904 was one of this class. Gallagher was one of the star operators who held the receiving championship. He won in the contest at Philadelphia in 1903; but lost it the next year because the band at Madison Square played "Dixie" during the contest. His opponent was a Southerner with no ear for music: so, instead of confusing him, the strains of the patriotic air inspired him to greater effort, while Gallagher was floundering around, hopelessly lost.

Old operators are cranky about working Saturday nights; at least the uninitiated say they have a cranky idea about the telegraph wires becoming tired. Youngsters say the trouble is in the waning strength of the aged arms that plays out towards the end of the week and not the wire; but the older men shake their heads and talk about the saturation of the wires by the constant flow of current over them. Electromagnets are said to be rendered useless by too much current, which saturates them, and the same theory is applied to telegraph wires by these cranky old operators. Practically every telegraph operator has some "queer" notion regarding his profession or some part of the implements with which he works; but they are discovered only by close association.

The choicest bit of slang of the age lay concealed in the ticks of their instruments for years before George Cohan rescued it and put it to work in one of his musical comedies. Telegraph operators have been saying "23" to each other over

the wire for a number of years; but no one knew anything about it. A great many people are still unaware of the fact that this bit of slang originated with telegraph operators; for only a short while ago a writer ventured the opinion that the term "23" was of biblical origin, and cited the twenty-third verse of the sixteenth chapter of Matthew as the probable place.

Western Electric Pension System.

The Western Electric Company was one of the first of the large industrial corporations to adopt a system of pensions for superannuated or disabled employees. In March, 1906, the company set aside \$400,000 out of profits as a permanent fund for this purpose and later \$150,000 was added with the further provision that \$150,000 might be added to the fund in subsequent years. The fund, with accrued interest, now totals \$597,500.

This pension fund is managed by a board consisting of five officers, who are employees of the company, appointed annually by the board of directors or executive committee. All employees who have reached the age of sixty and have been in the company's services twenty consecutive years, are eligible to the pension privileges, whether able to work or not, and are not debarred from going into other business if they accept the pension privileges. Employees who have been thirty years in service or who have reached the age of fifty-five and been twenty-five years in service may on recommendation of the president be granted a pension allowance. Any employee who has been ten years in service and through injury or sickness has been incapacitated from work, may receive aid from the fund at the discretion of the pension board.

The annual allowance for each employee retired with a pension, on account of age or length of service, is as follows:

For each year of active service one per cent. of the average annual pay during the ten years next preceding retirement, with the provision that the board may base the pension upon the average annual pay of the ten consecutive years of service during which the retired employee was paid the highest rate of wages. The pension allowance is paid monthly from the date of retirement until death and, at the discretion of the board, the allowance may be continued to widows or orphans for a period not exceeding one year. The expenses of the pension system are borne entirely by the company, the employees contributing nothing to its financial support.

Savings and Loan Association Notes.

The New York State League of Co-operative Savings and Loan Associations will hold its annual convention in Schenectady on May 19-20. The association of that city has appointed committees to arrange details, and the plans proposed indicate there will be an unusually interesting session. Among those who have been invited to address the convention are Governor Hughes and O. D. Cheney, state superintendent of banks.

How Cedar Poles Are Marketed.

Between three and a half and four million poles, most of them of cedar, are purchased and used by the telegraph and telephone companies of the United States each year. The average life of these poles is from twelve to fourteen years.

Three sources of supply are open, the white cedar from the northern lake region, Idaho cedar from the Rocky Mountain country and red cedar from the Pacific northwest. Cedar is used because of its straight growth, although in some regions redwood, chestnut, fir and cypress are employed.

The cedar is the most durable and it is the preferred timber. The red cedar grows to a greater height than the other varieties, and almost all the extremely tall poles are from the States of Washington and Oregon. Twenty feet is the minimum height for telephone poles.

The pole getting industry is distinct from general lumbering. It has its own special crews and its own special nomenclature. The sawlog man is a lumber jack, the pole cutter a cedar savage. The cutting is done in the fall and winter months, and the hauling season is from the early freezing period till the spring thaws.

Cruisers pick out and mark the timber that is to be cut, and a compass man runs the lines. After him come the foreman and the crew that lay out the camp and put up the necessary buildings to house the men and horses and store the supplies. Then comes the roadmaking.

Roads are laid out as nearly direct as possible from the standing timber to the landing place next the railroad, allowing for grades and elevations. Trees are cut down close to the ground and a smooth bottom is prepared for the road, which is invariably of ice. If snow precedes the coming of the road gang ploughs are utilized to get it out of the way and give the frost a chance at the ground, often swampy in character.

A number of tank sleds that sprinkle water on the roadway are kept running in alternation with a machine called a rutter, which cuts deep ruts in the ice road as it slowly forms. When finished the road is composed entirely of ice a foot or so in thickness, with six or eight-inch ruts on each side. These ruts are made for the purpose of furnishing a place for the runners of the pole laden sleds to glide through and thus make hauling an easier task.

Pole cutting is done usually by piece work, but in order to prevent the cedar savage from hunting out the bunches of timber most to his liking the foreman causes the strip for each pair of men to work in to be marked off by a line of blazes along the trees. He must confine his operations to merchantable timber, avoiding the crooked trees.

As he goes he must make a path through which the trees may be rolled or slid down to the road or so that the horse and chain that snake them thither may be able to work with ease. This is insisted upon by his boss. He must exercise skill in making

the cut trees fall in such a way that they can be easily handled with branches and tops removed.

Hauling begins as soon as the road is completed and the cutters get a sufficient supply stacked up ahead. The peeling is usually left until after the winter rush is over and the men are brought from the woods to the yards. The bark is removed either with a heavy draw-knife or a four by eight-inch chisel with a four or five-foot handle called a spud.

The pole cutters are usually supplied with a list showing the sizes desirable. Long experience enables them accurately to judge the size of a tree at a glance. The smallest cuts are seven feet long and are sold for fence posts. Longer sticks are used for shed timber. All over twenty feet go into the pole class. This practically insures the cutting of all the standing timber.

As each pole is cut it is marked with the cutter's number and checked up by a man whose task it is to keep tab on the work. For defectives he gets no credit.

Sometimes at the railroad landing place, but usually in the assembling yards, the poles are sorted according to size and decked, which means piled up. The greatest activity follows the Christmas season, when each crew is working at top speed to keep ahead of the next crew that handles the poles.

This top speed is again reached when breaking up time comes, when thaws arrive. The melting ice turns its streams into the ruts during the day and the tank wagons are kept going all night to furnish ice in place of that which the sun has melted. When the weather gets too warm the road soon disappears and this puts an end to the hauling and likewise to the cutting. When this happens earlier than usual the first indications of a break up cause a general hustle and a race ensues to get out the timber before the roads become useless.

Notwithstanding the good pay it is difficult to keep the men at work all winter. From the cedar savage down to the road monkey, the man whose duty it is to keep the ruts free from all rubbish, there are among the loggers many who drink heavily, chew snuff and smoke strong pipes and unconcernedly throw up one job, knowing they can get another just as good at the next camp. These roamers are known as camp inspectors from their making the rounds during the winter.

As the renewals are estimated to require nearly 3,000,000 poles a year, not counting the new poles put up, the end of the cedar supply is in sight. The forest department figures that it will not last longer than fifteen years and the more optimistic supply men don't think there is more than a twenty years supply ahead.

Mr. J. C. Browne of St. Louis, Mo. general foreman of telegraph of the Missouri Pacific Railway System writes: "I have not missed an issue of the Age for years, subscribing for your paper each year is one of the most profitable habits I have formed. Success to you always."

The Hudson Word Register.



The Hudson Word Register for counting the number of words written on a typewriter which is the only reliable device for this purpose now on the market may be obtained with attachments for applying it to the standard makes of machines. When properly attached, the greatest confidence may be placed in this invention. It can be rendered inaccurate only

by the playful and careless operator who forces the space-key far below the spacing point and allows the fingers to slip from the key releasing it with a snap, causing the register lever to fly upward with uncalled for violence. This motion which is unnecessary and unnatural, might cause the register to jump. The space-key may be struck with any force desired, but should be released in the usual manner with a smooth, even motion. This insures accurate results.

There being no limit to the continuous forward movement of this register, any number of words may be counted without re-setting by simply taking note of the first 1,500 words and adding thereto the number registered when the work is complete.

To ascertain the number of words written, add the amount registered on the dial to the number appearing through the face.

This useful device is easily set by, first, turning the lower button in the direction of the arrow until it locks, and the pointer rests at 50 on the dial. Next, turn the upper button in like manner until it reaches the stop and the number 1500 appears through the face.

For message work the writer disregards the upper numbers, using the dial and pointer only, which is set by simply turning the button forward until it locks, requiring but one movement, and as little attention as is given in returning the typewriter carriage to commence a new line.

The additional tension on the space key is very light, and in no way interferes with the working of the machine. The register being thoroughly made, nickel plated and of neat appearance, is an ornament to any typewriter and is practically indestructible. Every operator who uses a typewriter will find this invention of great assistance, and it has been the general testimony of those who have used these registers that they would not do without one.

Special directions accompany each counter telling how to attach it to the particular type of machine for which it is wanted.

The price of this useful adjunct to a telegrapher's equipment has been reduced from \$5.00 to \$3.00 and orders may be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253

Broadway, N. Y. In ordering, be sure to specify the make of the typewriter for which the counter is intended, so that the proper attachments and directions may be sent with it.

Bound Volumes of Telegraph Age Covering a Memorable Year in the Telegraph.

The year 1902 was especially significant in the annals of the telegraph, inasmuch as that date marked the accession to office of the present official heads of the Western Union Telegraph Company. The story as told in *Telegraph Age* distributed over the months of that year, chronicling the numerous changes that eventful period witnessed, is of interest, one viewed with importance by many as being of high referential value, furnishing data and dates nowhere else so readily available. A portrait of Colonel Robert C. Clowry, the incoming president and general manager of the company, and of General Thomas T. Eckert, whom he succeeded, as well as others prominent in the Western Union service, were included in the issues of the paper during that year.

In that year, also, occurred the death of John W. Mackay, the head of the Postal telegraph and Commercial Cable companies. His passing necessarily wrought changes in the great telegraph interests under his control, their direction descending as a possession to his son, Clarence H. Mackay, their present head. Full-page engravings of both the Messrs. Mackay also appeared.

It was in 1902, also, that *Telegraph Age* printed a comprehensive, instructive and illustrated article descriptive of the famous Buckingham Long Distance Page-Printing Telegraph, a chapter covering nine pages and of profound interest. Again, it was in this same year that the notable telegraph tournament, known as the American Telegraphers' Tournament, was held at Atlanta, Ga., when some well remembered records for fast sending were established, an event altogether of achievement of which telegraphers are proud and delight to refer.

Enough has been indicated to show that the year 1902 was an eventful one in the telegraph. The bound volumes of *Telegraph Age* for that year possess a special value. A few are on hand and are offered for sale at \$2.50 apiece. These will be delivered to any address in this country, carrying charges prepaid, on receipt of price. Address all orders to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Mr. C. E. Davidson, manager, Western Union Telegraph Company, Tampa, Fla., in renewing his own subscription and that of E. M. Doyle, chief operator, recently, says: "You can always count on our renewing our subscriptions whenever they expire. We cannot get along without your paper."

The testimony of progressive operators is that *Telegraph and Telephone Age* is so thoroughly comprehensive in character as to make it absolutely indispensable to those who would keep informed. Its technical articles are of high practical value. Write for a free sample copy.

New Marconi Station at Glace Bay.

The trans-Atlantic service of the Marconi Wireless Telegraph Company has again been restored after having been discontinued since last August when the station at Glace Bay, N. S., was destroyed by fire. The station at that point has been erected on a headland about three miles from the town of Glace Bay, in Cape Breton, and is separated from the Nova Scotia peninsula by the Strait of Canso. The station stands about eighty feet above sea level and is a conspicuous landmark to fishermen for miles around.

The operating building is an unpretentious wooden structure with nothing to show that it is different from the ordinary wooden cottage, except the wires which lead down from lofty masts to special insulators inserted in its walls and the double line of telegraph poles leading to it which carry the wires of the Western Union and Canadian Pacific Telegraph Companies by means of which land messages reach and leave the station.

The transmission of a wireless message across the Atlantic is no different from that of the ordinary cable, except that the operator with every motion of his hand is controlling several hundred horse power at a point half a mile away, where the signaling switches are situated.

These switches connect the condenser and spark discharger and its associate circuits with the source of power, and there results from the condenser discharge a powerful electrical oscillation, which radiates into space and affects the receivers at Clifden.

The aerial system of the station is supported by four tall wooden towers, each 212 feet high. They form a square, the sides of which are 220 feet in length. In this space were contained the original station buildings which were destroyed in the fire. Supporting the aerial wires, in conjunction with the towers, are a number of masts, each 180 feet tall, which are so arranged that the wires spread out in the shape of a gigantic fan, the "handle" of which points toward Clifden, on the west coast of Ireland, where the corresponding station is situated.

The machinery for the generation of electrical energy and the transmission and reception of messages is contained in three buildings which are almost in a straight line. To the west of this line is the new power house containing the new machinery which has recently been installed.

The station at Clifden, Ireland, has also been overhauled and new apparatus installed. The transmitting aerial of this station contains 60,000 feet of wire and the receiving aerial 18,000 feet. The former is supported about 200 feet above the ground on twelve poles placed in three rows in the shape of an attenuated fan nearly one-tenth of a square mile in area, this arrangement being adopted with the object of radiating the electric waves most strongly in the direction of Glace Bay. The condenser, producing the necessary waves, is discharged by an apparatus consisting of a disk which rotates at a speed of more than 2,000 revolutions a minute.

Book Review.

A new and revised edition of "Wireless Telegraphy and Wireless Telephony," by Professor A. E. Kennelly, has been issued recently. This latest edition contains 271 pages and has 84 illustrations. This work which has heretofore been received with much favor by wireless students has now been revised and brought up to date. Because of the rapid advances made in the art of wireless telephony the author has added over sixty pages dealing with this subject. This is a book which can be appreciated by the practical man. It gives a general outline of the various principles underlying wireless apparatus and operation, avoiding complicated theory and tiresome details. The author also refrains from devoting any space in the book to historical matter attempting rather to include only those things which are of value to the art to-day. A copy of this work will be sent, carrying charges prepaid, to any address upon receipt of price \$1.00, by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

What Our Friends Say About This Publication.

Mr. John F. Skirrow, associate electrical engineer of the Postal Telegraph-Cable Company, New York, says: "Telegraph and Telephone Age is as necessary to the telegrapher who would be up-to-date as gasoline is to the automaniac."

Mr. H. G. Haddon, general manager of the Martha's Vineyard Telegraph Company, Woods Hole, Mass., in a recent letter states. "Telegraph and Telephone Age shows improvement with every issue."

Mr. W. G. Peebles, assistant superintendent of the Western Union Telegraph Company, Jacksonville, Fla., in a recent letter has this to say: "Your renewal of my subscription was eminently correct. I cannot get along without the paper, so don't fail to let it come along promptly every time it is issued."

Mr. J. B. Dillon, of Dallas, Tex., in ordering us to re-enter his subscription for another year writes:

"How will anyone get in the hall of fame, if he is in the telegraph or telephone business. And the 'Age' subscription list has not his name?"

Mr. J. Hervey Nichols, of Denver, an old time and military telegrapher who was with General Grant as operator when Lee surrendered at Appamattox, in renewing his subscription for another year says: "I have been a reader of your valuable journal since its first issue, and by this means have kept in touch not only with my old friends, but also with the new and wonderful electrical inventions, devices, and improvements as I could in no other way. How any ambitious employe of any telegraph or telephone company can afford to be without your paper is a problem that I am unable to solve."



KERITE



Insulated Wires and Cables

KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

Efficiency and safety in electrical installations depend chiefly on insulation. For fifty years KERITE insulation has been the standard of excellence.

Results count. KERITE wires and cables installed half a century ago are in service to-day. The wonderful durability of KERITE insures the highest safety and economy.

Initial tests determine the properties of an insulation only at the time they are made. They do not determine how well it will do its work years afterward.

The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

Experience of others should be useful to you. Insure your service by using KERITE.

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The Railroad.

Mr. John Ditch, chief telephone inspector of the Pennsylvania Railroad Company, Altoona, Pa., was in New York a few days ago on company business.

The jurisdiction of Mr. W. W. Ryder, general superintendent of telegraph of New York Central Lines west of Buffalo, has been extended to cover the Toledo and Ohio Central Railway and the Zanesville and Western Railway following the taking over of the operation of those lines by the New York Central management.

A bill has been introduced in the House of Representatives by Congressman Murphy of Missouri, which if passed would make eight consecutive hours a days work for all railroad telegraphers and other connected with the movement of trains. The stated object of the measure is "To promote the safety of employes and travelers upon railroads by limiting the hours of service of employes thereon."

Mr. S. A. D. Forristall, superintendent of telegraph of the Boston and Maine Railroad, Boston, Mass, was a recent New York visitor, coming to the metropolis on official business. Mr. Forristall is preparing to extend the use of the telephone for train despatching upon the system with which he is connected by installing telephone circuits with selective apparatus upon several divisions of the road in addition to those which are already thus equipped. He speaks in most commendatory terms of the service rendered by the telephone circuits which are now in daily use on his system.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., was a recent New York visitor. Mr. Williams has in operation on the railway system with which he is connected, what is probably the longest telephone train despatching circuit in use to-day. This circuit which extends from Richmond to Norlina and Raleigh, N. C. and from Norlina to Portsmouth and Norfolk, Va., is 276 miles in length and has fifty-one selector stations and sixty-five telephones. It has been in operation since February 1 and is giving very satisfactory results.

The transportation committee of the Association of Railway Telegraph Superintendents is endeavoring to secure reduced rates for the associate members and friends of the Association who wish to attend the annual convention, which meets at Los Angeles June 20 to 25. The rate from New York to Los Angeles and return via New York Central or Pennsylvania and any direct route from Chicago will be \$110.30. By any other line to Chicago the rate will be \$105.80. The round trip rate from Chicago will be \$72.50 and from Kansas City \$60.00. Tickets bought at these rates will be good returning until October 31. The committee has been trying to secure a reduction from these prices by getting tickets which will only be good a much shorter period.

Copper thieves have been at work recently on the Putnam Division of the New York Central Railroad, stealing telegraph and signal wires. Upon one occasion about 1,200 feet of wire was stolen.

Mr. W. E. Peirce of the Western Union Telegraph Company, New Orleans, La., has for some time past been engaged in installing telegraphones on the New Orleans and North Eastern Railroad. This system, as far as finished, gives entire satisfaction.

G. B. Reeve, formerly vice-president and general manager of the Grand Trunk Railroad, died at La Mirada, Cal., May 1, aged sixty-nine years. Mr. Reeve entered the telegraph service of the Grand Trunk railroad in 1862 as an operator and afterward served that road in various capacities, in 1900 becoming vice-president and general manager.

Dr. Frederick H. Milliner, of Omaha, experimental engineer of the Union Pacific Railroad, has received orders to proceed at once with the installation of a wireless telegraph system along that road. A station has already been established at Omaha. The first new stations to be equipped will be at Sydney, Neb., and Cheyenne, Wyo.

A patent, No. 956,109, for a transmission system, has been granted to O. T. Lademan, of Milwaukee, Wis. A telephone system for railroads in which each substation has a primary and secondary winding and a switch in the transmitter circuit for shunting the secondary and then opening the circuit so that telephone currents may pass through the receiver.

A patent, No. 956,373, for a composite telephone and telegraph system, has also been secured by Mr. Lademan. For calling telephones on telegraph lines with a make and break receiving contact signal, a battery, a relay and a closed circuit battery with signal controlling relay having a vibratory contact.

The thirtieth annual convention of the Telegraphers Beneficial Association was held recently in the Pennsylvania Railroad building at Trenton, N. J. The election of officers resulted as follows: President, William Ettenger, Elizabeth; vice-president, William Wilmot, Trenton; secretary-treasurer, W. H. Clarke, Elizabeth; trustee, John B. Fisher, superintendent of the New York division of the Pennsylvania Railroad; executive committee, H. T. Vauls, Elizabeth; W. T. Swem, Trenton; George C. Kadel, Camden; Edward P. Bruere, Trenton; W. C. Rogers, Camden; auditing committee, I. A. VanDusen, Elizabeth; W. H. Buckalew, New Brunswick; E. S. Mullen, Frankford, Pa. After the meeting a banquet was held at which about seventy-five were present. This association, which is composed of employes of the telegraph department of the Pennsylvania Railroad, has a membership of over 300.

The Work of a Lineman.

The average telegraph or telephone lineman, says an exchange, is recruited from the farm, as there are few city bred youths who are able or willing to undertake the hardships that befall the beginner or "groundhog," as he is commonly called by the rest of the gang. The groundhogs are set to work at first digging holes, and while this may not seem laborious it must be considered that to get this hole to a sufficient depth, which is from four to six feet, it is necessary to use a thirty-pound steel bar two inches in diameter and nine feet long, sharpened at both ends, to loosen the earth, as it is impossible to use a pick after breaking the ground at the top.

Then rock formation is often met with, which is never blasted unless it is impossible to break it out. To the beginner this is tedious work, and if he is not careful he will invariably chip it out until he has the hole running to a point at the bottom and find it impossible to continue. It is astonishing what an old timer can do with a bar and interesting to hear them tell of their feats and the number of holes they can dig in a day. Many are the wagers they make on their ability in this line.

After a few months of apprenticeship at digging holes the groundhog, if he is found to be a willing worker, is allowed to help the lineman, that is, he is detailed to wait on him while at work on a pole, tying such articles as may be needed from time to time to a line so the lineman may pull them up as he requires them. This is where he receives his first schooling in the art of climbing. The next pay day is likely to see him in the possession of a pair of spurs or climbers, if he is ambitious. Then it is up to him to see how long it will be before he is able to get up and down a pole lively enough to become a full-fledged lineman and command the respect of the gang.

There is a class of linemen who are called floaters. These men never work more than a few days at a time in one place, and are continually traveling. While this is the case with many, there are, of course, exceptions, and you will find some who manage to save enough money to purchase a small farm, where they settle down and live contently for the rest of their days.

The lineman has to work ten hours each day that it is possible to be out in the open, and seldom is the weather so bad that the foreman will allow his men to stay under cover. They live in the cheapest of hotels or boarding houses and fare badly, as it is difficult to find a suitable place to accommodate a large gang of men at the rate which they are able to pay.

Several years ago an enterprising young superintendent of construction while trying to economize and at the same time benefit the many men under him, conceived the idea of building portable camps, tents having been tried and proved unsuccessful. He designed and built one set, which consisted of two cars, one for sleeping accommodations and the other for eating and cooking in. These cars were built with the idea that they could be moved from

time to time as the work progressed and thereby overcome the necessity of the long drives it was necessary to take each morning to reach the work and return at night, and at the same time provide the men with good clean sleeping quarters and good wholesome food.

They were built just the size of a flat car and made so they could either be fitted with wheels or else be loaded on flat cars and hauled on the railroad as circumstances might require. The sleeping car was fitted with two rows of bunks on each side and would accommodate twenty men, having a small room at each end for the foreman and his assistant, while the dining car had one large table and at one end a large cook stove and the sleeping quarters for the cook and his assistant, usually a man and his wife.

They were so successful that several more sets were built, and the only drawback was the fact that the quarters were too small in the evenings when the entire gang was present. Yet the men were better satisfied and the company pleased with the knowledge that it could provide its employes with good and sufficient food at three-quarters the cost of boarding, and always have them on hand for a moment's call.

Of course, these cars could not be used in all branches of the service. When engaged in putting up or stringing wires the linemen cover several miles a day. They string anywhere from two to fifteen miles a day according to the number they are stringing and the nature of the country they are covering.

In one case a gang was at work raising a large pole and one young fellow who was angry because the foreman would not give additional help deliberately broke three of the pike poles by pushing so hard with his shoulder that they were splintered. To do this required a great amount of strength, as the pikes are made of hickory and are at least three inches in diameter and from ten to twenty feet in length.

To this lineman, breaking them seemed child's play, and he laughingly remarked: "If you don't get more men under this pole I'll break all the pikes we've got and then we won't be able to raise it at all." Evidently the foreman in charge must have believed him, for he quickly granted the request.

There are always chances for good and reliable linemen to secure steady employment as trouble hunters. These men are stationed at different points all over the country, each having a territory to cover in case of trouble on the line. While this work is steady and much easier, the salary attached to it is not very large and the lineman has to be ready to go out at a moment's notice, never being able to enjoy a holiday unless he fills his place.

He is ordered out in all kinds of weather and has a territory of from fifty to a hundred and fifty miles to cover. The line must be kept in the best of order and he is seldom allowed more than one man to help him, and then only for a few days at a time.

His great difficulty is to keep the wires clear, as

the farmers feel they should receive some compensation for granting permission to trim limbs of their trees, and while the companies have in most cases an absolute right of way for their lines this does not prevent the farmer from meting out his vengeance on the lineman when he comes to trim the trees on his land by either setting dogs on him or ordering him off the property and enforcing his order with a shotgun.

In one case a farmer kept a large and vicious bull in his field, which would chase a man on sight, and upon the case being taken to court the judge sustained the farmer, saying that he had a perfect right to keep the animal on his own property as long as it was not interfering with anyone on the public highway. This left the lineman in a quandry as to how he could clear the wires, for each month when the chief operator of that district sent in his report of the insulation of the wires under his jurisdiction it always showed "poor" at this point, and the trouble man would receive orders to clear them at once.

This continued for some time, but try as he might the lineman would always find the bull waiting for him. At last one day, meeting the trouble man from the next district, he arranged to go with him at night and trim the tree, for they were positive that in the dark they would be able to sneak up, climb the tree, cut the limb and get safely away.

Just as they were about to start their courage began to fail and they resorted to some stimulant to brace them up, after which they started for the scene of the trouble. On arriving one agreed to climb the tree and cut off the limb. After events seem to show that the Dutch courage imbiber must have gone to the wrong place and affected the eyesight instead of the head of the climber. He succeeded in sawing off a limb and after hauling it away they drove back home believing the trouble was a thing of the past. Two days later as the trouble man was driving by he looked up in amazement, saw the limb still there and a large branch on the opposite side of the tree missing. It is still a standing question how he could make such a mistake. It was costly for the company he was employed by, as it was compelled to buy the tree at the farmer's own price, cut it down and haul it away.

The trouble man meets with many surprises and never knows what he will find when he is sent out to repair a break. Several years ago a temporary line was built for a telegraph company by one of the leading railroads. Some of the poles were so short that the wires could be reached from the ground. One morning the trouble man received orders to cover his line north and look for a "swinging cross," meaning that several of the wires were touching each other in some way every few minutes and causing trouble all over the line.

After going several miles and not seeing anything he came to a large railroad construction camp, where several hundred Italians lived in the little huts furnished by the contractor who was grading a new cut for the railroad. It must have been wash day for these Italians, as he discovered their wet clothes

hanging on the wires and the wind blowing them against the other wires, causing the trouble.

Another man while covering his line looking for two "open" wires, found after an all-day drive that they must have been broken by a wild goose that he found dead on the ground at the point of the break. On making inquiries a farmer living close by informed him that the previous night he had heard wild geese honking and evidently flying very low and that one of them must have been low enough to hit and break the wires. He was well repaid in this instance for his long journey, as he secured a good fat goose in addition to finding his trouble.

There is a young man who has a station in the northern part of the country and has over one hundred and fifty miles of line to cover. While this is comparatively easy in the summer months, as he has only a few wires on the line, in the winter it is often almost impossible to cover it; but no matter what the weather may be when he receives an order he is expected to go out and fulfil it at once.

This line for mile after mile runs through a dense forest, and in some places he has to make fifty miles in a day to find a place to sleep. This can be done in summer on horseback, but in the winter the only mode of travel is on snowshoes. A fifty-mile jaunt on snowshoes with a bag of tools such as are necessary for him to carry is not a trip to joke about.

He often finds the poles completely covered with snow where it had drifted so he cannot find them, and last winter he was snowbound in a small cabin for three days without food except a few sandwiches he had with him for lunch. When the storm abated so he could start again he was so weak that he could hardly drag himself to the next village, where he was compelled to remain, his feet being so badly frozen that it was a question whether they would have to be amputated or not. With the courage of his class, inside of a week he started on his long journey back again, thinking nothing of the fact that he had come near losing his life.

Another man in the employ of the same company is stationed on the desert in the west. While the little hut he lives in, which is also a test station, enables him to hear all the news that is flashing over the wires, he rarely has a chance to hear a human voice, for although his abode is near the railroad it is seldom a train stops except to bring him supplies or water. In some ways he is better off than his fellow workman in the north, yet his is a position that few men would care to accept.

While there is hardly one of this class of men who has not had narrow escapes from death, yet they glory in their vocation. They love to boast of their many hairbreadth escapes among themselves, but to the stranger they merely shrug their shoulders and make some indifferent reply when questioned about them. As a general rule they are fatalists, believing that if they must have an accident it will come when ordained and not until then.

QUESTIONS TO BE ANSWERED.

[The list of questions which we published under this heading in our previous issue, the answers to which may be found in Chapter I of Jones' Diagrams, was much appreciated. Students in telegraphy have found them of great assistance in helping master the contents of this standard text book of telegraph engineering. We will continue to print similar lists of questions, taking up each chapter in turn. If students will carefully study the subject matter to which each set of questions applies until he is able to answer all of them without referring to the book, he will, by the time he has gone through the book in this way have gained a thorough knowledge of all of the principles underlying telegraphic operation].

CHAPTER II.

How is the action of magnetism usually described?

What is the difference between a natural and an artificial magnet?

What remarkable distinction is there between magnetic lines of force and an electric current with regard to the path which each will follow?

What effect does a magnet have upon another piece of iron which is brought in contact with it?

What property of a magnet led to the development of the polar duplex telegraph system?

What condition always prevails in a wire which is carrying a current of electricity?

Give a summary of the general facts made use of in the operation of a telegraph circuit.

Why do the majority of the lines of force of a relay pass through the armature and attract it instead of passing directly from one core to the other?

Why is steel or hard iron unsuited for use in telegraph neutral and single relays?

Where are the local circuit binding posts on a relay usually located?

Why are some batteries more efficient than others?

How was voltaic electricity first discovered?

What is the nature of the action in a battery which produces electricity?

What quality must two metals possess in order to be suitable for the two elements of a battery?

What effect does the generation of an electric current have upon the water in a battery?

How may this action weaken the battery?

Why are dry cells usually unsuited to telegraph operation?

What is the chief requirement of a battery for telegraphic purposes?

Why is the ordinary blue stone cell so often used in telegraphy, not suitable for use where a large volume of current is required?

In a copper zinc battery how do you explain the fact that we speak of the copper electrode as being positive while the zinc is known as the positive plate?

What is electro-motive force?

How is it measured?

What is the normal voltage of a single blue stone cell?

What determines the electro-motive force of any battery?

How do you explain the fact that a small battery may be nearly as efficient as a large one for a short time when connected on a long circuit but would not be nearly as efficient on a very short circuit?

General Mention.

At a meeting of the directors of the Associated Press, held in New York, May 2, Mr. Melville E. Stone, of New York, was reappointed general manager and Mr. Charles S. Diehl, of Chicago, assistant general manager.

Mr. Jerry O'Connell, of the operating force of the Western Union Telegraph Company at Milwaukee, on May 1 celebrated the fiftieth anniversary of his entrance to the telegraph service, all of which time he has spent at Milwaukee.

The Court of Appeals of New York State has declared constitutional a law passed by the State Legislature two years ago, limiting the hours of labor of telegraphers and others connected with the movement of trains to eight hours in any twenty-four hour period.

Instruction in telegraphy is now given at the Carlisle Indian School. The Indian students have been found to be well adapted for this work and it is believed that they will prove valuable as railway operators at stations in the desert regions of the west where it is difficult to get employes who will stay for any length of time.

Miss Jennie F. Beckwith, cashier of the Postal Telegraph-Cable Company at Chicago, formerly cashier of the Western Union Telegraph Company at Minneapolis, has been granted a four months' leave of absence and will sail from New York on May 28 on the Steamer Barbarossa for a European trip.

Mr. W. J. Holten, of Chicago, a former railway telegraph superintendent, for the past three years identified with the West Englewood Bank of that city, writes: "I cannot keep house without the Age. It puts me in touch somewhat with my old life and the associates of my telegraph days."

Telegraph service in Arkansas was interrupted recently in an unusual manner. A tornado picked up a negro woman and deposited her in a network of telegraph wires tangling them up and thus crossing the circuits and causing trouble. Some linemen with ropes soon came to her rescue, lowered her to the ground uninjured and thus cleared the lines.

Mr. Paul R. Wiggs, for many years identified with the telegraph service at Jacksonville, Fla., but for the past seven years engaged in commercial pursuits writes us that he finds sufficient matter of interest in our publication to warrant him in remaining a permanent subscriber to the same. He adds: "I like to keep up with my old friends in the business and enjoy reading the Age."

Obituary.

Charles H. Irwin, formerly in the employ of the Postal Telegraph-Cable Company, died recently at Front Royal, Va., aged fifty-one years. Mr. Irwin was at one time manager of the Birmingham, Ala., office of that company, and was later chief clerk in the office of the superintendent at Nashville. Mr. Irwin suffered a stroke of paralysis about two years ago.

George F. Porter, secretary and general manager of the Atlantic Insulated Wire and Cable Company, New York, died at Montclair, N. J., April 29, aged fifty-five years. Mr. Porter was at one time a telegraph operator. He was a member of the Magnetic Club and well known in telegraph and electrical circles throughout the United States and Canada. From 1892 to 1902 he was secretary of the National Electric Light Association.

Prosecution of Bucket Shop Cases by Government.

Following the raid made by Federal officials upon alleged bucket shops operating in various parts of the country and the arrest of about thirty persons against whom evidence had been secured, a special grand jury in Washington has been making a thorough investigation of these concerns. Many telegraph officials have been called to Washington to testify as to their knowledge of the way in which the bucket shops have obtained the stock quotations whereby they were enabled to do business. The investigators believe that they have obtained evidence proving conclusively that these quotations have been supplied for the past twenty-five years or more by one New York concern, but how this firm obtained them has not been discovered. Since the investigation has been in progress the Philadelphia Electrical Bureau has cut down a large number of wires in that city which had been strung without any permit and some of which it was alleged were used for transmitting the quotations to the bucket shops.

Answers to Correspondents.

[We will under this heading answer from time to time questions from any of our readers in regard to technical, historical or other features of the telegraph, telephone and allied industries. We receive many such inquiries from subscribers and always answer them by mail. As some of these, however, are of general interest we will hereafter print both questions and answers in this column so that all our readers may receive the benefit of our answers.]

A Boston correspondent asks the following:

"In an argument between myself and another, the question arose as to the origin of the prefix 'HR' in starting a commercial message, as used by both the Western Union and the Postal companies. I contend that it means technically 'Have ready,' while he says it means 'Here,' 'HR' being code for 'Here' according to Phillips. Will you please send me the origin of the prefix, and which is right, or if we are both wrong."

In answer to this we would say that "HR" is an abbreviation for "another." Some opera-

tors use "ANR," others use "AHR" and others again simply use "HR." These abbreviations were in common use long before Phillips' code was thought of.

Stories of Inventors.

Mr. Charles A. Brown, a patent attorney of Chicago, gave an address before the Chicago Electric Club on April 27 in which he related some interesting reminiscences in connection with various inventors and inventions. Mr. Brown spoke of Thomas A. Edison's invention of the duplex telegraph system and related the story of the inventor's negotiations with Mr. William Orton, then president of the Western Union Telegraph Company. Mr. Orton tried to impress on Edison that his invention was not very different from the Stearns duplex. Edison's laconic rejoinder was, "But mine works."

Another story related to the "expert relay" of Stephen D. Field. In explaining to the patent examiner this unusual title for an invention, Mr. Field said: "I call my relay an 'expert relay' because it has a tongue adapted to lie on either side with equal facility, according to the influences brought to bear upon it."

Night Messages and Word Counters.

When an operator has to receive a night message containing from fifty to possibly several hundred words the attachment of a word counter upon his typewriter is a great time saver. Many do not appreciate this, but, instead, when through receiving will take the time to count each word in checking up with the sender. This is wasted effort, as, in most cases, if he had a word counter on his machine he could check as soon as the sender had finished. In view of this fact, it seems strange that more operators are not provided with these useful devices. The Hudson word register is simple in operation, can be provided with attachment for any standard typewriter and is absolutely accurate. There is no limit to the continuous forward movement of this device. It registers up to 1,500 and then automatically begins counting again from 1 upwards. The additional tension placed on the space key to operate the counter is so slight as to be scarcely noticeable. The price of this useful adjunct to a telegrapher's equipment has been reduced from \$5.00 to \$3.00, and orders may be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York. All orders should state the make of typewriter for which the counter is desired, as attachments differ.

The United States Senate has passed a bill requiring telegraph companies to pay a tax on their gross earnings in the District of Columbia. As this bill had previously been passed by the House of Representatives it now goes to the President for approval.

Such is the scarcity of telegraph operators in Vermont that when one disappeared suddenly a short time ago bloodhounds were placed on his trail in order to find him and bring him back to his duties.

LETTERS FROM OUR AGENTS.

DETROIT, POSTAL.

William J. Macksey has been appointed all-night chief operator, vice W. C. Griffin, who resigned recently to accept a position with the American Telephone and Telegraph Company. B. C. Van Valkenburg has been appointed assistant night chief operator.

PHILADELPHIA, POSTAL.

Superintendent C. E. Bagley, General Foreman Lane and Foreman Gorsuch have returned from a tour of inspection of the telegraph lines along the New York, Philadelphia and Norfolk Railway and report very favorably on their condition for the coming volume of business to be handled during the produce season.

Mr. E. B. Pillsbury of New York, general superintendent of the eastern division was a recent visitor.

Chief Operator Earl W. Miller has returned after an illness of ten days and is superintending the rearrangement of the office.

NEW YORK, WESTERN UNION.

Dr. T. H. Fisher, formerly of this department, died in Brooklyn on May 8, aged fifty-five years. Dr. Fisher studied medicine while employed as a telegrapher in this office. Since completing his course about twenty years ago he has been practicing his profession in Brooklyn.

W. H. Mayer of this department is confined to his home, at Passaic, on account of a broken leg.

Bound Volumes of Telegraph Age.

For those of our readers who desire to have the past year's issue of Telegraph Age in a form in which they can readily preserve all of the copies for future reference we would recommend a bound volume. We are now able to supply these containing the twenty-four issues of 1909 for the nominal price of \$3.50. There are several features in one of these volumes which comprise nearly 900 pages of reading matter, which are alone worth much more than the amount asked. The series of articles by Willis H. Jones entitled "Some Points on Electricity" are in themselves worth the price of the book to any student. We have also published articles by the best informed authors upon the developments in wireless telegraphy, and, in fact, there will be found recorded in this book all of the important improvements in the wireless art during the past year. The use of the telephone for train despatching has largely increased since January, 1909, and we have kept pace with its development by presenting to our readers many articles upon this subject, written by some of the best posted men in the railway and telephone world. These are but a few of the many features presented in Telegraph Age, during 1909, and those interested in any branch of the telegraphic industry will find much valuable information in one of these bound volumes. A copy of this work will be sent to any address upon receipt of price, \$3.50, by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Weber's Handy Electrical Dictionary is a practical handbook of reference, containing definitions of every term or phrase used in the electrical industry. This vest pocket size indexed handbook contains over two hundred pages and over three thousand definitions. Notwithstanding the limitations of space, the work is so clear and lucid in its definitions, and so comprehensive in its scope, that it is not only an indispensable guide to the electrician in the intelligent performance and understanding of the duties of his profession, but is a work of the highest order of educational merit as well. Price, 50 cents. Address orders to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.

The Serial Building Loan and Savings Institution, of 195 Broadway, New York, has a record of over twenty-five years of successful operation. It is the oldest association of its kind in Manhattan and its business is conducted in the safest possible manner. It is managed by and for telegraphers and no securer place for the deposit of savings can be found. Write for particulars.

Telegraph Operator who wants a railroad job at \$55. Address "Relief," care of Telegraph and Telephone Age.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care Telegraph and Telephone Age, 253 Broadway, New York.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEY-BOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

Leg Pattern \$3.50
Legless Pattern 4.00
P.O.B. Columbia, Pa.

THE LEFLEY KEY



The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,
Columbia, Pa. R. F. D. No 1.

Telegraph and Telephone Age

No. 11.

NEW YORK, JUNE 1, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons in Electrical Measurement. Joint Resistance.

PART III.

Where the values of resistance in conductors are represented in large numbers; that is to say consist of a group of figures containing three or more numerals each, the "reciprocal" method of ascertaining joint resistance as described in the previous installment of this article is not usually followed for the reason that the calculations require too much figuring.

Under these conditions the rule of determining the joint resistance of two wires is to divide the product of the two resistances by their sums. From this rule we get the following formula: $JR = \frac{R \times R'}{R + R'}$

In which JR stands for joint resistance. R stands for the resistance of one wire. R' stands for the resistance of the second wire.

Example: Find the joint resistance of two wires possessing 1,800 and 900 ohms, respectively.

If we substitute these figures for the letters in the formula each represent we get

$$\frac{1800 \times 900}{1800 + 900} = \frac{1,620,000}{2,700} = 600$$

600 ohms, therefore, represents the joint resistance of the two wires.

Now if the example had called for the joint resistance of three wires, say of 1,800, 900 and 1,200 ohms, respectively, instead of two, the solution of the problem would have required a second calculation identical with that of the first. We can only ascertain the joint resistance of a group of wires by this method by dealing with them in pairs separately. In other words we can determine the joint resistance of but two conductors at a time, but after having done so the joint resistance of any such pair may be considered the same as though it represented the actual resistance of one single conductor. Hence we can couple the latter with the resistance of the third wire and repeat the operation. The answer obtained in the second calculation will give the joint resistance of the three wires.

Thus, treating the joint resistance of the first two wires, 600 ohms, as though it represented one wire and pairing it with 1,200, the resistance of the third wire we find that the joint resistance of all three conductors is

$$\begin{aligned} 600 \times 1200 &= 720,000 \\ 600 + 1200 &= 1,800 \\ \frac{720,000}{1,800} &= 400 \text{ ohms.} \end{aligned}$$

If there were more wires in the group the operation would be continued in the same manner, simply coupling the last joint resistance with the next wire and then proceeding as before.

Sometimes the joint resistance of two wires and the actual resistance of but one of the pair are known. In order to determine the resistance of the second wire in a case of this kind the formula is made to read: $\frac{R \times R'}{R - R'} = \text{Resistance of the second wire.}$

The only alteration being in the divisor, where instead of adding the resistances together, the lesser resistance is subtracted from the greater.

Using the same example for the purpose of demonstration, we know that the resistance of one of the wires is 1,800 ohms and that the joint resistance of it and its companion is 600 ohms. What is the resistance of this second wire?

Substituting the known values in the last formula we get $\frac{1800 \times 600}{1800 - 600} = 900$.

Hence 900 is the resistance of the second wire and this we know to be correct.

JOINT RESISTANCE OF DIVIDED CIRCUITS.

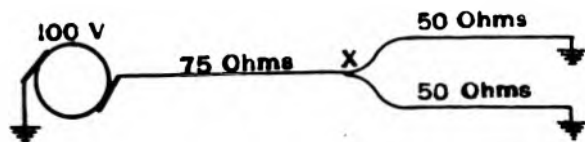
In a combination circuit containing taps or leaks the manner of ascertaining the total amount of resistance therein is somewhat different from either of the processes described.

Let us suppose we have a circuit made up in the manner shown in the accompanying diagram.

In order to find the total resistance of this circuit we must first find the joint resistance of the branch lines. In this case where we have two branches, each of which possesses 50 ohms, the joint resistance of the pair is 25 ohms. This means that

the entire resistance of the circuit is $75+25=100$ ohms. If there had been three or four branches from X, the calculation would be made in the same manner, viz: ascertain the joint resistance of all the branches and add the same to 75 for the total amount.

This diagram offers an opportunity for interesting study in several other ways. For instance, we may ask: How much current does the circuit draw from the dynamo? How much will flow in each of the three wires and why? Also: What is the value of the electromotive force at the point X?



Having ascertained that the total resistance in the circuit is 100 ohms, it follows from Ohms law $\frac{E}{R} = C$ that $\frac{100}{100} = 1$ ampere of current, the total volume drawn from the dynamo. It is also evident that all of it must flow through the wire leading to X, hence the lead takes 1 ampere. As the current divides equally between two branches when the resistance of the latter is the same, we find that each leg takes one-half of an ampere of current.

To find the value of the electromotive force at X, it is merely necessary to ascertain what percentage of the total resistance in the circuit the current has passed through when it has reached X, for the reason that the electromotive force in the line falls from maximum value to zero in direct proportion to the resistance at the point taken.

Thus we find 75 per cent. of the resistance has been overcome, hence the drop is 75 per cent. of 100 volts, leaving but 25 volts at X to furnish current in the branches. But as there is but 50 ohms resistance in each leg beyond X $\frac{25}{50} = \frac{1}{2}$ ampere. This answers the question as to why it divides equally at X.

If the branches were unequal, then each such branch would take current in volume according to Ohms law $\frac{E}{R} = C$, E being the value of the E. M. F. at X.

(To be Continued.)

Recent Telegraph and Telephone Patents.

A patent, No. 956,782, for a signal system, has been granted to H. O. Rugh, of Sandwich, Ill. Selective signaling device for party-line telephones, the substation having a signal controlling element controlling two signals with switching devices at central to operate either signal, and to place the controlling element in operative position.

A patent, No. 956,808, for a telegraphic relay, has been issued to Isidor Kitsée, of Philadelphia, Pa.

A patent, No. 957,050, for a telautograph instrument, has been secured by A. L. Golden, of Oakland, Cal. A plurality of magnets with moveable cores, a universal joint connected with all of them, a lever pivoted in the joint and a writing instrument pivotally secured to the lever.

A patent, No. 957,312, for a telegraphic keyboard transmitting apparatus, has been taken out by Patrick B. Delany, of South Orange, N. J. Transmitting keys, one for each character or letter, are provided.

A patent, No. 957,403, for a telephone receiver, has been awarded to Nathaniel Baldwin, of Heber, Utah.

Patents Nos. 957,489 and 957,490 for telephone apparatus and 957,491 for a telephone system have been granted to Charles F. Bradburn, of Delmer, Ontario, Can.

The following patents have expired:

Patents Nos. 496,904, for multiple-switchboard apparatus; 496,905, for a multiple-switchboard system; 496,906, for multiple-switchboard testing apparatus, and 496,907, for testing apparatus for multiple-switchboard systems, held by Charles E. Scribner, of Chicago, Ill.

Personal.

Dr. Alexander Graham Bell sailed from New York May 20 on a trip around the world.

Mr. J. A. Rosen, secretary of the Hult Transmitter Company, Topeka, Kansas, spent a few days in New York recently, coming here on business.

Mr. W. B. Van Sise, electrical and patent expert and an old-time telegrapher with offices at 253 Broadway, has associated himself with the Western Electric Company as patent expert; his address is now 463 West Street, New York.

Mr. W. H. Sawyer the old-time telegrapher who is well known in electrical circles, having been for many years identified with the American Electrical Works at Providence, R. I., has returned to his home in that city after spending the winter in Pasadena, Cal., as is his usual custom.

Mr. Gerrit Smith, the well-known electrical engineer and inventor, who for many years was identified with the electrical engineer's office of the Western Union Telegraph Company, after three years' illness has almost entirely recovered his health.

Mr. T. Thorne Baker, the inventor of the system for transmitting pictures by telegraph which is described elsewhere in this issue, sailed for England May 21. He expects to return to the United States in the fall and give a demonstration of his system between New York and Chicago.

Mr. Harry A. Tuttle, president and general manager of the North American Telegraph Company and president of the Commercial Club of Minneapolis, was in Denver recently, having been sent there by the latter organization to inspect the large Denver Auditorium and report upon it to the united commercial bodies of Minneapolis with a view of building a similar structure in that city.

Mr. Melville E. Stone, general manager of the Associated Press, New York, tendered Prince Iyesato Tokugawa of Japan, who was a recent visitor in this country, a dinner just previous to his sailing from New York for Europe. Mr. Stone did this as an appreciation of the hearty reception given him while in Japan during his recent trip around the world.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. J. G. Blake, general superintendent of the company at San Francisco is in New York on company business.

Mr. W. I. Capen, general superintendent of plant, New York, has returned to the city after a prolonged absence in the west on business connected with the construction of new lines.

Mr. Thomas A. Edison was a recent executive office visitor taking occasion to call upon many of his old friends in the service. After dining with the officers of the company he visited the various departments shaking hands with all whom he met. He enjoyed a visit of several hours inspecting the modern telegraph installation found in the main office.

A son was born to Superintendent and Mrs. John A. Forehand of Seattle, on April 11.

Mr. H. H. Hall, manager of the Ashtabula, O., office who has been identified with the telegraph service for sixty years and is one of the best known old timers in that state, was a recent New York visitor. Mr. Hall took occasion while in the city to call on many of his old time friends.

The office of the company at Fort Wayne, Ind., has been moved to new quarters.

The Postal club of Atlanta held a German luncheon Saturday evening May 28 in the Merchants' and Manufacturers' Club rooms in that city. Originally designed post card invitations sent out by Mr. A. M. Beatty, whom one of the Atlanta papers characterizes as the chief booster of the club, assured a large attendance.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. S. M. Williams, special agent and Mr. F. A. Pickernell, assistant to the president of the American Telephone and Telegraph Company have gone to Salt Lake City, Utah to join the party of Mr. Belvidere Brooks, general manager, accompanying them back to New York on their trip of inspection.

Mr. Theodore P. Cook, of Chicago, general superintendent of the western division also joined the party at Salt Lake and is accompanying them through his territory.

Mr. A. R. Brewer, treasurer, and Mr. A. S. Dresdner, assistant treasurer of the company have had added to their department an extra office which will be occupied by these two officials. This additional room gives the treasurers' department the extra space long needed.

The Jacksonville, Fla., Board of Trade, has passed resolutions of regret at losing from their membership Mr. B. F. Dillon, who was recently promoted from the superintendency in that city to be general superintendent of the southern division with headquarters at Atlanta. Similar action was taken by the Citizens' Loan Association of Jacksonville. Mr. Dillon had held the office of president of the latter organization since its formation in 1895 and as expressed in the resolution, "his ability and sound judgment have contributed largely to the success of the Association."

Mr. R. A. Black of Philadelphia and Mr. A. C. Kaufman of Albany, who was for many years until June, 1908, superintendent of the Postal Telegraph-Cable Company at Albany N. Y., have been attached to the office of General Superintendent A. G. Saylor.

Albert F. Kelley, aged thirty-five years chief clerk in the office of Superintendent E. M. Mulford, New York, died on May 27.

Mr. S. M. Cullison of the General Superintendent's office has been transferred to the auditor's department.

Mr. Marion H. Kerner, on Memorial Day, had the statue of Professor Samuel F. B. Morse in Central Park appropriately decorated. For sixteen years now Mr. Kerner assisted by a few other loyal admirers of Professor Morse has paid this tribute to the memory of the inventor of the telegraph.

An entirely new office in more commodious quarters has been moved into at Sioux City, Iowa.

At the annual meeting of the American Telegraph and Cable Company, held May 25, Edward J. Hall, Union N. Bethell, and Belvidere Brooks were elected directors, to succeed J. T. Terry, George J. Gould, and Edwin Gould. Other directors were re-elected.

At a recent meeting held at Kenosha, Wis., of the stockholders of the Northwestern Telegraph Company, owner of many lines operated by the Western Union Telegraph Company in Wisconsin and Minnesota, control of the company formally passed into the hands of residents of Hartford, Conn. A majority of the stock, amounting to nearly \$4,000,000, was voted by Francis R. Cooley of Hartford, and the old Directors gave up their places to Francis R. Cooley, Charles P. Cooley, Jonathan B. Bruce, Lyman B. Brainard, Arthur L. Shipman, Arthur R. Bradley, and Henry M. Sperry, all of Hartford.

C. B. Horton, Assistant Superintendent, Western Union Telegraph Company, Omaha.

Mr. Charles Bela Horton, who has recently been appointed assistant superintendent of the third district, western division of the Western Union Telegraph Company, with headquarters at Omaha, is one of the younger men in the service. He has evidently inherited the true telegraphic instinct, however, from his father, the late Charles B. Horton, having himself served for many years



C. B. HORTON.

Assistant Superintendent, Western Union Telegraph Company, Omaha.

as assistant superintendent and superintendent at Omaha. Mr. Horton was born at Northville, Mich., May 16, 1876, and entered the telegraph service in October, 1891, as messenger in the Omaha office of the Western Union. In June, 1893, he became an operator in that office, later serving in the same capacity at Denver, Aspen and Colorado Springs, Col. In 1898 he was made manager at Deadwood, S. D., and filled that position until 1903, when he joined the telegraphic staff of the Globe-Democrat of St. Louis. In June, 1904, he returned to the Western Union service as manager at Lincoln, Neb., where he was located until his recent promotion.

The Cable.

Mr. James A. Scrymser, president of the Central and South American and Mexican Telegraph Companies returned to New York, May 20, from a three months trip to South American points, during which he took occasion to visit the stations of the Central and South American Telegraph Company along the Pacific coast and at the Isthmus of Panama. Mr. Scrymser was accompanied on his trip by his wife, Mr. J. Montgomery Hare and Mr. Loyall Farrugut.

The Central and South American Telegraph Company announces that on and after June 1 the rates between the United States and Canada, and Peru, Bolivia, Chili, Argentina, Uruguay and Paraguay will be reduced fifteen cents per word,

making the rate from New York east of the Rocky Mountains and Canada eighty-five cents and west of the Rocky Mountains eighty-six cents per word.

According to the annual report of the Indo-European Telegraph Company for the past year one of that company's North Sea cables was out of commission 79 days during the year on account of the depredations of trawlers and their second cable was interrupted for 66 days from the same cause.

Mr. Clarence H. Mackay has made the following statement in regard to the report in English and American papers that The Commercial Cable Company had formed an alliance with the Anglo-American Telegraph Company:

"The Commercial Cable Company never has had, and has not now, and does not intend to have any connection, whatsoever, with its competitor, the Anglo-American Telegraph Company, either in the way of controlling its stock, or making any traffic agreement, or in any other way. The Commercial Cable Company will continue to be independent and competitive just as the Postal Telegraph-Cable Company will continue to be independent and competitive. All reports to the contrary are false."

Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company, New York, at the hearing recently held by the Canadian Senate in regard to the bill which was introduced in that body with a view of placing cable companies under the jurisdiction of the Railway Commission and requiring them to lower their rates made the following statement.

"None of the Atlantic cable companies are earning more than a fair return. Some are not even earning that, because of the loss of income from disabled cables and the enormously increased charges for maintenance. To reduce rates would be to reduce income still further.

"There is no reason to expect that the trans-Atlantic cables will be free from damage or breakage in the future, any more than they have been in the past. On the contrary, the agencies which inflict the injury are multiplying and extending the field of their operations, and the cable companies must take into account the probabilities that their repair bills and loss of traffic will increase and will not diminish. One of our cables was damaged last year about sixty-five miles from our cable landing at Dover Bay, Nova Scotia, and we were in consequence deprived of its use for three months. When making the repair our repairing ship found that for a distance of two and a half miles the cable had been caught about every ten fathoms by steam trawlers, and had been flattened, twisted and subjected to great strain. A large number of steam trawlers are now fitting out in readiness for this season's fishing, and we dread the damage which they may do us, and which we see no way to avert. The strongest, newest and

best cables are not immune from the depredations and devastations of these trawlers.

"The Commercial Cable Company has had three cable ships at sea at one time repairing or replacing disrupted cables. For over six months continuously during the past year we at no time had our entire facilities working, there being some break somewhere during all that period. The expense connected with all this has been enormous, to say nothing of the loss of business on account of not having complete facilities. In fact, the menace to the business is so great that we have decided to lay still another cable in the Atlantic Ocean, although such additional cable is entirely unnecessary to our present business if we could be sure of having our present facilities uninterrupted. Then there is our competitor, the Western Union Telegraph Company. We are told that for nearly nine months both of its cables have been entirely disrupted and out of use. The Direct United States Cable Company which has one cable in the Atlantic Ocean, has also been in trouble during the past winter. All the cable companies without exception have had these troubles, and the aggregate expenditure for interruption and repairs has been enormous.

"This demand on the part of Canada for reduced rates is not justified. Canada already enjoys a much lower rate than would be possible if the rate were to be fixed for a cable service dependent on Canadian traffic alone. It is the large volume of United States traffic that renders possible the low trans-Atlantic rate for the smaller volume of Canadian traffic. The cable rates across the Atlantic are the lowest cable rates in the world. The companies, and especially this company, have shown their friendly disposition towards Canada already by making a special rate as a matter of special gratification to Canada for the traffic in which Canada herself is specially interested—namely, the traffic between Australia, Canada and Great Britain."

S. Fenn, Manager of Direct U. S. Cable Company.

Mr. Samuel Fenn who was recently appointed manager of the Direct United States Cable Company with headquarters at London, England, is one of the old timers in cable circles having entered the service when submarine cable communication was in its infancy and grown up along with it, so to speak. Mr. Fenn was born at Brentford, England, May 28, 1855 and entered the employ of the Electric and Intercolonial Telegraph Company in 1868 as operator. In 1875 when the cable of the Direct United States Cable Company was laid he joined the forces of that company being employed at Halifax. He was connected with the company's station at that point from that time until his recent promotion, serving successively as operator, assistant superintendent and superintendent.



SAMUEL FENN.

Manager, Direct United States Cable Company, London.

J. F. Fraser, Superintendent Direct United States Cable Company, Halifax.

John F. Fraser, who was recently appointed to the superintendency of the Direct United States Cable Company, at Halifax, as briefly mentioned in our March 16 issue, was born at Fochabers, Morayshire, Scotland, October 5, 1854. He prepared for Aberdeen University, but did not enter, passing instead into the Govern-



JOHN F. FRASER.

Superintendent, Direct United States Cable Company, London.

ment Postal Telegraph service at his native place soon after the transfer to the state of the inland telegraphs in 1870.

At the formation of the Direct United States Cable Company Mr. Fraser joined the electrical staff of the company under Mr. George Von Chauvin at the works of Messrs. Siemens Brothers on October 6, 1873, and was engaged in testing duties during the manufacture and

submersion of the cables. When the cable was landed at Rye Beach, N. H., he remained there as the company's first representative and later joined the operating staff under Mr. George G. Ward, filling the positions of operator, clerk in charge and assistant superintendent. In 1888 he took charge of the Rye Beach station, when Superintendent W. J. Fraser assumed dual control of the Boston and Rye Beach offices.

Mr. Fraser has had a wide experience in translation and testing work at Rye Beach, where the first union of the English double current and American closed circuit system was accomplished.

Municipal Electricians.

Mr. H. T. Snyder has been appointed superintendent of the fire alarm bureau at Los Angeles, Cal.

The installation of a fire alarm telegraph system has been recommended at Kansas City, Mo. At present the telephone is depended upon entirely for reporting fires in that city.

The fifteenth annual convention of the International Association of Municipal Electricians will be held in Convention Hall, Rochester, N. Y., September 6, 7, 8 and 9. The previous convention chose wisely in selecting the place for their next gathering and there is no reason why the coming meeting should not be the most successful and enjoyable one ever held by the association. Any one desiring particulars may secure the same by addressing the secretary Mr. Frank P. Foster, Corning, N. Y.

Telegraph and Telephone Companies Under Control of New York Public Service Commission.

The bill placing telegraph and telephone companies operating in New York State under the jurisdiction of the Public Service Commission of the Second District of the State which has its headquarters at Albany, has been passed by the Legislature.

This measure was prepared by the Special Legislative Committee which made a careful investigation of the conduct of these companies during the past winter. Power is given to the commission, upon complaint or upon its own motion, to issue orders in relation to rates and service. This authority, the bill stipulates, shall not be construed as giving the commission power to make an order requiring a telegraph or telephone company to perform any act which is unjust or unreasonable or in violation of the requirements of its franchise or of any State or Federal law.

The Commission receives the power of investigation and limited control over the forms of accounts and records of the companies, which are required to file annual reports with the Commission. The Commission is given the veto power over the exercise by the companies of

rights and privileges under the franchises, which they have not exercised up to this time.

The measure contains provisions against discrimination in rates. It prohibits any corporation or association other than a telephone or telegraph company, to acquire more than ten per cent. of the stock of any telephone or telegraph company.

The bill prohibits the granting of reduced rates or free passes or franks for transmission of any messages except by officers or employees of the companies.

The bill requires that the permission and approval of the Commission shall be given for issues of stocks and bonds, except that companies may issue notes payable otherwise than on demand for proper corporate purposes without the approval of the Commission, and notes to be payable at specified periods of not more than twelve months.

Retirement of R. F. Easson.

Mr. R. F. Easson, superintendent of the press and commercial news department of the Great North Western Telegraph Company at Toronto, Ont., has, after sixty-one years in the service, retired, his resignation becoming effective June 1. Mr. Easson joined the force of the Montreal Telegraph Company in Toronto in 1844, at the age of eleven, being the second messenger employed in that city. With the exception of two years from 1853 to 1855, when he was employed in Chicago, his entire telegraphic career has been spent in Toronto. In 1864 he became chief operator and in 1882, when the Montreal Telegraph Company was taken over by the Great North Western, Mr. Easson became superintendent of the press and commercial news department, which position he has held until the present time. The system which he has organized for gathering the news of the Dominion and distributing it to the various newspapers is known as the Easson service and is regarded as especially complete in all its details. The many friends of Mr. Easson throughout the country wish him a long and pleasant holiday.

The Associated Press.

The telegraph bureau of this association located on the third floor of the Western Union Telegraph building at 195 Broadway, New York, is, since its complete overhauling, declared to be the best equipped press office in the country. New and up to date telegraph apparatus has been installed throughout the office and ample space has been provided for each operator so that the work of the department is now carried on with the greatest possible facility and convenience.

Among the members of the force is Mr. W. L. Waugh, who has been in active service since 1878 and has probably transmitted more press matter during his thirty-two years of employment with this association than any other operator.

The Telephone.

The report of the Cumberland Telephone and Telegraph Company for March shows an increase in the gross income of \$39,595 over March, 1909.

Mr. E. L. Cline, manager of the Toledo Home Telephone Company at Toledo, Ohio, has been appointed general manager of the New Long Distance Telephone Company, at Indianapolis.

The New York Telephone Company has filed with the Secretary of State at Albany a certificate increasing its capital stock from \$100,000,000 to \$125,000,000. There has been issued up to the present time stock of a par value of \$85,672,800.

Mr. H. B. Thayer, vice-president of the American Telephone and Telegraph Company, and president of the Western Electric Company spent a few days in San Francisco recently, going there on business connected with the service.

Mr. V. B. Hicklin has been promoted to the managership of the telegraph department of the American Telephone and Telegraph Company at Des Moines, Ia., where quite a large number of repeaters are located.

Mr. James K. Wass, who has been auditor of the Bell Telephone Company of Missouri, at St. Louis for the past seven years, was the guest of honor recently at a dinner given to celebrate the twenty-fourth anniversary of his continuous service with the company.

William R. McGovern, chief engineer of the Wisconsin Telephone Company, lectured before the engineering classes of Marquette University at Milwaukee, Wisconsin, May 21, on the "Engineering and Construction of a Telephone System."

The report of the American Telephone and Telegraph Company and associated companies for the three months ending March 31, shows gross earnings of \$39,533,281 and a net income of \$12,197,112. After paying \$2,598,141 interest and dividends amounting to \$6,400,674, this leaves a surplus of \$3,198,297, an increase of \$722,774 over the corresponding period in 1909.

The stockholders of the Continental Telephone and Telegraph Company, at a meeting recently in New York, elected the following board of directors: J. N. Vance, Senator William Flinn, Herman C. Stifel, George E. House, John A. Howard, A. S. List, Samuel W. Harper, Max Koehler, Robert C. Hall, Walter S. Dickey, George E. Sifel, W. C. Handlan, John W. Garland and William M. Clark.

John G. Stoakes, who for over thirty years was secretary and treasurer of the Central District and Printing Telegraph Company of Pittsburg, died in that city May 15, aged fifty-six years, after an illness extending over three years. Mr. Stoakes was born at Wilkville, O., and after leaving high school became a telegrapher for the Pennsylvania Railroad in his native town. He afterward went to Pittsburg, entered the telephone service and soon became secretary and treasurer of the company, which position he held until the recent reorganization when the executive offices were moved to Philadelphia.

Mr. E. H. Greenleaf, district plant superintendent of the New York Telephone Company, Newburgh, N. Y., was a recent New York visitor coming here on company business.

The annual report of the Cuyahoga Telephone Company of Cleveland, Ohio, for 1909, shows gross earnings for the year of \$842,387 and net earnings of \$392,525. This is one of the most important of the so-called Morgan properties and has over 26,000 stations.

It is reported that an option has been secured by J. P. Morgan and Company on \$2,000,000 worth of bonds of the Interstate Telephone and Telegraph Company of Illinois out of a total issue of \$2,300,000. This company is an independent company having connections throughout Illinois and their lines would furnish connection between the Ohio and Indiana properties controlled by Morgan and Company and the new independent telephone system which is to be installed in Chicago.

An order has been issued at Trenton, N. J., by United States Judge Rellstab, requiring the Continental Telephone and Telegraph Company to show cause why a receiver should not be appointed upon the grounds of insolvency. The complainants are Bernard M. Wolf of Boston and Max Koehler of St. Louis, stockholders. Mismanagement of the company's affairs and misuse of assets by some of the officers are alleged as the cause of the troubles of the company. Pending decision on the application, the officers of the company are restrained from disposing of any of the assets.

A New Telephone Relay.

Mr. S. G. Brown, the inventor of the submarine cable relay, has recently developed a telephone relay or repeater which is said to possess some remarkable properties. The principle of this relay depends upon the researches of Professor J. J. Thomson and others with regard to the flow of electrons across a microscopic air-gap between two conducting surfaces at different potentials. If the metallic circuit of a dry cell be interrupted by a minute space of the order of 5×10^{-7} centimeters, the metal at the point of interruption being platinum, the current will continue to flow round the circuit and across the opening, and any slight alteration in the length of the space will vary its resistance and greatly affect the value of the current that flows round the circuit. This conduction space is therefore exactly what is wanted for the current-varying device of a telephone relay, where microscopic mechanical movements are to be transformed into large current changes. The relay constructed on this principle will magnify the feeblest telephone currents, speech or signals too faint to be heard in the ordinary telephone receivers being heard clearly by means of the relay. In wireless telegraph work it has detected messages, the very existence of which was not even suspected.

Radio-Telegraphy.

The Belgian Marconi Wireless Telegraph Company reports a net profit for the past year of about \$9,500, as compared with about \$5,000 for the previous year.

It is stated that the French government will install a chain of wireless stations to connect their various African possessions and that wireless communication will be established across the desert of Sahara.

A patent, No. 956,489, for signaling for electromagnetic waves, has been granted to R. A. Fessenden, of Washington, D. C. A medium of high specific inductive capacity with an antenna and reflector immersed in the medium.

A patent, No. 956,936, for apparatus for teaching wireless telegraphy, has been granted to F. E. Butler, of Detroit, Mich. A sending key, an adjustable core resistance coil, a buzzer and generator in series receiving circuits and telephone receiver.

The Hawaiian Islands are now completely linked together by wireless telegraphy. The principal station has a day range of 400 miles and a night range of 1,250 miles. This station is reported to be in frequent communication with Sitka, Alaska, 2,000 miles distant.

Now that Marconi has successfully re-established the trans-Atlantic wireless service of his company, it is said that he will next turn his attention to overland wireless transmission with a view of extending his system from the Atlantic to the Pacific coast of Canada.

A recent report of the British Post Office shows that at the end of 1909, 116 sea-going vessels were licensed by the English Government to carry wireless telegraph apparatus. There were also 260 licensed land stations in the United Kingdom of which 241 were for experimental purposes.

The French liner *La Provence* has been equipped with the Bellini-Tosi "wireless compass" system and on a recent voyage from Havre to New York gave this device a thorough test. It was found that by this means the relative positions of the ship and any other vessels with which they could get into wireless communication could be accurately determined. By making observations of the direction of land stations of known location the course of the ship could also be ascertained.

The United Wireless Telegraph Company has received orders for equipping twenty-one vessels of a Brazilian steamship company, the *Lloyd Brasileiro*, with wireless apparatus. They will also establish eight shore stations in Brazil. One of these stations is to be at Rio Grande de Sul, one at Santos, three in and near Rio de Janeiro, one at Bahia, one at Pernambuco, and one at Para. The system will afford communication between Rio de Janeiro and all of the *Lloyd* fleet at all times, except when those in the New York service are out of range.

Beginning May 23 the French Government inaugurated a wireless time service from the Eiffel Tower for the benefit of ships at sea. Time signals are sent out at midnight and at two minutes and four minutes after midnight.

A patent, No. 957,001, for wireless telegraphy, has been awarded to Frederick G. Sargent, of Graniteville, Mass. Receiving apparatus of a wireless telegraph system is provided with a circuit-breaker for the local circuit, connected with the relay circuit and operating to break the direct connection between relay and coherer to compel all the Hertz waves to pass through the coherer, and establish an indirect connection therebetween.

A patent, No. 957,852, for a transmitting system for space telephony, has been issued to Victor H. Laughter, of Detroit, Mich. Space telephony apparatus comprising a transmitting set including in the circuit oscillation-inducing means adapted to be adjusted to a state of inactivity close to the critical point, and means adapted when influenced by sound waves to bring the oscillation-inducing means to a critical operative point, a receiving set, and means in circuit with the transmitting set adapted to throw the receiving set into operative relation with the aerial limb of the transmitting set when the oscillation-inducing means is inactive and to cut out the receiving set when the inductor is rendered active.

The officers of the newly formed Continental Wireless Telephone and Telegraph Company are: President, F. T. Davis, of Philadelphia; vice-president, Walter W. Massie, of Providence, R. I.; general manager, Thomas E. Clark, of Detroit, Mich.; technical director, A. Frederick Collins, of Newark, N. J. The headquarters will be in New York. The new company contemplates the institution of a transcontinental commercial service, as well as the continuance of marine reports and shipping messages. As announced in our previous issue, the companies which form the consolidation are the Massie Wireless Telegraph Company, Clark Wireless Telephone and Telegraph Company, Pacific Wireless Telegraph Company and the Collins Wireless Telegraph Company.

According to a German publication, the Zeppelin Air Ship Company have recently carried out some wireless telegraph experiments, using the new Telefunken singing spark system, and have obtained some very satisfactory results. The experiments up to the present have shown that with a comparatively simple laboratory form of apparatus installed on the Zeppelin air-ship signals can be readily given and received at distances up to at least fifty kilometers from the Telefunken Station at Nauen. It has also been found that the large mass of metal employed in the construction of this form of air ship enables considerably less sending energy to be employed for a given distance than is the case with the ordinary land stations or stations carried on other non-metallic types of air ship.

New Methods of Transmission Employed in Wireless Telegraphy.*

BY G. FERRIE.

Among the numerous defects which were charged against wireless telegraphy on its first appearance the chief was that little security was offered as regards the messages entrusted to it; the reception of radio-telegrams could be spoiled, not only by the signals simultaneously sent from other stations, but also by the electric phenomena of the atmosphere. Although the numerous investigations which have been made with a view to remedying this state of affairs do not yet permit of absolute security for Hertzian messages, important improvements have been realized, and the situation is distinctly ameliorated.

The maximum of security would be obtained were it possible to realize, on the one hand, an emission of very regular unifrequent waves, having as small damping as possible, and, on the other hand, receiving and detector circuits of small damping, and which could only be set into vibration under the influence of an oscillatory movement of single, well-determined frequency. At the sender the desired result will be realizable when it becomes possible to generate sustained oscillations of sufficient power.

Since 1903, following Poulsen, numerous attempts have been made to utilize the singing arc supplied at low tension, with a view to producing such waves, but the results are not good enough for modern practice. The production of very high frequency alternators for use in supplying the antenna directly without the intermediary of arc or spark is occupying attention in France at the present time, and the results obtained in this direction will shortly be published.

In the methods in actual use which employ the discharge of a condenser for generating the Hertz waves, either inductive or direct excitation is used. Wien has shown that the disposable energy is split up between the two vibratory motions whose wave-lengths differ the more the closer the coupling employed. It is, therefore, important to try to reduce the difference—that is, the coupling—at the same time keeping the value of the latter sufficiently high for the energy transference from the one circuit to the other to take place. It has been found that for values of the coefficient of coupling lying between .06 and .12 the energy is practically confined to a single one of those two oscillations, the slower or the faster, according to the relative values of the elements of the circuits. For the measurement of the coupling and the damping recourse is usually had to wave-meters and to the equations of Bjerknes.

Although there are many kinds of wave-meter, a new type has recently been devised by the author, which enables measurements to be made without any adjustments from a simple reading. The principle is as follows: Between two points, a certain effective E.M.F. is maintained by means

of a single loop which encloses a part of the flux to be measured. Between these two points two circuits are connected, each containing one wire of a hot-wire ammeter and an impedance. Each of the wires controls a pointer; these pointers are both capable of movement across the same scale. For each value of the frequency the pointers cross at some point on a curve which can be empirically marked on the scale. The apparatus having been previously graduated, the measurement of the wave-length or frequency of an oscillating circuit is made by simply taking a reading of the point of intersection while the loop is held near to the circuit.

The calculation of the damping of antennæ is not a simple matter, owing to the apparent resistance due to radiation and to the difficulty of measuring the low resistances of earth connections. It is, further, important in practice to keep down the ohmic resistance of the circuits. In the installations erected by the military telegraphs, direct excitation is employed, and the resistance of the connections from the exciting circuit is reduced as much as possible, these being made of wide strips of thin sheet copper. Bethenod's formula for the high-frequency resistance of conductors shows particularly that it is important to diminish the thickness of the sheet. Finally, the mass of the sparking electrodes has been made considerable, with a view to avoiding over-heating during prolonged working.

This construction of the circuits has rendered it possible to make the capacity greater, other things being equal, and, as a result, increased the power brought into play, with loose coupling and reduced damping. Poincaré has shown that the radiation decrement of an antenna composed of several wires increases with the number of wires and with decrease of the mutual induction between the wires, hence with increase of the distance apart of the wires; but since the volume which can be given up to an aerial in space is limited in practice, it is advisable to employ a sufficiently large number of wires, within limits.

The method of charging up the condensers is also of importance, not merely as regards the quality of the spark, but also as regards ease of reception of the transmitted signals. Telephonic reception having been almost exclusively employed of late years, the number of sparks and the kind of sound they produce are both of some importance. The majority of installations at present employ low-frequency current which is stepped up for charging the condensers by means of resonance transformers. With such transformers liberally designed, both as regards the iron and the copper circuits, it is easy to obtain pressure rises of six and even of ten. The number of sparks is not equal to the number of alternations, and it is possible, by suitable means, to vary the number of sparks between ten and twenty on alternating current of forty or fifty cycles per second. The sparks being so few in number, each represents a considerable power. Arcing is, however, not so persistent, since the sparks are due to pressure

*Abstract of an article from the bulletin of the International Society of Electricians.

risers; but still, in order to avoid formation of an arc, the electrodes of the spark-gap have been made in the form of large parallel cylinders; for very large powers these cylinders should be kept rotating. A more musical note is obtained by using a metal wheel provided with teeth and rotating between the electrodes of the spark-gap. This suffices for one to two kilowatts, but if a larger amount of power is employed the heating is too great and arrangements must be made to ensure that the spark always jumps from the moving tooth to a new spot on the fixed electrode. For powers of six kilowatts to ten kilowatts, the author, with Fracque and Brenot, has obtained good results using a discharger arranged in the following manner: On a copper cylinder twenty-five centimetres in length copper rods are fixed radially, each passing perpendicularly through the axis of the cylinder, and being equally spaced angularly; fifteen or twenty such rods are used. The cylinder is driven by an electric motor, the minimum tangential velocity of the ends of the rods being fifty metres per second. The sparks occur along the length of the fixed electrodes as each rod on the cylinder arrives in turn at the position where the air-gap is smallest.

A well-sustained musical note is obtained with this device, although some irregularity is caused by the blank spaces which occur in the series of sparks, and which are unavoidable when low-frequency alternating current is used. The use of such dischargers is not limited to the case of alternating currents, for Marconi has for several years past been using a rotating disc discharger with direct current at 10,000 volts.

Instead of employing low-frequency alternating currents, it is advantageous to use alternating current of higher frequency—300 to 1,000 cycles per second—so as to be able directly to obtain sparks of the required frequency for a musical note. Such arrangements have, in fact, been employed by von Lepel and by the Telefunken Company. Investigations along this line also have been made by the author with Fracque and Brenot. These have shown that it is impossible to obtain a musical note with the ordinary discharger, since the blank spaces occur just as with low-frequency alternating current. If, however, the discharger is made in the form of a point opposed to a disc, a good musical note is obtainable; the better the longer the spark, which has been used up to fifteen millimetres. These experiments were made using special alternators furnishing current of 1,000 and of 400 cycles per second. With the latter the note of g' (about 400 vibrations) can be obtained, and by diminishing the excitation c' , and even g . These experiments have as yet, however, only been made with reduced power.

As regards the reception, the use of slightly damped waves has rendered it necessary to find new detectors. These are now available in the shape of detectors operating in virtue of their unilateral properties or as solid electrolytic cells.

For still further safeguarding the receiver against disturbances caused by signals which are

not intended for it, directive antennæ have been tried, with which a maximum intensity is obtained in a definite direction. One ingenious solution of this problem is that due to Bellini and Tosi, and this is being put into practical operation at Boulogne.

Trolley Induction Litigation.

The Indiana Appellate Court, in the case of the Postal Telegraph Company of Indiana vs. the Chicago, South Shore and South Bend Railway Company, which was appealed from the La Porte County Superior Court of that state, has granted the appellee's request for oral arguments and has fixed the same for June 9.

In the case of the Lake Shore and Michigan Southern Railway Company, which also was appealed from the La Porte County Superior Court, the Indiana Appellate Court overruled a motion to postpone the hearing for advancement, advanced the cause and fixed the oral argument thereof for June 9. The same ruling was made in the case of the Western Union Telegraph Company vs. the South Shore Company.

These cases were instituted by the two telegraph companies and the Lake Shore Railroad in December, 1908, in an endeavor to prevent the use of high tension single phase alternating current by the South Shore Interurban Railroad. Judge Tuthill in the La Porte County Superior Court in June, 1909, ruled that the air was free and that the interurban company had as much right to it as the other companies. A motion to consolidate the three cases has also been filed in the Appellate Court.

Need of a Telephone Engineers' Handbook.

Editor Telegraph and Telephone Age:

Do you publish or do you know of any one who publishes a book on central energy telephone work issued in the same size and style as Jones' "Pocket Edition of Diagrams." I would like a book of this nature so that I could carry it in my pocket. All of the books on the telephone which I have are too large to carry in this way.

May 12, 1910.

Linn Roush.

West Bridgewater, Pa.

This is a sample of many inquiries which we receive for a telephone engineers' hand book. It would seem that the demand for such a work would be great enough to amply repay some one who has an extensive practical experience in telephone work for the labor required in its preparation. The telegraph, electrical, mechanical, civil and other engineering fields all have their so-called pocket books, each containing a vast amount of information relating to the particular branch of industry to which it applies and with the large number of progressive men now employed in telephone work there is no reason why that field should not also have its hand book of ready information.

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June 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Study of the Telegraph.

The plan which we have recently adopted of publishing in each issue a list of questions, the answers to which can be found in Jones' Diagrams, seems to fill a long felt need on the part of many of those connected with the telegraph who desire to obtain a thorough knowledge of the principles underlying the operation of the apparatus which they see before them every day. It is difficult for most people, unassisted, to study a book and secure therefrom the most important information. The boy in school only learns his lesson so that he remembers it by studying it and then answering the questions of his teacher. If he was left to follow his own course and merely made to devote a certain amount of time to reading the lesson it is safe to say that nine out of ten would fail when examination time came. It is the same with those of more mature mind who endeavor to increase their knowledge by self-education. Upon first reading a chapter in the book which they are studying the principles there evolved, may seem so plain that it appears to be

wasted effort to give that chapter any more attention. This is where the mistake is usually made. With nothing to direct the mind along a course which will enable it to retain the important things which come before it the best things are lost, entirely forgotten when the time comes when they might be of use.

We believe that the plan which we have adopted will enable many of those desirous of increasing their store of electrical knowledge to check themselves before they commit the common error of believing that because a thing is easily understood it is easily remembered. It will be surprising to most people to find how few of those questions they are able to answer after reading over once the text to which they apply. After a second reading they will be able to answer more, but in most cases it will require several careful readings before all of the questions can be answered without referring to the book. As these will appear at intervals of two weeks it will be an excellent idea to study that part of the book to which they apply as soon as the list is received. A half hour or an hour each day spent in this manner for a week would in most cases be sufficient for the student to gain a thorough understanding of that particular part of the book. If this is done he will then be able to take up more intelligently the next succeeding chapters, when the questions bearing upon them appear in our columns.

The words of commendation which we have heard already are sufficiently numerous to make us feel that the plan is a good one and well worth continuing because of the benefit which our readers will derive. We will continue the publication of these questions until we have covered all of Jones' Diagrams and will then take up other standard works on telegraphy and follow the same course.

Cost of Telephone Operation in Chicago.

One of the most complete analyses of the cost of furnishing telephone service in a large city has been made recently by D. C. and W. B. Jackson, expert telephone engineers in the form of a report on the business of the Chicago Telephone Company during the year ending March 31, 1910. This report was prepared in conjunction with certified public accountants and gives these detailed statements: First, a comparative statement by classes of service showing for each the gross revenue, gross expenses, net revenue or losses and the totals covering the portions as a whole; second, a statement showing the details of the investment in property apportioned to each class of service and third, a statement for each class of service showing the details of the expense figures submitted in the first statement.

The company's books show that \$622,296 was expended during the year on reconstruction and replacements. Instead of this amount, however,

the engineers and accountants have added to the expense of operating the property and spread against the various classes of service in the statements of the report the sum of \$1,578,922, which was considered a fair amount to be set aside for depreciation. This figure was arrived at by considering the fact that a large part of the plant has been recently installed and hence has not as yet cost the company anything on account of depreciation, and up to the present time there has been no cost on account of reconstruction occasioned by the construction of street-railway subways; but it is contended that these costs are just as real as the costs for operators or maintenance of plant, and it is said to be just as important for the life of the company and the continued quality of its service that these costs are provided for, although the effect is not so immediately apparent.

Taking this amount into consideration the report shows that the gross revenue for the year was \$7,864,770 and the total expense \$6,973,785, leaving available for dividends and interest on bonds \$890,985. After paying five per cent. interest on the bonds and eight per cent. dividend on the stock this left a deficit of \$908,533.

The tables accompanying the report show that after deducting the proper amount for depreciation only eight classes of service out of the twenty-six included in the classification were conducted at a profit. The greatest profit per station was derived from the public prepaid nickel single party telephone service installed in approved locations only. The net revenue per station on this class of service amounted to about \$67. The greatest loss per station or line was shown in one class of private branch exchange service on which a flat rate is given. The loss in this case amounted to about \$156 per line.

About half of the total deficit is traced to the prepaid nickel four party line residence service, the loss per station on which equals \$5.87. The number of telephones in this class was 72,932.

This report was made for the city in accordance with a provision in an ordinance passed in 1907 extending the franchise of the company. It was made for the purpose of readjusting rates and this question will now be taken up by the city council of Chicago.

Legal.

The ignorance of a clerk as to whether Seida is a man or a woman's name lost for the defendant a suit brought recently against one of the telegraph companies in a municipal court at Detroit. Seida Abda, a Syrian woman, landed at Ellis Island, New York, October 21, 1909, and fell into the hands of crooks. They found that she had a relative in Detroit named John Marab.

They sent a telegram to him asking him to send \$100, and signed the name of Seida Abda. The money was telegraphed and one of the

crooks received it from the telegraph company.

Suit was brought by Marab, and his attorney argued that the company made a mistake in not paying the money to the woman, and that they should have known Seida is a woman's name, and therefore should not have handed the money over to a man.

One of the telegraph companies recently won an important victory in the United States Circuit Court of Appeals when Judge Buffington of that court handed down a decision reversing that of a lower court in an action which was brought against the company in Pennsylvania. During a heavy storm in 1903 fourteen miles of wire were broken down and the company then, to strengthen its line, erected an extra pole between every two in position before the storm. The residents along the road contested the right of the company to erect the poles.

The lower court sustained this contention and refused to grant the company an injunction restraining the residents from chopping down the poles. The Court of Appeals, however, holds that the company has a right to make these improvements and orders that the decree of the lower court be reversed, the case reinstated and an injunction issued restraining the respondents from tearing down, or in any way interfering with the erection of the poles, so long as the complainant stays within the bounds of the law.

The Supreme Court of Massachusetts decided recently that a telegraph company had no right to refuse to accept and transmit a proper message for which pay had been offered. In the case in question suit for damages was brought against the company for its alleged refusal to transmit a message to which was attached a sticker which said:

"Notice is hereby given that this is a business message and that failure to deliver it promptly and correctly is likely to cause sender financial loss."

The court's opinion said that such a notice would furnish no justification for a refusal to send a message whether it might or might not be sufficient reason for charging something more than the lowest rate established for the transmission of messages. It was intended to show that the damage for a failure properly to send and deliver the message would probably be substantial, and, under the statute and the rules and regulations of the company, create a liability that might reach the sum of \$100.

Such a liability might exist without a special notice if the language of the message sufficiently indicated the importance of a prompt delivery of it, and the loss that would result from a failure to deliver it promptly.

Whatever negotiations or proposals or limitations on the part of the defendant might have been warranted by the giving of the notice, the absolute refusal to receive and send the message was unreasonable and justified a finding for the plaintiff.

The Baudot Printing Telegraph.

The Baudot printing telegraph system which is described in considerable detail in "The Hughes and Baudot Telegraphs," by Arthur Crotch, is somewhat similar to the Hughes system described in our May 1 issue, in that the printing is done on a tape from a type wheel. It possesses a great advantage over that system, however, in that it allows of the use of the wire at one time for the transmission of four separate messages and on comparatively short circuits this number may be increased to six. Unlike the usual multiplex systems in which half of the messages are transmitted in one direction and half in the opposite direction all of the messages may, if desired, be sent in one direction by this method.

It is a well-known fact that in ordinary Morse working, the duration of the impulse used to send a dot is much greater than the time required for the current to rise to its working strength and then to fall to zero. If then the duration of the signals can be shortened, the speed of working may be greatly increased. This is what is accomplished in the Baudot system. The principle by which this is effected is as follows: The line is not permanently connected to any one set of apparatus, but is caused to make regularly recurring contact with each set. Thus each sending operator has the use of the line for approximately one fourth, one fifth, or one sixth of the time, as the case may be, in which to transmit his signaling impulses over the wire. The requirement for Morse multiplex working in this way is that the line be brought at each end to a revolving arm carrying a metallic brush which sweeps over a circle divided into as many insulated segments as there are separate sets of apparatus to be worked on the line. If the two arms are made to revolve in synchronism then during a fraction of each revolution an insulated segment at one end of the line will be connected to a corresponding segment at the other end.

Supposing that the duration of the contact between the line and a segment is about equivalent to the length of a dot. Then if a dot be sent by a key connected to a segment at one end while the brush is passing over that segment it may be received intact on a relay attached to the corresponding segment at the other end. If the key contact is not closed until the brush is about to pass off the segment the signal will be clipped short. A dash would be inevitably cut short. If, however, the revolving arms were run at a high rate of speed, say several hundred revolutions per second, the depression of the key for a dot would be of sufficient duration to send a rapid succession of impulses to the line. The sending of a dash would simply mean a greater number of such impulses. Suitable apparatus being provided to convert these rapid successions of impulses into continuous signals, it will be seen that although each set of apparatus is worked

precisely as if it had sole possession of the line it is actually disconnected from it the greater part of the time. It will also be noted that the current sent out by any set may travel in either direction without interfering in any way with the operation of the other sets.

In applying this principle to Baudot operation, each segment of the ring described is divided into five equal segments, all insulated from each other and the rest of the ring. At the sending end each one of these segments is connected to a key and at the receiving end the segments are connected to a series of five electromagnets. From the previous explanation it will be clear that if one, two or all of the keys be held down a current or currents will pass to the line and will be received on the corresponding electromagnets at the opposite end. The keys are connected, however, for double current working, that is, when in their normal position the segments are all connected to the negative pole of a battery, and where any one is depressed it connects its segment to the positive pole of the battery. Thus if none of the keys are depressed a succession of negative impulses will be sent to the line with each revolution of the trailer arm. If the first one only is depressed a positive impulse followed by four negative impulses will go to the line, and so on. As the receiving magnets are not polarized they would be affected either by positive or negative impulses. To avoid this a relay is inserted in the line at the receiving end, the tongue of which is connected to battery and one contact of which is connected to the trailer arm. When a positive or marking impulse is received over the line this relay makes the proper contact and transmits an impulse to the proper segment and thence to the corresponding electromagnet. When a negative or spacing impulse is received the relay breaks contact and the corresponding electromagnet is not affected.

The five keys and magnets thus described represent the means for sending and receiving one message only.

The five keys are arranged so that one, two or all of them in any order may be depressed by the fingers of one or both hands. It will be seen that no matter how many of the keys are depressed the passage of the trailer over the segments will result in sending to the line five impulses of current. Each such set of five constitutes a character, the different characters being obtained by varying the order and direction of the currents. Thus all of the letters and figures are of equal length, that is, they each require the transmission of five current impulses. At the receiving end, however, only the positive or marking impulses actuate the magnets.

In order to form the signals correctly the operator must hold his keys in the proper formation while the brush is passing over the segments to which they are connected. As soon as it has passed he must get the next combination ready. To permit him to do this he is provided with a telephone receiver, known as a cadence telephone. This is so connected that just before the brush is to pass over the segments on which he is working, a momentary current is sent through the telephone and thus he is informed

that the trailer is about to pass. While he is getting ready for the next signal the printing mechanism at the other end of the line having been actuated by the receiving magnets, is performing the operation of printing the character sent. When sending, instead of allowing the current to pass through the line relay at the home station, and thus actuate the printing mechanism so that the operator may have a check on himself, a leakage path is provided so that a small part of the current passes through what is known as a leak relay, and this operates the printing apparatus, thus allowing the sender to see that the correct signals are being transmitted.

The receiving electromagnets each have a single coil. The armature is pivoted to the piece of soft iron forming one end of the coil, and when the magnet is actuated this armature comes in contact with a similar piece of soft iron, which forms the other end of the coil, thus completing the magnetic circuit. A flat spring normally keeps the armature from making this contact.

Mounted inside the case of the instrument, on the principal axle of the machine, is what is known as the combiner. This consists first of all of a toothed wheel by which the axle is turned. On the same shaft, close to this wheel, are mounted side by side two steel discs, having cut on their peripheries a series of notches. Separating them from each other, and from the toothed wheel, are two thin discs of somewhat larger diameter. The one of these, which is between the two thicker discs, is not quite continuous, but is cut away for a short distance. Mounted above these discs is a series of five levers, the lower ends of which will normally rest on the periphery of one of these discs in the groove formed by the disc itself and the two thin discs. This groove is called the spacing groove, while the groove formed on the periphery of the second disc, is called the marking groove. The levers mentioned are free to move laterally in the direction of the shaft, and when the part cut out of the disc, separating the two grooves, in the course of its revolution comes opposite these levers, they are free to pass from the spacing groove to the marking groove. The magnets actuated by the series of impulses sent over the line will cause their corresponding levers to be moved from one groove to the other, while the levers corresponding to the magnets, which are not operated, will remain in the spacing groove during the course of that revolution. At the end of the revolution unless held in the marking groove by the next succeeding impulse the levers will be automatically returned to the spacing groove.

As mentioned previously, the discs which form the bottom of the two grooves have notches cut in their peripheries, these notches extend over thirty-five fortieths of the circumference, the remaining five fortieths opposite the space cut out of the separating disc being left plain. Where a notch is cut in one disc the other disc is left plain. The formation of the various characters is dependent upon the arrangement of these notches. When a character has been sent over the line, or rather the impulses corre-

sponding to a character, and the magnets thus actuated have moved their levers over into the marking groove, there is a certain point in the course of the revolution of the combiner when there will be a notch beneath the foot of every one of the five levers. When this point is reached a spring which acts collectively upon the heads of all of the five levers forces their feet into these notches. The combiner is all of the time traveling at a fair rate of speed and the feet of the levers are no sooner in the notches than the traveling of the wheel throws them out. This ejection is in the nature of a sharp blow which is transmitted to their heads and from the heads to the mechanism which causes the paper to be brought into contact with the type wheel.

The type wheel is mounted on the same shaft as the combiner, and thus revolves with that part of the mechanism. Nine-fortieths of its circumference is left plain, and on the remaining portion the letters of the alphabet are raised. Alternating with the letters are the figures, punctuation marks, etc. When in its normal position with reference to the shaft, letters only will be printed. It is not rigidly fastened to the shaft, however, but is so arranged that when a certain combination of signals, known as the figure space, is sent over the line it will be shifted forward in relation to the shaft a distance equal to half of the distance between two letters. Then when the required combinations are sent over the wire, figures or punctuation marks will be printed. The same set of combinations of signals used for transmitting letters are used for transmitting punctuations. When it is desired to begin printing letters again another combination, known as the letter space, is sent over the wire, and the type wheel is automatically shifted back to its normal position.

As the work done in the receiver is not constant, it is necessary to have a governor or moderator to keep the speed uniform. Part of this consists of a brass disc fastened to the frame of the machine and hollowed out on one side, so as to present an inclined plane to the second part of the device which is mounted on the main driving shaft, which passes through the center of the disc. The moving part consists of a weight loosely mounted and held in position by two spiral springs. Opposite the hollowed out part of the disc this weight carries a small brush of tow. Normally this brush does not come in contact with the disc. When the speed of the shaft increases beyond the normal, however, the weight brings an extra tension on the springs and flies outward. As it does so the brush moves outward and comes in contact with the inclined surface of the disc, the friction resulting acting as a brake. The higher the speed the greater the pressure between the two, and the greater the braking effect. As the axle on which the moderator is mounted is running at a much higher speed than the one on which the combiner and type wheel are mounted, any variation in the speed of the latter will be greatly multiplied on the former. The springs which restrain the weight may be so adjusted that the speed variation of the apparatus is very slight.

In order to be operated by the extremely short impulses of current used it is necessary that the relay employed should be very sensitive. The form of relay used with this apparatus consists of a pair of permanent horseshoe magnets clamped together with a piece of soft iron between each pair of poles. In each of these pole pieces a short vertical pin is inserted, ending in a sharp point, and these points serve as pivots for the armature. The armature consists of three pieces. Two pieces of circular section of unequal length are joined together with a piece of brass intervening. Across the inner end of the longer piece a rectangular crosspiece is fastened. This crosspiece is above the poles of the electromagnets and both of its ends are of the same polarity. A change in the polarity of the magnet cores will consequently cause the armature to respond very quickly. A vertical tongue attached to the armature plays between the two contact points.

Three of these relays are used at each end of the line. The first one known as the line relay repeats impulses of the same kind as those received into the coils of the combiner relay. This relay in turn repeats positive impulses only to the electromagnets of the receiver. The third relay is the leak relay which is brought into action as previously mentioned when the station is sending.

The distributor which distributes all of the impulses received to their proper destination consists of two ebonite plates one of which carries six circles of brass made up of segments arranged in the proper order and the other one of which carries four similar circles. These plates are stationary while by means of arms carrying brushes which revolve over them the actual work of distribution is performed. One of these rings is solid and is permanently connected to the line. Adjoining this is a ring made up of twenty-four segments, five for each of the four arms of the apparatus and four for correcting currents. These segments are connected directly to the levers of the sending keys. The second set of rings consist of one made up likewise of twenty-four segments and one made up of five segments four of which are each equal to five of the smaller ones and the fifth of which is equal to four of the smaller ones. The smaller segments of the one ring are connected to the receivers while the four larger segments are connected through a switch of each sender to the tongue of the leak relay. A third pair of the rings is made up of one which has twenty short segments all electrically connected together and one short movable segment likewise connected to the others. These segments are all connected to the tongue of the line relay. The second ring of this pair has one long segment which is opposite the twenty short ones of the other ring and one shorter one which occupies the remaining space of the circle and is thus opposite any space in which the movable segment may be placed. The long segment of this ring is connected to the

coils of the combiner relay. The movable segment is for the receipt of correcting current and the segment opposite it is connected to the correcting magnet. A fourth set of rings is like the second set described, the longer segments being connected to the tongue of the combiner relay through the receiving switch on each arm and the shorter segments being connected directly to the receivers. The fifth set of rings is made up in the same way as the first. The solid ring is connected to a battery which sends currents through the cadence telephones and correcting currents to its own receivers by means of the connections made with the short segments.

The distributor is provided with a regulator similar to that used on the receiver. The brush, however, and disc on which the brush rubs are omitted. The extra energy required to drive the revolving weight as the speed increases and the circle which the weight describes increases is sufficient to compensate for any slight irregularities which may occur. The work of the distributor being simply to turn the bushes, the load on that instrument is practically constant so very little speed regulation is necessary.

When the signals arrive they are not sharply divided into their constituent impulses but come as a series of waves more or less running into each other. The shortened segments of the ring in the third pair described serve to separate these waves and to utilize only the stronger portions or the crests. The combiner relay being fitted with a low resistance shunt which renders its movements sluggish the signals are repeated into the receivers at their proper length.

For the successful operation of this system it is of course necessary that the two distributors and the eight receivers shall run in perfect synchronism. The arrangements for accomplishing this are of two kinds main and local. For the former the distributor at one station is made standard and caused to send correcting currents regularly to the line. The other distributor is fitted with apparatus to be actuated by the receipt of these currents. There is thus no interchange of correcting currents the latter being sent in one direction only. The standard distributor is set at a certain speed and the one fitted with correcting apparatus is set to run slightly faster so that the correction will always act as a retarding influence. Local correcting currents are sent from each distributor to its own receivers. Two twenty-fourths of the time required for each revolution of the distributor is consumed in sending correcting currents to the line. Connections are made by the brushes between the movable segment of the ring in the third pair mentioned and the distributor correcting magnet. The segment mentioned is made adjustable to provide for varying retardation in the line. When properly adjusted and when the distributor is running at the proper speed no impulse will be received in the cor-

rector magnet. If, however, the speed is too high current will flow to the correcting magnet and the armature of that magnet will operate a brake thus cutting the speed down to the desired limit. The same principle is made use of in making local corrections between each distributor and its receivers.

From the description so far given it might be inferred that the transmission of an impulse was instantaneous. Such, however, is not the case and the length of time which it takes for the current to flow from the sender to the receiver is appreciable when compared with the total duration of an impulse. This time factor depends of course upon the electrical constants and length of the line. On this account if the two distributors were running exactly together, that is, if segment 1 of the sender was connected to the line at the same time as segment 1 of the receiver at the distant station the impulse sent out from segment 1 instead of being received on segment 1 would be received on some other segment as 2, 3 or 4 depending upon the amount of retardation. To provide for this the distributor at the receiving end is run far enough behind the sending distributor to make up for this difference. This would avoid all further difficulty if we only wished to send one way. Suppose the distance which the distant distributor lagged behind the home distributor was equal to one segment. Then if we were sending on the first two arms of the home station impulses sent from segments 1 to 10 inclusive would be received on segments 1 to 10. If then we desired to send from the distant station on the two remaining arms impulses sent from segments 11 to 20 inclusive would be received on segments 13 to 22 inclusive. In this case if all of the rings were running in phase with each other the impulses in question would not reach their proper receiving magnets. To avoid this one of the distributor plates which bear the rings may be turned with reference to the other until the impulse sent from the distant station will be received on the proper magnet at the home station. To accomplish this the distributor plate at the home station only has to be moved.

Duplex working is possible with this system but has never been attempted in France, where it is chiefly used, as the capacity obtained by simplex working is sufficient to meet all ordinary demands. Repeaters are used with the Bandot to a considerable extent. Where the traffic is sufficient, between two points far enough apart to require repeaters, it is customary to allot two wires to the traffic, one to be worked one way and the other in the opposite direction. In this case a simple form of repeater can be used. When a wire is worked both ways, however, a more elaborate arrangement is required and a distributor becomes necessary at the repeating station.

Wheatstone Working in England.

In view of the return to the use of the Wheatstone system in this country the following description of the way traffic is handled in England by this method will be of interest. This outline was very kindly given us by Major Walter A. J. O'Meara, engineer in chief of the British Post Office in a recent letter which reads as follows:

"The transmission of news traffic in this country is dealt with almost entirely by the Wheatstone system.

"London is the distributing centre for news work, and about twenty special 'news' wires radiate from the central telegraph office to all parts of the country. A number of offices are in circuit on each wire so that about 80 towns are in special direct communication with the central telegraph office for the reception of news messages.

"During parliamentary sessions and other periods of pressure, the number of special news circuits is considerably increased.

The average working speed on these lines is 250 words per minute.

"Wheatstone slips up to eight in number, can be perforated simultaneously by means of pneumatic perforators, thereby avoiding delay to those news items which have to be transmitted to a large number of stations.

"At the receiving offices the Morse slips are written up by hand. If re-transmission be necessary, the written messages are dealt with, being either sent by key, or re-punched and forwarded by Wheatstone transmitter.

"For some years past, Creed receivers have been in use in the Manchester office which re-transmit much of the news matter received from London to the smaller towns in Lancashire and Yorkshire. These instruments have been found very useful for this class of work, the only drawback being that they limit the working speed of the circuit to about 100 words per minute. With recent improvements, however, it is probable that the speed of perforating the received tape may be raised to 150 words per minute.

"Where Creed receivers (perforators) are in use for the reception of messages to be delivered locally, the perforated slip is passed through a printing instrument which translates the Wheatstone signals and prints the messages in Roman characters on slip, at a speed of about 100 words per minute. The Creed system, however, has not yet been extensively adopted in this country, and further comments on its merits would be premature."

"The Practical Management of Dynamos and Motors," by F. B. Crocker and S. S. Wheeler, as indicated by its title, affords a clear understanding of the use, care and operation of these important adjuncts of the well equipped modern telegraph office. There is a constant demand for this book, for telegraphers find it an invaluable addition to their working library. There are 206 pages, and 99 illustrations; price, \$1. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

The Military Telegrapher in the Civil War.

PART XL.

Mr. H. D. Sloat, who is at present living at Elgin, Ill., served as a member of the United States Military Telegraph Corps in Arkansas during the Civil War. In writing to Colonel William R. Plum, the historian of that organization, in 1879, he gave the following account of his military experience which shows that although he was not exposed to all of the dangers that some of his comrades were, who were located where more important military operations were in progress, still life in that section of the country was not entirely without excitement.

"I commenced my career as an operator in 1860, at which period I was placed in charge of the old Pacific Telegraph Company's office at Ft. Kearney, Nebr. This was long previous to the building of the Union Pacific Railroad, or, in fact, long before that gigantic project was conceived. I spent nearly two years at this frontier post, during which time I devoted myself energetically to the acquiring of the art of reading signals by sound. The tedium of picking up the art was relieved semi-occasionally by orders from headquarters at Omaha to start out on repairs and, by the way, in order to give something of an idea of the difficulties and hardships of early Pacific operators in obtaining a knowledge of the art, I will say that I had seventy miles of wire to keep in repair, besides conducting the office and keeping up a small battery.

"But orders to go on the line were not so unpleasant after all, and bringing a government mule into requisition I would get over my fifty miles on the western division pretty lively, though at seasons, when the buffaloes made use of our poles as scratching apparatus, thereby breaking poles and dragging the wires about utterly regardless of the law they were violating. I was obliged sometimes to work an entire week in repairing one break of this nature. When I joined the military telegraph corps I was assigned to take charge of the Pine Bluff, Ark., office, in Colonel Cloglin's department, and after a few months' very pleasant experience, socially and otherwise, during which period I was initiated into the mysteries of military cipher telegrams, I received orders from R. C. Clowry, then captain and assistant quartermaster in charge of military lines at Little Rock, to report at that point for duty. At this juncture I want to pay a brief but heartfelt tribute to Colonel Clowry. He was a whole-souled, genial, unassuming gentleman, whose position never interfered with his friendly intercourse and gentlemanly deportment towards his subordinates. He was one of the few men whom promotion does not spoil.

"I wish also to express my good opinion of Messrs. Smith and Holt, with whom I was associated in the Little Rock office. I remember them as genial fellows, first-class telegraphers and a credit to the profession generally.

"My only experience in actual military service was on the occasion of my accompanying a cavalry expedition of 200 men up the Arkansas River. Two steamers had been despatched for Fort Smith with supplies, but owing to the low stage of the water, they had become stuck in the sand bars about fifteen miles above Little Rock. I was selected as operator to accompany the expedition and report progress with the aid of a set of pocket instruments. We reached the boats without any difficulty except marching under a torrid sun and I was detailed with about a dozen men to go to the telegraph line, which ran parallel with the river, about three miles distant. I shall never forget that tramp over the roughest section of the country conceivable, with the sun's ray pouring down upon us with fearful intensity. We did not succeed in finding the line but really lost our bearings, and before we knew it had described a circle and struck the river again, just as our steamers were passing back on their return to Little Rock. I came very near suffering sun stroke and when we reached the river I was violently ill.

"I am not likely to forget a little incident which occurred on the previous night, before we reached the boats and while in camp. I took a few men as guards over to the line, which at that point ran close to the river, for the purpose of reporting progress to headquarters. We were obliged to cross a bridge spanning a little stream from which a plank had been torn up as a precaution against surprise from the guerillas who were (in our imagination at least) concealed all about the place. Tying our horses on the camp side, I stationed my men and proceeded to bring the two sections of the telegraph wire into the window of an old deserted and dilapidated hotel in order to establish communication with Little Rock. Unfortunately, however, I could get no response to my repeated signals. You can easily imagine that the situation was somewhat 'ticklish' to me, out there in the darkness with the dense forest all around me and the thought of a guerilla picking me off with a rifle. Just at that moment I heard the sharp report of a gun, either from a sentry or a guerilla. This was followed by a call to arms in the camp and my boys came rushing in, declaring the guerillas were on us. We scrambled over that break-neck bridge and mounted our horses and started for camp, I bringing up the rear. We were obliged to ride along the base of a precipitous brush-covered bluff, the boys were ahead and I was spurring my horse frantically to catch up with them, when I heard something breaking through the brush, above me. At that, every hair stood up on my head like bristles—yes, like the bristles of that infernal hog coming through the brush which I had taken for a guerilla. I don't remember telling this to the boys.

"The alarm proved to be false, however, and soon the camp became quiet. The next morning we moved on again in search of the steamers. I sometimes recall this incident of my military experience and enjoy a hearty laugh over my encounter with that swine guerilla. I afterward came north on account of an attack of chills and fever, and fearing

I should experience a return of the malady should I go back, I concluded to remain in the north."

Mr. James Jones served as an operator in the United States Military Telegraph Corps in Kentucky and Tennessee during a greater part of the Civil War. In writing to Colonel Plum, in 1878, he gave in part the following account of his military experiences:

"I was the first operator at Stanford, Ky., on the line to Somerset. When this line was extended to Cumberland I was sent to Mount Vernon. Returning to duty at Mount Vernon, after a leave of absence, the day after the battle at Richmond, Ky., I was captured by a portion of General Kirby Smith's command near Terryville, Ky. I marched five days with the Confederates, a distance of about 100 miles. I was then released on parole at Frankfort, Ky. I was exchanged after two months and sent to Munfordsville, Ky., where I remained about six months, and from there was sent to Glasgow, Ky., the headquarters of the third division of the twenty-fourth army corps, General Judah commanding. After the movement of the Army of the Ohio into east Tennessee I was sent to Burnside Point.

"One morning while I was stationed at Mount Vernon, General Morgan's command of Confederate cavalry reached Crab Orchard. The operators at Landon and Cumberland Gap, as well as myself, had been notified to be on the lookout for him. About ten o'clock someone on the wire called 'MC,' my office call, and said: 'Where is Morgan?' The question and the style of sending satisfied me that it was Morgan's operator, Ellsworth, so without indicating any suspicion, I replied: 'Morgan was south of Richmond this morning. Wolford's cavalry and the seventh Pennsylvania regiment are in close pursuit. Our troops here are preparing to cut them off in the direction of Somerset. I think we will bag the rascals.' The troops of Mount Vernon consisted of one sick soldier, forty or fifty home guards and myself. The home guards were called out and a small party sent in the direction of Crab Orchard. Seeing no signs of the enemy they continued until they reached the town where they learned that the Confederates had left in a great hurry, having learned by tapping the wire that a large force from Mount Vernon was moving to cut off their retreat. The home guards returned to Mount Vernon and reported the situation to me, whereupon I was able to explain the reason for the enemy's sudden retreat. Upon his return to Dixie, Ellsworth published an account of his exploits with the telegraph, but somehow forgot to mention the one at Crab Orchard.

"At Mount Vernon the telegraph was a new thing, as before the extension of the military line to that point many of the people in the mountains had never heard of it. As a consequence the operators were regarded as superior to ordinary mortals and were asked many strange questions. One man in particular, however, would not be fooled. After listening to the story of the speed with which the telegraph

would carry intelligence, this old man said: 'Stranger, that's a lie. A humming bird is the fastest thing on earth, and it can't begin to make the time you say this thing makes.'

"While I was stationed at Munfordsville, General Morgan made a raid along the Louisville and Nashville Railway, destroying to the best of his ability the railroad and telegraph lines. Following this, I started out with a party of men to make repairs. The Confederates had cut down some of the poles, burned others, broken the wires, and twisted them in all imaginable shapes, in some places carrying them away into the forest and winding them around the trees. Consequently I had a hard task to restore communication between Munfordsville and Nashville. I think I made more splices without tools than any other man living. Arriving at Elizabethtown I learned that another party from Louisville had reached Muldranglis Hill and would soon meet me. The railroad buildings at this point having been burned, I was given permission by a lady residing in the town to run the wire into her house. The other party came along in a short time, connection was made and the first message sent over the line was the official announcement from General Rosecrans to General Halleck of the victory of Murfreesboro. I was complimented by Captain Samuel Bruch, superintendent of military telegraph, for my promptness in opening up communication, but no notice was ever taken of it by the government or military authorities.

"In February, 1864, I was sent from Burnside Point to Clitwoods to open a new office there. A line repairer went with me to reconstruct the line as we went along. When we arrived at that point, I found that the line was open. My repairer went back, found a break, repaired it, and returned and still there was no circuit.

"We remained there three weeks and the line was never put into working condition. At the end of that time I received orders to return to Kentucky, as the route had been abandoned.

"I was next stationed at Jacksboro. While I was there, General Joseph Wheeler, with his cavalry, crossed the river at Strawberry Plains and moved in the direction of Clinch River. I had with me at the time as line repairer James Palmer. The line between Jacksboro and Knoxville having ceased working, I sent Palmer out to look for the break. When he approached Clinton, he learned that the Confederates had appeared on the south side of the Clinch River. He also met a woman who had talked with some of the Confederate soldiers who had told her they would cross the mountains at Jacksboro or Wheeler's Gap two miles below that point.

"This news caused great excitement in Jacksboro. A few troops there at once began to look for a place of safety in the woods and all of the male citizens sought the same shelter. That the Confederates would cross at one of the points named appeared plausible enough but to me it appeared to be too plausible. I could not see why

known, so while the others sought places of safety, I concluded to wait and see what would happen. Making the best preparations possible for safety in case of a hasty flight, I took my station at the key while Palmer laid down and went to sleep. I waited until daylight when Palmer took the watch and I slept for a while. In the meantime, I had received the following message from Captain W. L. Gross: superintendent of military telegraphs:

If you should have to leave Jacksboro, do not go farther than to secure your safety and return as soon as possible. Try and report where the Confederates cross the mountains.

"As the Confederates did not come to Jacksboro it was necessary to look them up. This duty was assigned to Palmer and he performed it most satisfactorily. My message to Captain Gross gave the hour when the Confederates crossed at Winters Gap, their number, and the number of guns which they had with them. It also predicted that they would strike the railroad at or near Murfreesboro three days after the time of crossing. This prediction proved accurate as the Confederates reached the railroad at the exact place and time given in my message. As a result they were driven back and the military branch of the army claimed great credit for their success in defeating the movements of the Confederates. Needless to say, however, not one word of credit was ever given to the telegraph operator who secured the information which gave the army its victory. The theory of the commanders of the army in regard to this raid was that its objective point was the Louisville and Nashville Railroad and preparations were made accordingly. My report, however, gave them accurate information as to the real objective point and enabled them to drive the Confederates back."

What is Electricity?

First we must ask what is positive electricity? and the answer is still we do not know. For myself I do not even guess—beyond supposing it to be a mode of manifestation, or a differentiated portion of the continuous and all-pervading ether. It seems to exist in lumps the size of the atoms of matter; and no portion of it less in bulk than an atom has ever been isolated, nor appears likely to be isolated. But although it may have bulk, it appears as if it had no appreciable mass; the massiveness or inertia of the atom is probably due to something else, in fact to the possession of negative charges in equal amount. This part of the doctrine is not yet certain. More investigation is urgently needed into the meaning and properties of positive electricity. Meanwhile we shall only be following the lead of Professor J. J. Thompson if we assume that a unit of positive electricity has a massiveness (or what is often inaccurately called "weight") either zero or very small, most

probably very small; perhaps about one per cent. of the mass of some atoms of matter may be due to the positive electricity which they contain.

But concerning negative electricity we know a great deal more. This exists in excessively minute particles, sometimes called electrons and sometimes called corpuscles; these are thrown off the negatively charged terminal in a vacuum tube, and they fly with tremendous speed till they strike something. When they strike they can propel as well as heat the target, and they can likewise make it emit a phosphorescent glow; especially if it be made of glass or precious stones. If the target is a very massive metal like platinum, the sudden stoppage of the flying electrons which encounter it causes the production of the ethereal pulses known as X-rays. Electrons are not very easy to stop, however; and a fair proportion of them can penetrate not only wood and paper, but sheets of such metals as aluminum, and other moderately thin obstacles. That is because they are extremely small much smaller than the atoms of matter.—Sir Oliver Lodge, in Harpers.

The Quadruplex.

"The Quadruplex," by Maver and Davis, is doubtless the most thoroughly practical low-priced work treating on this subject ever published.

It is clear and lucid in its style, a text-book free of all technicalities and easily comprehended. It contains 128 large pages, is copiously illustrated, bound in cloth and well printed on heavy paper.

It embraces just the ideas that should find a place in every telegraph office, and no telegrapher who desires to acquire a complete knowledge of multiplex telegraphy, the perfect understanding of which is so essential in these days, should fail to promptly obtain a copy of this important book.

Its chapters include: Development of the Quadruplex; Introduction and Explanation; The Transmitter, Rheostat and Condenser; Stearns Duplex; Instruments of the Polar Duplex; The Polar Duplex; The Quadruplex; The Dynamo-Electric Machine in Relation to the Quadruplex; The Practical Working of the Quadruplex; Telegraph Repeaters; The Wheatstone Automatic Telegraph.

It will be seen at a glance that such chapters as these fully cover the modern apparatus found in the telegraph offices of to-day. Copies of this book can be obtained from us at \$1.50 each, express charges prepaid. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

As there are only a few copies of this important work on hand and as a new edition of the book is not contemplated, it will be well to secure a copy before the supply is exhausted.

Telegraphy of Photographs, Wireless and by Wire.

Mr. T. Thorne Baker, of London, England, who has been spending some time in this country, on May 14 gave a very successful demonstration of the operation of his apparatus for transmitting photographs by wire on a circuit between New York and Boston. One of the lines of the American Telephone and Telegraph Company was used for this purpose and the operation of the device was witnessed at both terminal points by many men prominent in the commercial and scientific world. By retouching, the photographs transmitted in this way may be made as good as the originals. Mr. Baker hopes to be able to make a test of his apparatus between New York and London in the near future over one of the transatlantic cables. The time required to transmit an ordinary photograph is about four minutes. Previous to this test on the evening of May 11, Mr. Baker, in an address before the New York Electrical Society, described the operation of his apparatus and exhibited some of the results which he has accomplished.

Just before coming to America Mr. Baker delivered a lecture before the Royal Institution at London, in which he said in part that it frequently happens that when two alternate processes are available for certain work, and one of them is considerably less practical than the other, that the less practical one is possessed of much higher scientific interest. This may certainly be said of the telegraphy of pictures and photographs. The whole of the methods of transmission can be classed as either purely mechanical, or dependent on the physical properties of some substance, which, like selenium, is sensitive to light. The latter methods are of no little scientific interest, and, although very delicate and for the moment obsolete, there is every likelihood of their coming into more extended use later-on.

The telegraphing system has been employed by the London "Daily Mirror" for the transmission of photographs since July, 1909, and has been worked very regularly between Paris and London, and Manchester and London. The method of telegraphing photographs that has been employed on a large scale by the "Daily Mirror" may be called a practical modification of several early attempts. The effect of an electric current to discolor certain suitable electrolytes or to set free an element or ion that can be used to form, with a second substance a colored product was employed in many early forms of instruments for telegraphing writing, etc. If we break up a photographic image into lines which interrupt the current for periods depending on their width, these interrupted currents can be used at the receiving station to form colored marks which join up en masse to form a new image. Mr. Baker's telegraphic process is thus briefly as follows:

At the sending station is a metal drum revolving under an iridium stylus, to the drum being attached a half-tone photograph printed on

lead foil. Current flows through the photographic image to the line and thence to the receiver. The receiver consists of a similar revolving metal drum over which a platinum stylus traces. Every time the transmitter stylus comes in contact with a clear part of the metal foil current flows to the receiver, and a black or colored dot or mark appears on the chemical paper. But it will be readily understood that if the reproduction—built up of these little marks, which have to be made at the rate of some 200 per second—is to be accurate, each mark must be only exactly as long, in proportion, as the clear metal space traversed by the stylus.

In this system a metal drum is revolved by a motor, making one revolution every two seconds; over this a metal stylus or needle traces a spiral path in the same way as a phonograph. On the drum is fixed a half-tone photograph broken up into lines, and printed in fish glue upon a sheet of lead foil (in these line photographs the light and shade of the picture is made up of masses of thinner or thicker lines, with clear spaces in between). As the stylus traces over such a photograph its contact with the metal base is interrupted every time one of these fish-glue lines comes beneath it, and for such a time as depends, of course, on the width of the line. The transmitting instrument thus sends into the telegraph lines a series of electric currents, whose periods of duration are determined by the width of the lines composing the photograph. A similar stylus traces an exactly similar path over a revolving drum in the receiving instrument, but round this drum is wrapped a piece of absorbent paper impregnated with a colorless solution, which turns black or brown when decomposed by an electric current. What happens then is that every brief current which passes through the paper causes a mark to appear on it. The width of the mark depends on the duration of the current—or should do—so that these marks gradually combine to re-compose the photographic image.

This method is all very well in the laboratory, but when we come to try it over a long distance the capacity of the line at once causes serious interference. If the circuit be closed by means of a Morse key, the time of contact at the key being one-sixth of a second—a common time duration of a short tap—the discharge of current from the cable would be considerably longer than one-sixth of a second. When, therefore, we are sending signals through the line at the rate of 175 per second, it is not difficult to see that every signal will run into the next dozen or so at the receiving apparatus, and the result will be a hopelessly confused mass of overlapping marks. The use at the receiver of what is termed a line balancer, a modified form of shunt apparatus embodying the principles of wiping out residuary currents from the cable in the way frequently made use of in duplex telegraphy, has rendered commercial the old ideas of telegraphing by the electrolytic method, and as many as 300 sharply defined chemical marks can be recorded in one second by its use.

If a picture revolving beneath a tracer has to redraw itself, as it were, on a piece of paper perhaps hundreds of miles away, it is obvious that each mark redrawn must occupy a precisely similar spot on the new paper as it does in the original picture. As cylinders or drums are used in picture telegraphy, this means that they must revolve in perfect unison. The method of synchronizing used by Professor Korn has proved very satisfactory, and has been adopted in practically all systems of phototelegraphy. The motors which drive each drum are run at about 3,000 revolutions per minute, and geared down very considerably, so that the drums themselves revolve, perhaps, at thirty revolutions per minute; the motors are run from secondary batteries and should be run for a sufficient time before beginning a transmission to allow of their warming up. The speed of each motor is controlled by a regulating resistance in series with the field magnets, and the speed is ascertained by means of a frequency meter.

The receiving drum is revolved a little quicker than the transmitting drum. It consequently completes its revolution before the transmitter. It is then stopped by a steel check, and is obliged to wait until the other drum has caught up. When the transmitting drum has completed its turn, a fleeting contact comes into play, a reverse current is sent to the receiving station, this is led into a polarized relay which actuates an electromagnet, and this magnet removes the check. Thus both drums must always start off in unison for each new revolution. It was found that where each operator endeavors to keep his motor running uniformly by regulating the resistance according to the fluctuations recorded by a frequency meter, the personal element makes itself visible in the results; straight lines appear wavy, and the synchronism is not at all good.

The great advantage of this process is that the whole operation is in full view, whereas with systems in which the received picture is obtained on a photographic film one has to develop such film before it is possible to discover whether anything is wrong. With the receiver described, the operator keeps his hand on a sliding contact of the resistance in the line balancer and merely adjusts their position during the first two or three seconds according to the condition of the electrolytic marks—i.e., whether crisp and concise or not. The transmitting cylinder can be used as the receiving cylinder, and the apparatus is thus reduced to the limits of simplicity.

Portable instruments have been built embodying these principles, and these machines have worked successfully. They are suitable for wire or wireless work.

The "Daily Mirror" inaugurated the Paris-London photographic service in November, 1907, with Professor Korn's selenium instruments. In this system use is made of the fact that the electrical resistance of the metal selenium varies according to the strength of illumination to which it is subjected, a beam of light passed through the light

and dark parts of a photograph in succession being used to vary the strength of an electric current sent to the receiving apparatus. The transmitter light is concentrated from a Nernst lamp to pass through a revolving glass cylinder, round which a transparent photograph (printed on celluloid) is fixed, the beam traversing the film at its brightest part, where the rays come to a focus. The light which passes through the picture is reflected by a prism inside the cylinder on to the selenium cell, through which the current passes.

The inertia of selenium once overcome, the metal immediately becomes of great use for many purposes. Professor Korn's method of compensation is to let the light fall at the same time on two cells of opposite characteristics; one has great inertia and small sensitiveness, the other low inertia and great sensitiveness. By this combination the cells may be used for the purposes of photo-telegraphy, where at least half a dozen changes per second are required to be recorded abruptly, even in transmitting the simple portraits to which the selenium process is limited.

Late in 1908 Professor Korn introduced his telautograph, in which a Caselli transmitter, such as already described for the telegraph is used, and a line sketch or half-tone photograph is attached to the drum. The receiver is similar to that used in the selenium machines, a spot of light cast on a revolving sensitive film being shut off every time current flows through the wire of the galvanometer and displaces it; when displaced the shadow of the wire falls over a fine slit placed in front of the film, and so prevents the light from passing through to it. The method of synchronizing the sending and receiving cylinders is the same as that used in the telegraph, in which Professor Korn's arrangements have been copied. Similar methods have been adopted for many years, however, in certain systems of ordinary telegraphy.

For wireless transmission of photographs a line picture is attached to the drum of the transmitter, and the intermittent current which is ordinarily passed into the telephone line goes into an electromagnet, which then attracts a soft iron diaphragm attached to brass springs, which are fixed to two rigid supports. Every time current flows through the magnet coils this diaphragm is attracted to it, and platinum contacts are brought together; when the current flows, and this contact is made the primary circuit of a transformer is closed, and the secondary having a spark gap and being inductively coupled to the aerial and earth, a signal is transmitted into space. Thus, in the wireless transmitter the only difference from ordinary telegraphy lies in the fact that the length of the signals and their distance apart is regulated by the lines composing the sketch or photograph.

When working with high voltages in the primary, such as 110, arcing is liable to take place, and hence the distance between the contacts when not attracted must be considerable. This means that the distance between the diaphragm clamps

must be short, and the German-silver spring of which the diaphragm is made must be thick, these two conditions making the natural period of vibration very short. It has been found, however, that by interposing a mercury motor-interrupter in the primary circuit, aging is almost entirely avoided.

The receiving apparatus is very simple, and depends, for short-distance work, upon a coherer cymoscope, the decohering apparatus being of a particular character. Every time an oscillation passes to the antenna, the coherer becomes conductive in the ordinary way, and a relay is actuated; this relay is usually made to start a hammer vibrating, the hammer hitting the coherer, and thus causing it to lose its conductive power. But a vibrating hammer is useless for the photo-telegraphic receiver, and it is essential to have one strike only on the coherer for each signal detected.

Small portable machines have been constructed for wireless transmission, and they possess the advantage that "tapping" of the communications would be quite impossible. For this reason it would seem that the method should be of value for military and naval purposes; even supposing that anyone wishing to intercept a plan or written message were to have an exactly similar instrument, with the same dimensions, by merely altering the rate of running by five or ten per cent., according to prearranged signals, the picture as received by the intercepting party would be quite unintelligible and confused.

When dealing with wireless work the question of synchronism becomes more serious. Two methods have been employed, each of which appears to answer satisfactorily. The first method secures accurate synchronism independently of any wireless communication. It has already been explained how, in the ordinary telegraphic work, the receiving cylinder is driven rather faster than the sending one, and when it finishes up a complete turn too soon it is arrested until the sending cylinder has caught up with it when the latter sends a reverse current which is responsible for its release. In the wireless apparatus both sending and receiving cylinders are driven too fast, so to speak—that is, they are made to revolve in four and three-quarters seconds, instead of a nominal five. A check comes into play at the end of the revolution, and the cylinder is stopped until the five seconds are completed, the motor working against a friction clutch in the ordinary way during the stop. At the end of one-fifth of a second each cylinder is automatically released by chronometric means. A special form of clock is used, with a centre seconds hand which projects beyond the face by about one inch, and to the end of it is attached a brush of exceedingly fine silver wires. At every one-twelfth part of the circumference of the clock dial is fixed a platinum pin, and consequently every five seconds the little brush wipes against the convex surface of one of them. Each of these pins is connected with one terminal of a battery, the other side of the battery leading to the relay, as does also the centre sec-

onds hand. Therefore, each time the brush wipes against a pin the circuit is closed, and the relay throws into action a local circuit connected up with its terminals. This circuit excites an electromagnet, which attracts an armature and pulls away the check which is holding back the cylinder. At the end of each five seconds the cylinders consequently recommence turning. Well calibrated clocks of the pattern used will keep good time for the period taken to transmit a picture, one gaining on the other quite an inappreciable amount, depending on the friction of the brush against the pins.

The other method of synchronizing is controlled by electromagnetic oscillations. Let us suppose that a coherer is being used as a cymoscope, the transmitting cylinder is kept running without any interruption, but by means of a reflecting contact it sends out a wave at the conclusion of its turn, a bare space in the picture being necessary about one-half second beforehand, so that no waves are sent out for the one-half second previous. The receiving cylinder is driven too quickly and checked at the end of the revolution. It then, by means of a cam pressing down a spring lever, throws out of circuit the marking current and brings into circuit the relay which actuates the electromagnetic release. Consequently, when the synchronizing wave is received, the coherer causes the relay to work, the release is effected, and the receiving cylinder starts a new revolution in unison with the transmitter. This means of synchronizing is only possible in cases where a cymoscope is employed that is capable of actuating a relay. It will therefore be seen that it is out of the question except for short distances.

Book Review.

A new edition of the "A B C of Wireless Telegraphy," by Edward Trevert, has just been issued. Since this book was first published in 1902, it has been one of the most popular works on the market for the use of those who desired to obtain an elementary knowledge of the principles underlying the art of wireless telegraphy and who had neither time nor inclination to master a large amount of complicated theory or to trouble with many tiresome details. Two editions have been issued since the first and additional matter added so that the present edition has been brought up-to-date. The author aims to give some information regarding the theory, apparatus employed and methods of operation used in wireless telegraphy and telephony. Directions are also given for making some of the simpler pieces of apparatus. A copy of this work will be sent, carrying charges prepaid to any address upon receipt of price \$1.00, by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Telegraph and Telephone Age is headquarters for all electrical books. Write for catalogue.

Telephones in England.

The Financial Times, of London, England, in a recent article reviews the telephone situation in that country, where, after 1911, the telephone system will be entirely under Government supervision. Since the arrangements were first made whereby the Government assumes the management of all of the telephones the National Telephone Company, the private organization which operates there has naturally refrained from making any greater expenditures in extending the service than were absolutely necessary. During the same time the Post Office authorities have not increased their expenditures in this direction. As a result the service has not been developed in the past three or four years as fast as it should have been. In commenting upon the condition of affairs which will exist when all of the telephones are transferred to state control the article in question says in part:

"There are two great difficulties to be met—the difficulty of obtaining sufficient capital year by year and the difficulty of keeping the service at the highest pitch of efficiency in the face of constant demands for lower rates to subscribers and higher wages to the staff. It is much to be regretted that chambers of commerce should confine their agitation in telephone matters almost exclusively to the question of rates. If they were to make a close study of the telephone situation here and in countries where the service is more highly developed, they would see that the difference does not lie at the door of lower rates, but it due to a liberal expenditure of capital (attracted by good dividends) and to unceasing attention to efficiency in every detail of organization. Contrary to the general view, the telephone service is not simply a matter of providing so many instruments and so many exchanges and arranging a cheap schedule of rates. It is a very highly specialized business, demanding keen intelligence and intimate knowledge, constant supervision of minute but vitally important details of traffic, and the highest incentives of carefulness and devotion on the part of every member of the staff. All kinds of business demand these qualifications, but none in a greater degree than the telephone service.

"The high stage of telephone development reached in the United States—where, for instance, trunk lines are used with an ease and freedom which are a revolution to anyone accustomed to the dilatory and inefficient system in Great Britain—is due to the fact that under private enterprise, unharassed by state interference, the telephone companies have been able to develop their organizations to the highest pitch. There is grave doubt whether a similar pitch is possible under British Post Office rule, with officials who tend inevitably to become hide-bound, with capital restricted by treasury and political requirements, with a system of promotion by seniority instead of by merit, and with the same sort of labor agitation as is growing year by year in the telegraph and postal services. One has also to reckon with the fact that

the growth of the telephone has been affecting the revenue from telegrams, and that, consequently, the Post Office authorities will not be inclined to force the telephone service forward at the rate it deserves. That there will be a definite change in the state of affairs is clearly recognized within the National Telephone Company's own staff.

"The National Telephone Journal recently remarked: 'In America, on the one hand, the telephone service is rapidly being developed to its utmost limits; in Europe, on the other hand, state-controlled, the telephone system is either, at best, moderately developed, or else absolutely starved. There is no doubt that in a well-organized company the freer stimulus given to individual merit and capacity, and the reaction of the latter both on the quality and earning power of a service, benefit a far wider circle than the shareholders—namely, the public at large. Compared with the simple question of rates, the possibility of a falling-away from the high standard of efficiency now reached by the National Telephone Company is a profoundly serious matter.' After all, it does not matter very much to a business man whether the telephone service costs him \$50 or \$75 a year if the facilities afforded are in every way adequate. The effect of an increasing agitation for lower rates, and only for lower rates, must tend to discourage the outlay of capital, to delay the replacing of out-of-date equipment, and to provide an excuse for starving the special technical departments on whose work the value of the service to the public depends to a far larger extent than those people are aware. The entire energies of chambers of commerce and other bodies representing business men ought to be concentrated on securing the highest rate of progress and the highest limit of administrative efficiency under Post-Office rule. All their energies will be needed for that work; but if these energies are to be limited merely to adjusting the schedule of rates, it will be found by experience that the cheapness of a telephone service is no guarantee that it will be worth even the reduced amounts asked for it. We feel sure that if these bodies were to arrange for a detailed study of telephone conditions at home and abroad by capable men they would realize their influence is really needed to secure the adequacy and efficiency, much more than the superficial cheapness, of the telephone service under Post-Office management."

Use of Telephones in National Forests.

The telephone in the national forest is not only of the greatest assistance in the management of the forest but its value is inestimable when used to report or summon help for a fire. In a single case of forest fire it may be worth the entire cost of its construction. No other work of improving the forests has been more acceptable to the residents in their vicinity.

In the summer of 1905 Secretary Wilson and United States Forester Gifford Pinchot, after going over large areas of little developed and

almost unexplored national forest land, decided that systems of telephones, with proper connections, would be invaluable in the forests of the west.

It was not until sometime later, however, when Congress made a specific appropriation for the improvement of the national forests, that funds were available for this purpose. Last year 3,200 miles of telephone lines were constructed in the 148 national forests in the west, and wire to build about 400 miles of additional line was shipped to the various forests, but with the funds on hand the work of construction could not be completed.

A town in southern Utah, with about 1,000 inhabitants, was isolated four days' ride from the nearest railroad station until a telephone line was built by the forest service across the mountainous country for forty miles, thus connecting the town, the headquarters of the forest, and several ranger cabins with the telegraph station.

From two to five ranger stations are now connected with the supervisor's office on many of the national forests, and by the use of telephones in the homes of settlers centrally located, other points are reached. The marked saving in time otherwise required for a trip of from twenty to forty miles is evident.

In some forests lookout stations have been established to which a wire is run and a man stationed in the vicinity, so that he can climb the point of vantage several times each day and with his glass sweep over the landscape in every direction, quickly scanning an area of two or three hundred thousand acres. It is by such plans that fire patrol and fire control have been established in the national forests with an exceedingly small protective force, and damage from fire has been reduced to a minimum.

An Improved Cable Relay.

Dr. Isidor Kitsee, of Philadelphia, has recently secured a patent, No. 956,808, for an improvement in a telegraphic relay. Its object is to produce means to lessen the sparking or sticking between the stationary and movable contacts of a relaying device.

In experimenting with sensitive relays, Dr. Kitsee has found that the sticking or sparking is greatly prevented when the source of current itself, without any electro-magnetic devices or other resistance, is short circuited; but in short circuiting the source of current, such for instance as batteries, not every type is suitable therefor and the type now usually employed—secondary batteries—has to be entirely discarded on account of their low resistance. The so-called "gravity" or "blue-stone" cells, however, are well adapted for the purpose in question.

In applying this improvement a relay is used consisting of a suspended movable coil placed in a magnetic field similar to the siphon recorder commonly used in ocean cables. This coil carries a movable

contact which normally touches a fixed contact and thus short circuits the battery. The battery is also connected to the coils of a local relay or sounder, but when the line relay is in its normal position no current will flow through these coils, as the battery is short circuited. When, however, an impulse is received over the line, and the connection between the movable part of the line relay and stationary part is broken, the short circuit is removed and the local relay or sounder is operated.

Dr. Kitsee's first claim on this device is: In cable telegraphy, a receiving organism comprising a movable coil in the region of a stationary magnetic field, two relaying contacts therefor, one relaying contact movable and suspended on a conducting thread, the second relaying contact stationary, a localized source of current, one pole connected to the stationary contact and the second pole connected to the conducting thread; a second circuit for said source of current and a translating device in said second circuit.

New Cable to Isle of Shoals.

The Shoals Cable Company has been incorporated with a capital stock of \$50,000 for the purpose of laying and operating a cable between the Isle of Shoals and Rye Beach, N. H., with land connections to Portsmouth, N. H. A company was formed for a similar purpose and a cable about five and one-half miles in length was laid in 1892. The cable, however, was defective and poorly laid and because of the constant expense of keeping it in repair, was afterward abandoned.

In 1908 the Shoals Telephone and Telegraph Company was organized by Robert Morton, of Boston, manager of the eastern division of the Telepost Company for the purpose of purchasing the franchise of this company and repairing the old cable. The franchise was purchased but it was soon learned after a considerable expenditure of money that it would not pay to attempt to put the old cable in service. On this account the present company with larger capital was formed as a holding company with Robert Morton as president, Charles W. Crane, treasurer and William O. Forbes, secretary. These, in addition to C. L. Egin, of Somerville and E. C. Kimball, of Lowell, form the board of trustees. The new cable will have seven conductors and will be suitable for either telephonic or telegraphic purposes. It is expected that the new connection will be completed during the present season. This will prove a great convenience to the many people who visit the Isle of Shoals during the summer. Mr. Morton still retains his connection with the Telepost Company. The new company, is in no way identified with that corporation except that it will have a working arrangement with it.

"Pocket Edition of Diagrams," etc., the latest revised edition, 334 pages and 160 illustrations, published by Telegraph & Telephone Age, contains just the information every telegrapher requires.

How.

BY E. E. BRANNIN.

Nearly a quarter of a century ago, an employe, not over zealous in his work, though particularly active in his efforts to obtain an increase of salary, asked the writer how he could get more than he was then earning and was thus answered: A reply to your question can be made in twenty words, but for the purpose of illustration we elaborate it slightly in order that you may more easily understand the answer.

If a grocer pays six dollars for a barrel of flour delivered at his store, keeps the flour in stock for a month or so and then sells it for six dollars, how much does he make or lose on the transaction? To this the employe replied: He just evens up, neither makes or loses.

Now then, suppose that every article in his store was sold on the same basis as the barrel of flour, how long could he maintain his store, paying rental, clerk hire, keep of horse and wagon, light, heat, etc? Of course he must make a profit otherwise he sustains a loss, was the answer. Now then, suppose that every man in this office rendered no more service than you do in comparison with the compensation you receive, do you think that the company would revel in an immense profit? Now let us talk plainly, and on a basis of fact. It is my honest opinion that the net profit to this company as a result of your labor here is a fraction less than that the grocer would realize on his barrel of flour.

If you want more remuneration for your work than you are now receiving, demonstrate the fact that you are earning it, make yourself a partner with your employer, make his interests your own. Emulate the example of some of those working near you, doing more than you for a smaller compensation, don't wait for work to come to you, look for it. Don't work mechanically, or be afraid to do something outside the work you are supposed to do; do not pretend to be at work, when you are only trying to avoid it. Don't forget that Abraham Lincoln was dealing out facts when he wrote: "You can't fool all the people all the time." Don't talk unless you have something to say, utilize your brain, don't think with your feet. In other words, the best way to get more than you are now earning, is to earn more than you are now getting.

To-day, if asked how one could get more than he is now earning the writer would tender the same prescription given the employe twenty-five years ago, and supplement it with advice calculated to meet the present day conditions of strenuous activity and exactness, advising him to thoroughly master every detail in his line of employment; to steer clear of pessimism and jealousy; to be at all times loyal even if he cannot love, if the latter quality is lacking on either side ascertain why. The consideration and courtesy that the public demand and have a right to expect from an employe, should also obtain

between the employer and the employe. Neither should lose sight of the fact that things we are desirous of catching are not attracted by worm-wood or vinegar. The employe should aspire to lead or at least keep step with or close on the heels of the leader. He should also understand the "how" or theoretical as well as the practical side of his work. He may understand that by making deductions, additions, or divisions a certain result is obtained, but he should be in a position to elucidate the why and wherefore. To sum up: He should be prompt and careful, quick and accurate, practical and theoretical, not forgetting to inject into the whole a 'goodly portion of "horse-sense." Be kind, considerate and just to all with whom he comes in contact. Annihilate discouragement, build up perseverance. If he is a member of the new electrical class stick to it. The promoters of that class doubtless feel gratified at the success of their efforts. The result will certainly tend to the betterment of the service and redound to the credit of the members of the class. They may not all develop into electrical wizards like Edison, but they will attain knowledge that will materially benefit them in their present employment, and better fit them for other pursuits if they elect to retire from their present vocation. Veritably "knowledge is power."

A Messenger's Prank.

A restaurant proprietor in Wilmington, Del., was surprised one day recently to find that every order sent to the kitchen was returned doubled, that is two orders were forthcoming instead of one. After this had continued for about an hour he finally visited the kitchen and demanded what the cook meant by doubling up every thing that was ordered. The cook was astonished.

"Deed, boss," he stuttered, "I only obeyed what you said."

This only served to make matters worse.

"Well, boss," said the cook, "every time you give an order you said 'make it two.' What else could I do?"

The proprietor denied all responsibility for the "make it two" amendment and was trying to solve the mystery when the housekeeper suddenly espied a telegraph messenger boy perched on a ladder near a window. She thought this a queer proceeding. When the next order was shouted from the dining room by a waiter, however, she heard the lad exclaim, "Make it two!" This was the cause of all the trouble. During the time that he was not engaged delivering messages the lad in question had amused himself by making trouble in the nearby restaurant.

Mr. C. A. Fonville, manager of the Western Union Telegraph Company at Montgomery, Ala., in a recent letter writes: "The Age is received regularly and it is like getting a letter from home. I will do all that I can to increase your list of subscribers in this city."



KERITE



Insulated Wires and Cables

KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

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NEW YORK**

Western Representative

WATSON INSULATED WIRE CO.

Railway Exchange, CHICAGO, ILL.



The Railroad.

Mr. C. McCormack has been appointed superintendent of telegraph of the Chicago and Eastern Illinois Railroad with headquarters at Danville, Ill., vice Mr. J. L. Davis who has resigned to accept a position with another railroad system with headquarters in New York.

The first telephone despatching circuit on the New York, New Haven and Hartford Railroad, extending from New Haven to Northampton, Mass., a distance of about one hundred miles, has been placed in operation and is giving very satisfactory service.

Telephone despatching service has been inaugurated on the St. Louis and San Francisco Railroad between Springfield and Monett, Mo. Additional equipment between Springfield and Kansas City has been installed and will soon be placed in service. This will make 238 miles of such circuits in operation.

Mr. N. C. Griswold, who for many years has been a railroad official in the coming session of the Northern Pacific Railway at Tacoma, Wash., having acquired a half interest in the Eagle Mill Company of Centralia, Wash., has resigned and will in the future devote his energies to the lumber business.

Considerable interest is being taken by American railroad officials in the coming session of the International Railway Congress to be held at Berne, Switzerland, July 3 to 16, and according to present indications this country will be well represented. The United States Government has appointed eight delegates, and the American Railway Association will send its president, Mr. F. A. Delano, and six other delegates.

The committee from the eastern division of the Association of Railway Telegraph Superintendents which was appointed at the meeting held in Washington, March 25, to formulate a system for delivering messages to passengers on trains, whereby a receipt can be obtained and returned to the telegraph company, met in New York, May 24, and conferred with officials of the telegraph companies. A plan for accomplishing this purpose was prepared and will be presented to the Association for approval at the Los Angeles Convention. The superintendents present at the meeting were: Mr. E. P. Griffith, of the Erie Railroad, New York; Mr. J. C. Johnson, of the Pennsylvania Railroad, Philadelphia; Mr. C. M. Lewis, of the Philadelphia and Reading Railroad, Reading, Pa.; Mr. A. B. Taylor, of the New York Central Railroad, New York and Mr. N. E. Smith, of the New York, New Haven and Hartford Railroad, New Haven. The Western Union Telegraph Company was represented by Mr. A. G. Saylor, general superintendent of the eastern division and Mr. E. M. Mulford superintendent, New York, and the Postal Telegraph-Cable Company was represented by Mr. Minor M. Davis, electrical engineer, New York.

The final meeting of the committee appointed by the eastern division of the Association of Railway Telegraph Superintendents to consider the proposed standard railway telephone agreement was held in the office of Mr. F. G. Sherman superintendent of telegraph of the Central Railroad of New Jersey in New York, May 24. There were present the entire committee, consisting of Mr. E. P. Griffith, chairman Mr. L. B. Foley and Mr. A. B. Taylor of New York; Mr. J. C. Johnson of Philadelphia; Mr. N. E. Smith of New Haven and Mr. Sherman. A report was adopted which will be presented to the Los Angeles Convention.

Some time ago an application was made by the Seymour Power Company to cross the Canadian Pacific Railway at a certain point in Ontario. They proposed using a single pole on each side of the tracks to carry their transmission line of 45,000 volts. The railroad company objected to this construction and an appeal was made to the Board of Railway Commissioners. The case was heard in Port Hope, Ont., early in May. The Canadian Pacific asked that a structure on each side of the railway be made up of four cedar poles in the form of two A's and connected together with arms, the butts of the poles to be protected by concrete or otherwise from fire for a distance of six feet from the ground. The Board of Railway Commissioners has rendered its decision ordering the construction according to the requirements of the railway.

The twenty-ninth annual convention of the Association of Railway Telegraph Superintendents which meets in Los Angeles June 20 to 25 bids fair to be one of the most successful of any ever held by that body. The list of papers which appeared in our April 16 issue indicates that the committee has arranged an educational program second to none. The various subjects which will be considered will be handled by experts in the line of work which each represents and the discussion which will follow their presentation will be participated in by those who can speak from practical experience. There are so many points of interest around Los Angeles that the entertainment committee has had a difficult task to select the very few places which it will be possible for the superintendents and their friends to visit during their brief stay in that city. Taken altogether it is hard to see where the plans for the coming convention could be improved upon. On account of the resignation of Mr. John L. Davis, president of the Association, Mr. I. T. Dyer, first vice-president will preside over the business sessions of the convention. Mr. Dyer is chairman of the committee of entertainment which has arranged the plans for the gathering and it is largely through his personal efforts that such an excellent program has been provided.

Telegraph and Telephone Age is headquarters for electrical, telephone and telegraph books. Write for catalogue.

The Boston Force in 1863.

Mr. Charles C. Bedlow, assistant superintendent of telegraph of the Boston and Maine Railroad, Boston, Mass., and the son of J. S. Bedlow, formerly superintendent of the American Telegraph Company at Boston, has in his possession an album which was presented to his father in 1863 and which contains pictures of all the operators in the Boston office at that time.

The album bears on its front cover in gold letters the inscription "J. S. Bedlow, Superintendent, American Telegraph Company, 1863" and on the back cover is engraved "From the Employees of the Boston Office." Photographs of the following are found in the book:

W. F. Richards, G. F. Milliken, J. Harlow, J. F. Lotts, A. W. Todd, T. A. Davin, Gerrit Smith, J. W. Duxbury, Thomas McKey, H. W. Wheeler, C. W. Henderson, J. A. McGee, J. Labonte, W. H. Allen, J. H. Milliken, J. W. Robman, W. C. Havens, B. G. Winter, J. C. Barrett, Thomas Allen, D. C. Roberts, H. S. Martin, C. L. Godwin, E. W. Gibbons, J. J. Powers, E. S. Hardy, D. D. Devereaux, Wm. Martin, Jaius Harlow, M. J. Crook, C. A. Richardson, C. Sughrue, A. B. Rogers, I. N. Keith, J. H. Twichell, Frank J. Milliken, Miss A. M. Leavett, Miss S. B. Allen, E. J. Byrne, F. B. Lynch, N. Rice, J. B. Davidson, S. N. Holloway, C. H. Pike, C. J. O'Leary, E. McEleny, J. S. Whitacre, J. Hinchman, C. H. Sawyer and J. W. Robinon

The album was made up and presented to Mr. Bedlow and a duplicate was also presented to the superintendent of the division in which Boston was located, Mr. Charles F. Wood. Mr. Bedlow was superintendent from Boston to Calais, Me., and Mr. Wood from Boston to New York. Mr. Bedlow resigned in 1863 to take the superintendency for New England of the United States Telegraph Company and continued in that capacity until the formation in the east of the present Western Union Telegraph Company July 1, 1866. He then became superintendent of the third district, eastern division of that company, Boston to Calais, Me., including a part of New Hampshire, retaining this position until his death by accidental drowning at Old Orchard, Me., July 2, 1878.

There are a number in the album who were prominent in the service but most of them have long since died. Only two are at the present time employed in the Boston office, viz.: C. W. Henderson, formerly and for many years manager of the operating department, and Jas. A. McGee, the latter now a member of the operating force.

Gerrit Smith has been an honored member of the electrical staff of the Western Union at New York for the past thirty years. He is the inventor of many useful telegraphic devices.

Geo. F. Milliken, for many years manager, succeeding W. F. Richards, at the death of the latter, is still a hale, hearty personage on the streets of Boston. He has been identified with the Gamewell Fire Alarm Telegraph Company for many years. When in the telegraph service he was

prominent electrically and was the originator of the well-known "Milliken" repeater.

A. W. Todd, E. S. Hardy and D. C. Roberts were well known outside of the Boston circle, having at various times been in the New York office and elsewhere.

John W. Duxbury entered the telephone service and was connected in an official capacity with the New England Telephone and Telegraph Company at the time of his death.

Thomas A. Davin was well known to the older men in the service. His death occurred March 27 of this year. For the previous twenty years he had been operator for a banking house in Boston.

W. H. ("Billy") Allen left the business to become private secretary to the collector of the port of Boston some twenty-five or more years ago, but returned to the service later and was in the Postal Company's employ as manager at Washington. For several years past he has been private secretary to Mr. P. V. DeGraw, fourth assistant postmaster-general.

H. S. Martin, whose home is in Keene, N. H., has been in the banking business for many years and is now with J. C. Stratton and Company of New York.

Daniel D. Devereaux was manager of the Duxbury cable office for the twenty-seven years prior to his death, which occurred May 13, 1909.

John Whitacre became one of the high grade operators in the office, but left the service about thirty years ago to enter commercial pursuits. He is now in the real estate business in St. Paul.

Wm. Martin, of the receiving department, was well known by nearly everybody in the city. He was very prominent in Masonic circles. His supply of witty stories was inexhaustible.

Henry Wheeler entered the service of the Maine Central Railroad Company at Brunswick, Me., as ticket agent in the early seventies and held that position until his death about ten years ago.

John Milliken was in the employ of a banker as private operator many years ago, and is still employed in that capacity.

Benjamin Winter, who died about 1880, will be remembered as the manager of a very important branch office for the Western Union in the basement of the old State House. As this was prior to the invention of the telephone and introduction of leased wires, he handled a tremendous brokerage business.

James Barrett will be remembered as one of the operators of the Phelps printer, which system was long since shelved.

Jaius Harlow, filled the position of cashier for many years prior to his death.

Miss Allen (known to operators of the present generation as Mrs. Howard) is one of the most expert women operators who has ever worked a key. For many years she was chief operator for Charles Head and Company, one of the largest banking institutions in Boston, and was recently retired on a pension without having in any degree lost her nimbleness of finger or alertness of mind.

Charles Sawyer became chief operator for the Atlantic and Pacific in Boston, and when that company was merged with the Western Union, he became chief operator for Lee, Higginson and Company, the well known bankers of Boston, which position he held until his death some ten years ago. He was one of the most expert and intelligent telegraphers America has produced, and was the District Director of the National Telegraphic Union in 1864.

Canadian Notes.

The case between the Western Associated Press and other papers of Canada which was mentioned in our February 1 issue and which was not completed at the hearing in Ottawa held in February, was continued in Winnipeg May 13, but no decision was reached and a further hearing will take place in Ottawa during the first week in June.

The application of the Board of Trade and Grain Exchange of Winnipeg for a reduction in telegraph rates and a general investigation into the telegraph throughout Canada came up before the Board of Railway Commissioners in Winnipeg on May 12. The Board decided they would not enter into a general investigation, but later on would look into the rates in and out of Winnipeg. This will probably be done in September.

At the hearing of these two cases in Winnipeg there were present, representing the Canadian Pacific Railway, Mr. Jas. Kent, manager of telegraphs; W. J. Camp, electrical engineer, and E. W. Beatty, general solicitor of the company. The Canadian Northern Railway Company was represented by W. C. Muir, superintendent of telegraph, and the Great North Western Telegraph Company by Mr. I. McMichael, vice-president and general manager and Mr. J. Paddington, manager at Winnipeg. The Grand Trunk Pacific was represented by Mr. A. B. Smith, general manager of telegraphs.

Annual Reunion of Old Time and Military Telegraphers.

When the twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association and of the Society of the United States Military Telegraph Corps meets at the Auditorium Hotel in Chicago, September 8, 9 and 10 there will probably be gathered together the largest number of old timers who have ever attended one of these meetings. The fact that Chicago is near the centre of population of the United States and also the home of so many of those who were in the service twenty-five years ago or more ought alone to be reason enough to justify this prediction. When, however, we add to this the fact that there are among the Chicago members of these two bodies some of the most energetic and wide-awake men who ever served at the key and who are now interesting themselves in the success of the coming event there is no reason to doubt that the 1910 reunion of the old time and military telegraphers will be one of the most successful ever held.

International Telegraph and Telephone Conference.

The second International conference of telegraph and telephone engineers will be held in Paris September 4 to 11, inclusive. Among the list of subjects which will be discussed which appeared in our March 1 issue is the question of manual versus automatic telephony. To aid the consideration of this question the French Government has proposed the holding in Paris from September 4 to 18 of a public exhibition of automatic telephone systems. The French Administration will, if the suggestion is carried through, provide free space and lighting and will be responsible for the safety of the exhibits, which should include apparatus for at least 100 subscribers and should, as far as possible, represent inter-communication stations.

General Mention.

The bill prohibiting the employment as messengers, between the hours of 10 p. m. and 5 a. m., in the larger cities of New York state, of boys under twenty-one years of age, has passed the Legislature and been signed by the Governor.

The English underground telegraph system will be extended during the present year from Leeds to Hull. It is expected that Leeds and Stockton will also be joined. The latter connection will complete the underground system from London to Newcastle.

Professor J. A. Fleming, the well-known electrical engineer and author of London, has, during the past winter, conducted a lecture course in that city on the "Propagation of Electric Currents in Telegraph and Telephone Cables." This course was attended by over seventy telegraph, cable and telephone engineers, and at its completion an examination was given on the work covered.

Mr. W. E. Athearn, engineer of equipment, of the Western Union Telegraph Company, New York, and Minor M. Davis, electrical engineer of the Postal Telegraph-Cable Company, New York, report absolutely no disturbances, whatever, observable on the lines of their respective companies during the recent passage of the earth through the tail of Halley's comet. The wireless companies also state that their service was not interfered with in the least.

The first annual number of Poor's Manual of Industrials has just been issued. This covers in the industrial field information, similar to that which has appeared concerning the railroads for over forty years in Poor's Manual of Railroads. In the new volume the telegraph and telephone companies of the United States are grouped together. The total capitalization of all of these companies reported is \$1,140,734,324. Their gross earnings during 1909 amounted to \$198,095,052 and their net earnings to \$72,612,736. After paying dividends of \$29,015,348 and making other deductions there was a surplus of \$18,871,278.

QUESTIONS TO BE ANSWERED.

[The lists of questions which we published under this heading in our previous issue, the answers to which may be found in Chapters I and II of Jones' Diagrams, was much appreciated. Students in telegraphy have found them of great assistance in helping master the contents of this standard text book of telegraph engineering. We will continue to print similar lists of questions, taking up each chapter in turn. If students will carefully study the subject matter to which each set of questions applies until he is able to answer all of them without referring to the book, he will, by the time he has gone through the book in this way have gained a thorough knowledge of all of the principles underlying telegraphic operation].

CHAPTER III.

What principal factors determine the capacity and electromotive force of a dynamo?

What factors directly determine the electromotive force of the dynamo?

What principle is involved in the generation of an electric current by means of a dynamo?

How was this principle discovered?

At what point in its revolution is the greatest electromotive force generated in a conductor on the armature of a dynamo?

At what point is there no electromotive force generated?

What is the essential difference between a direct current dynamo and an alternating current generator?

CHAPTER IV.

What three factors have to be considered in making electrical measurements?

What effect does the resistance of a conductor have on the value of the current flowing therein?

Who discovered this fact and what is the statement of this fact commonly called?

Upon what is the standard unit of resistance in general use to-day based?

What formula represents the relation which always exists between electromotive force, current and resistance?

What information is necessary in connection with a given circuit to determine the value of any one of these three factors?

How can you find the strength of current in a circuit having given the voltage and resistance?

How can you find the resistance having given the current and voltage?

How can you find the voltage having given the current and resistance?

What is the unit of quantity called and what is its value?

What is the unit of work and how is its value determined?

How would this unit be made use of in determining the required capacity of a dynamo for an electric lighting installation?

What is the electrical equivalent of a mechanical horsepower?

Rates for inland telegrams in Jamaica have been reduced from one shilling for twelve words inclusive of the address, to six pence and one-half pence for each additional word.

Obituary.

Charles E. Chandler, a member of the United States Military Telegraph Corps, died at Los Angeles, Cal., April 7.

William H. von Hartman, also a military telegrapher, died at Westville, Oklahoma, April 25. This is the ninth death of members of the Corps since the annual meeting at Pittsburg last August.

John J. Gallagher, aged twenty-six years, an operator employed by the Postal Telegraph-Cable Company at Boston, was accidentally drowned May 22.

Charles A. Tommaney, an operator employed by the Western Union Telegraph Company at Albany, N. Y., died of pleurisy May 3, aged twenty-four years.

James Howard Crawford, an old time telegrapher, died at his home in Pittsburg May 15, aged fifty-two years, after a long illness. Mr. Crawford was born in Pittsburg and served as train despatcher and later had charge of the telegraph system of the Pittsburg and Lake Erie Railroad.

Answers to Correspondents.

[We will under this heading answer from time to time questions from any of our readers in regard to technical, historical or other features of the telegraph, telephone and allied industries. We receive many such inquiries from subscribers and always answer them by mail. As some of these, however, are of general interest we will hereafter print both questions and answers in this column so that all our readers may receive the benefit of our answers.]

One of our Brooklyn readers asks the following:

Regarding speed and practical efficiency, what system of telegraphy stands foremost in the field to-day?

This is a difficult question to answer as there are many systems in use to some extent designed for higher speed than Morse operation and each of which has its exponents who claim that it is the fastest and most efficient. From results being attained at present in this country, however, it would seem that the Wheatstone system is probably the fastest and most efficient system now used to any extent in our telegraph service. A speed of from 100 to 300 words per minute can be attained by this method, according to the length of the line.

There are of course, certain chemical and other highly sensitive systems capable of much more rapid signaling over the line than the Wheatstone, but none begin to compare with it as a really practical working system, peculiarly well adapted to take care of a large volume of business with the minimum delay and greatest accuracy.

Following the action of the Western Union and Postal Telegraph-Cable Companies in increasing the wages of their employes the 125 operators in the United Press service have been granted an increase of fifteen per cent. in their wages.

Trade Notes.

The Western Electric Company has recently placed on the market a selector for telephone train despatching which has been developed by their engineers.

The new selector is a very simple device, being a straight step-by-step mechanism with but three moving parts, bridged directly across the line. There is only one contact made and as all relays and other complicated parts are eliminated it is claimed that the selector is as near perfect as it is possible to make it. Central battery ringing is provided for, thus doing away with the necessity of installing dry batteries at the way stations. The selector is also arranged for local battery ringing if desired.

The Electric Storage Battery Company of Philadelphia has opened two new sales offices, one at Detroit, Mich., and the other at Denver, Col. These offices have been opened in order to better serve the customers of the company in the adjacent territory. A stock of battery material will be carried in Denver from which orders can be promptly filled.

Electrical Club at St. Louis.

At a meeting of employes of the Western Union Telegraph Company and the American Telephone and Telegraph Company held at St. Louis on May 12, an electrical club was organized, to be known as the "Western Union Electrical Club of St. Louis."

The following officers were elected: W. E. Bellman, chief operator Western Union, president; Charles McNeill, manager of branch offices, vice-president; Peter A. Peterson, traffic chief, secretary, and Miss Loretta M. Hood, treasurer; R. H. Bohle, J. G. Alger, C. W. Frey, W. J. Armstrong and G. A. Littell constitute the executive committee.

The object of the club is education along electrical lines. Meetings will be held on the second and fourth Thursday of each month. A regular course of lectures will be given by professors from technical schools, followed by practical demonstration of matters pertaining to the telegraph and telephone business.

The following have been enrolled as members of the new club:

G. R. Alger, W. J. Armstrong, W. E. Bellman, J. Benedict, Miss Rose Berg, R. H. Bohle, Jno. F. Canavan, C. W. Carroll, O. R. Carson, M. J. Cassidy, W. R. Chapman, C. W. Crary, L. P. Custer, C. E. Drake, C. E. Dubbs, J. E. Dunlop, T. F. Dunn, R. C. Dyer, Miss Nellie Frazier, C. W. Frey, H. G. Gosting, H. S. Graber, C. W. Groos, Erle Harlan, R. L. Holden, Miss L. Hood, W. H. Johnson, C. W. L. Jost, E. A. Kintz, C. A. Lackey, J. M. Leeper, G. A. Littell, R. G. Matthews, J. F. McCarron, J. A. McIntyre, C. McNeill, A. Mitchell, E. H. Moore, H. F. Musgrove, R. E. Norman, M. M. O'Neill, P. A. Peterson, N. T. Petty, Ed. Powers, G. A.

Putnam, C. L. Rayborn, W. L. Rhodes, P. W. Robertson, Miss Nellie Ruhlman, C. S. Slaughter, H. S. Smith, Miss Alma Snyder, L. R. Spehr, Geo. F. Stewart, S. D. Terrell, A. Turner, O. L. Turner, A. E. Van Tyne, W. A. Wilkerson.

LETTERS FROM OUR AGENTS.**CHICAGO, WESTERN UNION.**

Mr. C. H. Addison has been appointed night traffic chief.

Mr. W. E. Clabeau has been made division chief nights in the St. Louis division and Mr. Louis Finan has been assigned as his assistant.

C. H. Shell, Jr., has been appointed chief of the St. Louis division, vice A. C. Garrison resigned.

E. P. Hass has been appointed assistant chief of the St. Louis division.

A gold watch, chain and charm was presented recently by the employes in this office to Mr. A. B. Cowan former chief operator who was, on April 1, promoted to the assistant superintendency in this city. The presentation was made by Mr. C. H. Finley, chief operator, following which Mr. C. H. Shell, general wire chief, gave Mr. Cowan a bouquet of American beauty roses.

NEW YORK, WESTERN UNION.

Mr. Martin Durivan has taken charge of the West End, Long Branch, N. J., operating department for the summer as has been his custom for over twenty years. Mr. P. J. Casey, assistant superintendent, New York will soon assume the management of the West End office. Mr. Casey has acted as manager at this summer resort for some twenty-five years.

Mr. George E. Cromwell, a former old timer in this office but for some years past living in retirement at Damascus, Pa., was in the city recently. Mr. Cromwell who was a military telegrapher during the Civil War came here for medical attendance. He has recently undergone a severe but successful operation and his friends hope for his early restoration to complete health.

Edward Gordon, formerly an operator in this office and one of the prominent figures in the service during the seventies died at Hudson, N. Y., May 2 aged seventy-one years.

Recent appointments in this office are:

F. B. Chase, to be assistant traffic chief of the southwestern division; Mr. A. Patridge, to the loop board, vice Mr. Chase; O. L. Butler, as Erie division traffic chief, vice N. B. Hall, assigned to learn the eastern switchboard; F. W. Streeter, and J. W. Burnett, to the southern switchboard, vice C. C. Lever, transferred to the office of general manager B. Brooks, and J. R. Heidemark, transferred to the position of all night wire chief; J. Gschwind, night newspaper chief has been transferred to day work as assistant general wire chief; J. D. Price, has been appointed night newspaper chief, vice Mr. Gschwind; W. F. Packard has been appointed southern traffic chief, vice Mr. Price.

D. W. McAneeny, assistant eastern wire chief is absent from duty on account of sickness.

A. A. Lopez, repeater chief has just returned to duty after his wedding trip.

Miss M. F. Lynch, city wire chief and Miss E. Vatelet sailed May 21 for an extended trip in Europe.

The Electrical Society has engaged Mr. J. Harold Morecroft, professor of electrical engineering at Columbia University, to give a series of lectures on electrical currents, electromagnetism, etc. Professor Morecroft will alternate with Mr. Charles Thom, chief of the quadruplex department, who gives lectures on the practical working of the Western Union instruments.

Mr. Louis C. Williams, professor of physics at the Erasmus Hall High School, will teach the theory of electricity. Professor Williams will lecture and quiz the class every Friday evening.

The membership of the society is now 125. In addition to this class, there are six classes of night men, averaging ten men to a class, who are studying under professors during the day.

OTHER NEW YORK NEWS.

The Telegraphers' Aid Society now has its headquarters in room 518, at 195 Broadway.

The Serial Building Loan and Savings Institution, Mr. E. F. Howell, secretary; is now located in its new office room 517, at 195 Broadway. This room has been fitted up as a miniature banking office, including a large fire proof safe capable of holding all the securities and books of the Institution with a burglar proof money chest, filing cabinets, accommodations for the handling of business and the convenience of its members. The employees of both the Western Union and Postal Telegraph-Cable Companies are to be congratulated upon the great prosperity of this telegrapher's association.

Assessments Nos. 508 and 509 have been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Smith Robertson, at Minneapolis, Minn.; Thomas D. Whipple, at Newark, N. J.; Frank C. Ball, at Woodbridge, N. J.; Thomas C. Wilkenson, at Mallerytown, Ont.; Matthew R. Wolff, at Wheeling, W. Va.; Joseph W. Woods, at New York; Augustine Justice, at Camden, N. J.; Thomas A. Davin, at Dorchester, Mass.; Levi C. Weir, at New York, and Thomas H. Maholland, at Philadelphia, Pa.

An Electrical Book for Practical Men.

"Lessons in Practical Electricity," by C. Walton Swoope, which has been selected as an official text book by the electrical schools organized among the employees of the eastern division of the Western Union Telegraph Company, is, as its name signifies, an elementary text book for the practical worker. It contains nearly five hundred pages and has over four hundred illustrations. It is divided into thirty-

one chapters dealing with magnetism, batteries, electrolysis, current measurement, resistance, Ohm's law, circuits, galvanometers, electromagnets, measuring instruments, electro-dynamics, induction coils, dynamos, motors, electric lighting and alternating currents. At the end of each chapter, there are given several questions for the student to answer and practical problems for him to solve. Numerous interesting experiments are also described, which can be performed by the aid of simple apparatus. The book was written especially for the use of evening classes in practical electricity and is admirably adapted to that purpose. This work, together with Jones' "Diagrams," Maver and Davis' "Quadruplex" and Thom and Jones' "Telegraphic Connections" seems to meet all of the requirements of the student who desires to acquire a thorough knowledge of the principles underlying the operation of the telegraph system. The prices of these books are: Swoope's "Lessons in Practical Electricity," \$2.00; Jones' "Diagrams," \$1.50; Maver and Davis' "Quadruplex," \$1.50; Thom and Jones' "Telegraphic Connections," \$1.50. Any of these books will be sent, carrying charges prepaid, upon receipt of price by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.

Why not start a savings account with the Serial Building Loan and Savings Institution, 195 Broadway, New York, and have something laid aside for a rainy day, or to assist you in buying a home? They pay a higher rate of interest than any other depository for savings and the fact that they are under the supervision of the New York State Banking Department assures you that they offer a perfectly secure place for the deposit of your money.

WANTED—A man accustomed to the making of telephone parts, and the assembling, adjusting, and installing of telephone transmitters and the like; an experienced all around workman and electrician. Address, Manufacturer, care of Telegraph and Telephone Age, 253 Broadway, New York.

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Telegraph and Telephone Age

No. 12.

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Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons in Electrical Measurement.

PART IV.

In the preceding instalment of this article it was shown that the value of the electromotive force at the point where a circuit divides into two branches would change if either of the branches should be opened.

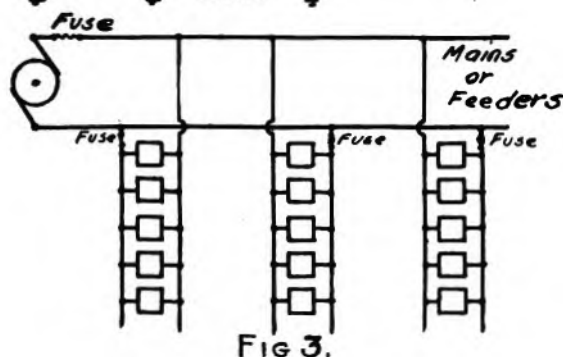
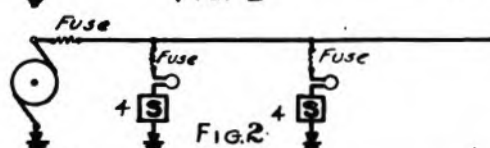
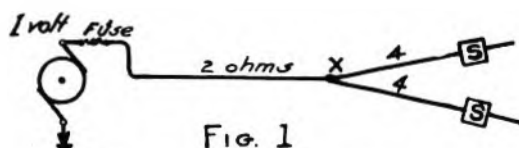
For instance, in Figure 1, with the voltage and resistances given the electromotive force at x would be one-half of a volt with both branches closed, because that point represents just half of the total resistance of the circuit, consequently the voltage in its drop from maximum pressure to zero has also reached the middle mark in its descent.

If one branch should be opened the electromotive force at x would then be greater because there would be a greater resistance in the line beyond x. With both closed the joint resistance in the branches is but 2 ohms. With one open we get 4 ohms straight, making the total resistance of the circuit $2 + 4 = 6$ ohms. Hence as x now represents but one-third of the total resistance the voltage would only fall to two-thirds of a volt instead of the one-half volt as in the first case. It is evident therefore that any instruments inserted in the branch circuits would receive more current at

one time than another and thus act in that choppy manner often noticed in sounder circuits where proper precautions have not been made to prevent it.

The remedy for preventing choppy circuits and the one invariably followed is to eliminate the resistance between the battery and the junction point x, as shown in Figure 2.

The object of this illustration is to emphasize the importance of constructing all mains, or feeders of telegraph circuits in such a manner that they shall contain no appreciable resistance



between the brushes of the dynamo and the point where a branch or line wire is connected for the purpose of taking current.

In Figure 1 that portion of the wire between the machine and the junction point x acts in the capacity of a main or feeder for the two branch circuits, hence it is inefficient for the purpose of a feeder for the reason stated.

In actual practice the objectionable resistance in mains or feeders is eliminated by merely leaving their terminals open and then tapping the various lines to them in the manner shown in Figure 2. Each line wire thus connected constitutes an individual circuit of its own and is in no wise affected by the opening or closing of any of its companions.

The value of the electromotive force does not alter in the mains because their ohmic resistance is so insignificant up to the point where such connections are made as to be negligible.

Each grounded circuit connected with the main may then have a resistance lamp inserted be-

twice the tap and the first instrument in circuit for the protection of the dynamo, usually two ohms per volt of the battery used. Figure 2 gives a good illustration of the manner in which current is supplied to the various wires at the main wire switchboards. The feeders or mains are represented by the rows of battery disks, the protecting resistance by the lamps above the board, while the fuses may be found behind the board where the line wires are connected.

For sounder circuits arranged in multiple two mains are required which must also have their terminals left open in order to prevent a difference of potential at different connecting points.

Theoretically all of the sounders might be connected between the two mains and the branch circuits shown in Figure 3 eliminated. In actual practice, however, that method is never followed for the reason that should the coils of one of the sounders accidentally become shunted out the dynamo would be short circuited and the resulting great volume of current that would flow into the mains would instantly blow out the fuse and open all circuits. In such a case it would be like hunting a needle in a haystack to locate the sounder at fault, even if otherwise such an arrangement was feasible.

To prevent such an occurrence as this the mains are tapped in the manner shown in Figure 3 and but four or five sounders combined in one group. By this method a similar short circuit would only affect the apparatus in one group while the mains and other circuits would not be affected. A fault of this kind would be located at once and remedied without material delay.

Returning to the subject of joint resistance it will be seen that as the joint resistance of the sounder or external circuits is equal to the resistance of one such circuit divided by their total number it is obviously very low. Consequently not only the resistance of the mains but the internal resistance of the dynamo itself must be exceptionally small. This requirement is easily met through the construction of the dynamo but with gravity battery the multiple method of arranging circuits is impractical for the reason that the two ohms per cell of internal resistance the jars contain foots up to more than the joint resistance of the external circuit amounts to. Hence with a gravity battery system the entire row of jars in series constitutes a part of the feeder or main, and for that reason is in exactly the same position as that of the conductor between the dynamo and x shown in Figure 1 and therefore useless.

(To be continued.)

Recent Telegraph and Telephone Patents.

A patent, No. 957,869, for an intercommunicating telephone system, has been awarded to E. R. Corwin, of Chicago, Ill.

A patent, No. 957,909, for an autophone system, has been granted to A. E. Stevens, of Fall River, Mass.

A patent, No. 957,973, for a signaling system, has been secured by O. T. Lademan, of Milwaukee, Wis. Metallic line telephone circuit, including a plurality of relays which are non-inductive with respect to the metallic circuit and which can be operated over the two metallic conductors in parallel as a telegraph system.

A patent, No. 957,977, for a protective system, for telephone lines has been issued to R. H. Manson, of Elyria, O.

A patent, No. 958,067, for a telephone system and apparatus, has been taken out by A. K. Andriano, of San Francisco, Cal. Interconnecting telephone system doing away with the operator at the central station.

A patent, No. 958,145, for a telephone meter system and apparatus, has been secured by R. H. Manson, of Elyria, O.

A patent, No. 958,224 for an electric signaling apparatus, has been awarded to L. W. Carroll, of Anamosa, Ia. A selective telephone signaling system, including tuned reed and an electric variable resistance device operated from the reed.

A patent, No. 958,248, for a telephone system, has been granted to L. E. Hicks, of Stinson, W. Va.

A patent, No. 958,315, for a telephone system, has been awarded to E. C. Rodman, of West Point, Ia.

Patents No. 958,560, for a telephone repeater, and No. 958,561, for a telephone transmitter, have been granted to P. Stragiotti, of Hurley, Wis.

A patent, No. 958,627, for a telephone system, has been issued to C. L. Goodman, of Atlantic City, N. J.

A patent, No. 958,847, for a party-line telephone call mechanism, has been taken out by William E. Zabst, of Portage, Wis.

A patent, No. 958,856, for a telephone system, has been secured by W. W. Dean, of Elyria, O.

A patent, No. 958,863, for a party line call register for automatic telephone systems, has been awarded to A. H. Dyson, of Chicago, Ill.

A patent, No. 958,868, for a telephone system, has been granted to W. F. Grandolph, of St. Louis, Mo., and W. C. Halne, of Chicago, Ill.

A patent, No. 958,894, for party line telephone system has been issued to H. J. Roberts, of Evanston, Ill.

A patent, No. 958,925, for a telephone set, has been taken out by W. Kaisling, of Chicago, Ill.

A patent, No. 958,979, for a telephone switch hook, has been secured by B. W. Sweet, of Cleveland, O.

A patent, No. 959,243, for a desk telephone standard, has been issued to C. T. Mason, of Sumter, S. C.

The following patents have expired:

Patent No. 498,236, for a telephone system, issued to Emery A. Clark, of Sioux City, Ia.

Patent No. 498,243, for a telephone switch, issued to Augustus G. Davis, of Baltimore, Md.

Patent No. 498,291, for an automatic telephone exchange system, issued to Alfred S. McCaskey, of Chicago, Ill.

Patent No. 498,309, for a telephone transmitter, issued to Charles F. Scattergood, of Albany, N. Y.

Patent No. 498,674, for a printing telegraph, held by Donald Murray, of London, England.

Personal.

Mr. H. W. Pope, the well known old time telegrapher, but who, for many years past, has been associated with the American Telephone and Telegraph Company, is traveling through the west with a party of newspaper men.

Mr. G. W. Peck, of New York, and Albert Douglass, of Chicago, special agents of the American Telephone and Telegraph Company, have gone to Los Angeles to attend the convention of the railway telegraph superintendents.

Mr. Charles J. Glidden, the well known old time telegrapher, at a recent dinner of the Press Club of Boston, related some of his experiences as a telegrapher and newspaper correspondent in Manchester, N. H., in early days. He also told how he once sent a telegram from the Fiji Islands to Boston that arrived seventeen hours ahead of the time it was filed.

English papers announce the marriage in London on May 11 of Miss Evelyn Butler, daughter of Lord and Lady Arthur Butler and granddaughter of the late General Anson Stager, to the Hon. Rupert Drummond. Lady Arthur Butler, nee Miss Nellie Stager, was well known in social circles in Cleveland and Chicago, having resided in those cities while her father, General Stager, occupied the positions of general superintendent and vice-president and general superintendent of the Western Union Telegraph Company.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Colonel R. C. Clowry, president of the company, has moved into his new home at Tarrytown, N. Y.

Mr. Belvidere Brooks, general manager of the company, has returned to his office, after an extended trip of inspection through the south-west and west, which took him as far as the Pacific coast. Mr. Brooks was accompanied throughout the trip by his wife, W. N. Fashbaugh, who is in charge of the traffic and W. C. Merly, secretary to the general manager. His party was later joined by R. E. Chetwood, engineer of construction; F. A. Pickernell, assistant to the President of the American Telephone and Telegraph Company, and S. M. Williams, special agent, all of New York. Arrangements were

made at the various points visited for the extension of the reciprocal operating relations existing between the company and the different Bell Telephone Companies, thus opening up for improved service many remote points in the west. As a result of the inspection a large amount of new construction and reconstruction work has been authorized. From San Francisco to Salt Lake City the New York party was accompanied by Mr. Frank Jaynes, general superintendent of the Pacific division; Mr. J. L. Ord, superintendent of construction and Mr. F. S. Rawlins, superintendent of telegraph of the Southern Pacific Railway, all of San Francisco. At Salt Lake they were met by Mr. Theodore P. Cook, general superintendent, and Mr. M. T. Cook, general agent, of Chicago; Mr. J. B. Sheldon, superintendent of telegraph of the Union Pacific Railroad, Omaha, and Mr. S. E. Leonard, superintendent at Denver. An informal dinner was given at Salt Lake City May 25, in honor of the visiting party and Mr. Jaynes, who, on that day, celebrated the fiftieth anniversary of his entry into the telegraph service. He gave some interesting reminiscences of his telegraph career, stating that when he first joined the telegraph in 1860 on the line of the Pacific Telegraph Company, between San Francisco and San Jose, there were just three men in the service of that company, the president, general manager and a boy, he being the boy. He was in Salt Lake City in 1861, when the transcontinental lines were joined there.

Mr. T. P. Cook also entertained the party with some of his early experiences when he was an operator at the military stations between Cheyenne and Salt Lake in 1864. He said that he was operator, lineman and a little of everything in that neck of the woods when the Indians had on their war paint. He said that whenever he went out to repair wires between stations he was escorted by fifty or more soldiers.

At Denver a dinner was given to Mr. Brooks in the Denver Club by a number of the leading men of that city. At this point the party was joined by Mr. C. H. Gaunt, superintendent of telegraph and assistant general manager of the Santa Fe system, Topeka, and Mr. C. S. Gleed, president of the Missouri and Kansas Telephone Company, Kansas City, accompanied by their wives.

Mr. W. E. Athearn, engineer of equipment, has returned to his office from a western trip on business connected with the service, which included visits to Omaha, Kansas City, St. Louis, Chicago and other offices.

Messrs. D. Lynch, cable engineer, of New York, D. C. Dawson, superintendent at St. John, N. B., and C. B. Dunham, manager of the cable station at Canso, N. S., have been in Newfoundland recently on business connected with the cable service of the company.

Mr. E. A. Baird, manager of the Binghamton, N. Y., office has been appointed chief clerk and inspector in the office of E. M. Mulford, superintendent of the first district, eastern division, New York. Mr. Baird is well qualified for the new position, having been in the service since 1890, when, at the age of sixteen, he was employed as operator on the Erie Railroad and the following year became manager at Warsaw, N. Y. He later occupied a similar position at Elmira and in July 1904, was transferred to Binghamton as manager, where he has since been located.

Engineer of Equipment W. E. Athearn has changed the apparatus on the New York-Albany and on the New York-Syracuse quadruplex circuits. Those circuits are now doing first-class quadruplex work.

A conference of managers in the district of Superintendent W. J. Lloyd, of Chicago, was held in his office recently to consider the condition and betterment of the service throughout the district. About forty managers were in attendance. Many improvements will be made in all of the offices of the district.

A new telegraph line is being constructed to the top of Pike's Peak, to replace a cable which was extended to that point several years ago, the service given by the cable not having been entirely satisfactory, because of much trouble from lightning.

Three new wires have been completed and placed in service along the line of the new Western Pacific Railroad between Salt Lake City and the Pacific Coast.

At the regular quarterly meeting of the Board of Directors, held June 8, a dividend of three-quarters of one per cent. was declared, payable July 15 to stockholders of record June 20. The following statement shows the condition of the company at the close of the quarter ended March 31, 1910.

Surplus December 31, 1909.....	\$18,584,497.13
Net revenues, quarter ended Mar. 31, 1910.....	1,794,998.55
	<u>\$20,379,495.68</u>
Dividend of $\frac{3}{4}$ per cent. paid	
Apr. 15, 1910.....	\$747,711.00
Interest on bonded debt.....	433,062.50
	<u>1,180,773.50</u>
Surplus Mar 31, 1910.....	\$19,198,722.18

The following statement shows the estimated condition of the Company at the close of the quarter ending June 30, 1910:

Surplus Mar. 31, 1910.....	\$19,198,722.18
The net revenues of the quarter ending June 30, based upon nearly completed returns for April, partial returns for May, and estimating the business for June, will be about.....	\$1,950,000.00
Less interest on bonded debt..	433,062.50
Leaves estimated net earnings for the quarter, less interest on bonded debt.....	<u>1,516,937.50</u>
	<u>\$20,715,659.68</u>

A great increase is noted in the number of telegrams collected and distributed by telephone. In Chicago the report for May, 1910, shows that six times as many messages were handled in this way as during the corresponding month last year. The telephone business in the Chicago office now requires the employment of eighteen telephone operators.

RESIGNATIONS AND APPOINTMENTS.

Mr. C. B. Foster, of Chicago, has been appointed manager at Moline, Ill., vice G. E. Peterson, transferred to the main office at Chicago.

W. J. Riordan has been appointed manager at Orange, N. J., vice C. R. Crowell, transferred to New York.

Mr. H. F. Horton, of Superintendent Mulford's office, New York, has been appointed manager of the Binghamton, N. Y., office, vice E. A. Baird, transferred to New York.

Mr. G. C. Wardell, manager at Elizabeth, N. J., has been transferred to the superintendent's office in New York, as inspector in charge of the development of the telephone-telegraph service in Northern New Jersey and Staten Island. He is succeeded by W. E. Demarest.

Mr. A. M. Stanley, wire chief at Jackson, Miss., has been appointed manager at Corinth, Miss., vice R. H. Tudor, transferred to the office of J. R. Terhune, superintendent, at Nashville, Tenn., where he will hold the position of estimate clerk, relieving Aris Brown, who has been transferred to a similar position in the office of J. C. Smith, superintendent, at Dallas, Texas.

The regular quarterly dividend of one per cent. on the preferred stock of the Mackay companies and one and one-fourth per cent. on the common stock has been declared.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Minor M. Davis, electrical engineer of the company, is on an extended trip of inspection to San Francisco, Seattle and other Pacific coast points, which will take him away from New York for about a month. He will also attend the convention of the Association of Railway Telegraph Superintendents at Los Angeles.

Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway Company's telegraph, Montreal, was a recent executive office visitor, coming here on business connected with the service.

Mr. J. P. O'Donohue, of the electrical engineer's office, New York, is in Chicago, on company business.

The Morkrum printing telegraph is soon to be given a trial between New York and Boston. This system is designed for duplex working. All of its functions are electrically performed and not mechanically.

The company now has a composite telephone and telegraph line in successful operation between San Francisco and Sacramento. This will eventually be extended to Reno, Nev., and Salt Lake City when the new line between the two latter points is completed.

The lines of the Independent Long Distance Telephone Company of Tennessee and Alabama have been acquired by this company and will be operated as strictly telegraph lines. These wires extend to many smaller points in Southern Tennessee and Northern Alabama not hitherto reached by direct wire.

RESIGNATIONS AND APPOINTMENTS.

Mr. C. M. Blivins, of the Chicago office, has been appointed manager at Council Bluffs, Ia., vice Mr. C. I. Scofield, transferred to the Omaha office as traffic chief.

Mr. Harry Morlan, formerly manager of the Kansas City, Mo., office, but for the past two years in other business at Dallas, Tex., has returned to the service and accepted the managership of the El Paso, Tex., office.

C. H. Jett, Postal Chief Operator, Denver.

Mr. Charles Henry Jett whose promotion to the position of chief operator of the Postal Telegraph-Cable Company at Denver, Col., was briefly mentioned in our May 16 issue, was born at Munfordville, Ky., May 1, 1865. He entered the telegraph service at Calvert City, Ky., in 1879 becoming an operator on the Louisville and Nash-



C. H. JETT.

Chief Operator, Postal Telegraph-Cable Company, Denver.

ville Railroad. He was afterward employed by different commercial companies and several of the leading railroads, being with the Santa Fé at Topeka for several years in the office of Superintendent of Telegraph R. B. Gemmell. The most exciting time in Mr. Jett's career was in 1893 when he was employed as a telegrapher by the United States Government at Haucks Tank, Ariz., during the last uprising of the Navajo Indians. He was sent with a body guard of eight or ten men to the scene of the uprising and while he was cutting the wire to get in communication

with Fort Wingate where the troops were located his guard started for a safer place half a mile away leaving him at the water tank station surrounded by the Indians. He finally succeeded in cutting the wire and crawling under the water tank got into communication with the fort. Just about daylight when the Indians would have been sure to discover him the troops arrived and rescued him from his perilous position. In 1896 Mr. Jett left the service to engage in other business but ten years later he returned to the key and was employed by the Santa Fé and Rock Island Railroad systems until he re-entered the commercial field by taking a position with the Postal Telegraph-Cable Company, at Denver.

The Cable.

At the annual meeting of the Central and South American and Mexican Telegraph Companies, held June 7, all of the directors were re-elected.

The cable ships Telconia and Colonia, belonging to the Telegraph Construction and Maintenance Company, have sailed from London with the new cable on board which they are to lay for the Commercial Cable Company between England and Ireland.

The Western Telegraph Company reports that on the occasion of King Edward's death over 100,000 words concerning that subject were transmitted over their cables. The new cable of this company from Europe to Buenos Ayres, Argentina, via Ascension Island, has been completed and the last section was placed in public service June 3. A reduction in rates followed the completion of this cable.

The Commercial Cable Company has announced that beginning June 1, their rates for cable messages from New York to Argentina, Bolivia, Chili, Paraguay and Uruguay, via the Azores, have been reduced to eight-five cents per word. The rate to Iquitos, Masisea, Orellana and Requena, Peru, is \$1.35 per word; to all other Peruvian offices, eighty-five cents per word.

Mr. Thomas Gothorpe has been appointed superintendent of the new station of the Direct United States Cable Company at Harbor Grace, Newfoundland. Mr. Gothorpe, who has been connected with the Rye Beach, N. H., station of the company for the past thirty-five years, was, before leaving for his new station, given a farewell reception by his friends at Rye Beach and presented with a chest of silver by the employees of the Rye Beach and Boston offices.

The diagrams appearing in "Official Diagrams of the Postal Telegraph-Cable Company's Apparatus and Rules Governing the Construction and Repair of Lines" were made from the company's blueprints and are absolutely correct. This volume, which is published by Telegraph and Telephone Age, under official sanction and supervision, is of especial value to operators and linemen. It will be sent to anyone, postpaid, on receipt of fifty cents. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Municipal Electricians.

The Utica Fire Alarm Telegraph Company is engaged in installing the new fire alarm telegraph system in Ilion, N. Y., recently contracted for.

A new fire alarm system is being installed at San Jose, Cal., by the Gamewell Fire Alarm Telegraph Company.

The city electrician of New Orleans has recently completed the installation of fifty new alarm boxes, located mainly in residential sections of the city.

Mr. William Allen has been appointed superintendent of police telegraphs in Brooklyn. Mr. Allen has been connected with the police department of Brooklyn for twenty-one years, during most of which time he has been attached to the telegraph bureau.

A patent, No. 958,719, for a signal-box for fire-alarm systems, has been granted to F. S. Bronson, of Rochester, N. Y. Fire-alarm and automatic telephone in which the signaling apparatus actuates the central telephone to automatically select the fire-alarm headquarters and then ring the number of the box.

Members of the International Association of Municipal Electricians should, if possible, arrange to attend the fifteenth annual convention of that body, which meets at Rochester, N. Y., September 6, 7, 8 and 9. The annual meetings of this organization are always productive of great benefit to those who attend and the coming gathering will be an exceptional one in this respect. Mr. J. B. Yeakle, of Baltimore, Md., is president and Mr. Frank P. Foster, of Corning, N. Y., secretary of the association.

A patent, No. 957,968, for a call-box signaling system and apparatus therefor, has been awarded to Clarence C. Johnson, superintendent of the American District Telegraph Company, New York. This covers signal-transmitting apparatus which comprises main-signal transmitting means, including means for transmitting through one circuit either of two different classes of signals at will, and comprising also other transmitting means for transmitting a signal through another circuit concurrently with the transmission of one of the two classes of signals transmitted by the first mentioned transmitting means.

There seems to be a tendency throughout the country to use the telephone system for reporting fires instead of turning in an alarm through the fire alarm system. The former method is not always satisfactory, as often the person using the telephone is in an excited condition and little information can be gained at headquarters regarding the whereabouts of the fire. Municipal fire authorities are consequently attempting to educate the public to use the fire alarm system where possible, and thus insure a prompt and accurate report of the location of all fires. Among others, Deputy Fire Commissioner O'Keeffe, of Brooklyn, is making an effort to have the people of that city well instructed in turning in fire alarms.

Before a recent meeting of the Brooklyn League the commissioner exhibited two varieties of alarm boxes, in general use, one with a key and the other without, and then explained minutely the manner in which an alarm is transferred to the firm alarm bureau and from there to the various company houses.

Telegraph and Telephone Companies Under Jurisdiction of Interstate Commerce Commission.

The railroad bill which was passed by the House of Representatives has been amended by the Senate and been placed in the hands of a joint committee of both houses to come to an agreement on the amendments. One of the provisions of the bill, which has been concurred in by both the House and the Senate, extends the jurisdiction of the Interstate Commerce Commission to cover the telegraph and telephone companies. The Senate amendment covering this point provides that telegraph and telephone charges shall be just and reasonable, and authorizes the commission to determine when they are not so. Special night rates and special rates on press dispatches are authorized. Telegraph passes are prohibited to all persons. The penalty for disobeying this provision is fixed at from \$100 to \$2,000. This gives the Interstate Commerce Commission much more power than the amendment passed by the House.

Indictment in Bucket Shop Case.

The Federal Grand Jury on June 10 returned an indictment against the Western Union Telegraph Company, charging it with forty-two violations of the bucket shop law of March 1, 1909. The charge is made that the Western Union Company, by means of a telegraph wire and a ticker, aided and abetted the conduct of a bucket shop in the District of Columbia. The forty-two counts in the indictment vary only in the dates on which the offenses are alleged to have been committed.

The testimony on which the indictment was secured was furnished to the Grand Jury by former employees of the company and by several of its officials, who were subpoenaed by the Government. No person in the Western Union was named in the indictment. It was a company offense and will be so pressed for trial.

What Our Friends Say About this Publication.

Mr. G. H. Corse, Jr., general Oriental agent of the Chicago, Milwaukee and Puget Sound Railway, with headquarters at Shanghai, China, formerly a member of the telegraph profession in this country, in a recent letter ordering us to continue his subscription for another year, states: "As I am so far away from home, I always look forward with pleasure to receipt of the Age, which is the only means by which I can keep in touch with what is going on in the profession I was personally associated with for several years, in both railroad and commercial fields."

The Telephone.

The laying of the new loaded telephone cable between England and France has been completed.

The New England Telephone and Telegraph Company has declared its regular quarterly dividend of one and one-half per cent., payable June 30.

An issue of \$1,250,000 of six per cent. preferred stock has been authorized by the Lincoln Telephone and Telegraph Company, of Lincoln, Neb.

Bids have been asked for by the Southwestern Telegraph and Telephone Company for the construction of a three-story exchange building at Dallas, Tex.

The Washington State Railroad Commission is investigating the subject of telephone rates in Seattle, the authority of that body having been extended by the 1909 Legislature to cover the telegraph and telephone.

The State Road Commission of Maryland has granted permission to the American Telephone and Telegraph Company to lay underground conduits along the road from Baltimore to Philadelphia. A similar request has been made to lay conduits along the road from Baltimore to Washington.

The report of the American Telephone and Telegraph Company and associated holding and operating companies for April, shows gross earnings of \$13,794,283, an increase of \$1,423,901 over the corresponding month last year and net revenue of \$4,210,146, an increase of \$30,426. The gross earnings for the first four months of the year amount to \$53,327,564, an increase of \$5,684,150, and the net earnings were \$16,407,258, an increase of \$1,290,635.

By a patent granted recently in England to Mr. J. Sayers for the protection of telephone circuits against alternating current traction systems, both electrostatic and electromagnetic induction are neutralized by providing an auxiliary insulated conductor parallel to the trolley wires and the telegraph or telephone wires to be protected. In the case of a double-line railway with a trolley wire over each track, two insulated wires run parallel to the trolley wires and are connected at both ends so as to form a closed circuit. At the point where current is fed into the trolley wires, the auxiliary circuit is connected to one pole of a small alternating-current generator, which charges it at the same frequency as that of the system, but at a lower pressure and 180 degrees out of time-phase. The other pole of this generator is grounded. In order to neutralize farther the electromagnetic induction the auxiliary circuit includes the secondary coil of a transformer, the primary of which is connected to the secondary of another transformer, the primary of the second transformer being in series with the main trolley-wire circuit. By this means a low-pressure current proportional to the main traction current, but 180 degrees out of time-phase with it, circulates in the auxiliary circuit.

At a recent banquet of the Pittsburg section of the American Institute of Electrical Engineers, Mr. Malcolm C. Rorty, division manager of the Central District and Printing Telegraph Company, spoke on "The Relation of the Public Service Corporation to the Public."

The proceedings for the appointment of receivers of the Continental Telephone and Telegraph Company have been dropped by agreement of counsel for the company and the applicants. The application for receivers alleged mismanagement by certain officers of the Continental Company, but it has since been found that these charges were untrue and the proceedings were started through a misunderstanding.

Judge Rellstab, of the United States District Court, at Trenton, N. J., has named Charles West of Philadelphia and Frank D. Houck, of Harrisburg, Pa., receivers of the American Union Telephone Company. It was stated that this company, which operates about 70,000 telephones in Western Pennsylvania and Southern New York, would soon have \$700,000 of indebtedness, which they could not meet. It was charged that this condition of affairs had become acute through the failure of the Continental Telephone and Telegraph Company to take care of the indebtedness in the arrangement by which the Continental Company was to acquire the American Union and other companies.

It is reported that a number of important reforms have been introduced in the Paris telephone service. In future, subscribers will not be obliged to maintain a deposit at the exchange to pay for trunk calls; the regulations defining the rights and duties of subscribers, hitherto kept strictly secret, will be made accessible to the subscribers; the telephone directory will be improved; subscriptions will be made payable at the nearest post office; the rule empowering the superintendents to cut off a subscriber without warning or explanation will be abolished; and compensation for loss of service will be paid for any breakdowns lasting more than a week instead of a month.

At a meeting of the Nebraska Association of Independent Telephone Companies, held in Lincoln June 1, Mr. Charles H. Hood, of that city, was elected secretary and treasurer of the association. A committee was appointed to confer with officials of the Postal Telegraph-Cable Company looking to a uniform basis of charges to enable the telephone companies to transmit by telephone, telegraph messages which reach territory not touched by the telegraph lines. W. E. Bell, of York, T. H. Pollock, of Plattsmouth, C. C. Deering, of Omaha, Warren Pratt, of Kearney and F. H. Woods of Lincoln, were appointed a committee to make the first draft of the proposed agreement.

Telegraph and Telephone Age is headquarters for all electrical books. Write for catalogue.

The Military Telegrapher in the Civil War.

PART XII.

Miss Louisa E. Volker was one of the few lady operators who were connected with the United States military telegraph service during the Civil War. She was the first lady operator connected with the corps west of the Mississippi and although exposed to great danger at times performed her duties with that same zeal which was a general characteristic of those employed in that branch of the service. In writing to Colonel William R. Plum, historian of the United States Military Telegraph Corps in 1878 she told in part the following story of her military telegraph experiences.

"I entered the service as operator on the United States military telegraph lines at Mineral Point, Washington County, Mo., December 5, 1862, after the office had been closed about six months. The Point was a small town of about one hundred inhabitants and situated sixty-one miles from St. Louis on the line of the St. Louis and Iron Mountain Railroad which then extended from St. Louis to Pilot Knob, a distance of eighty-six miles, where was stationed the headquarters of the advanced line of the army in southeastern Missouri with smaller forces thrown forward to Patterson, twenty-three miles farther south, and flanked on the east by the posts at Frederickstown, Marble Hill, Jackson, and Cape Girardeau. Up to this time no woman had ever been employed in telegraphing west of the Mississippi river and I felt almost discouraged and my friends feared for my success but I was determined to succeed. I entered upon the duties of the office with an enthusiasm that never flagged amid all the danger and chances of the war.

"The principal industries of Washington County were lead mining and lumbering, the southwestern portion of the county being a yellow pine region. There were a number of slaves in the county and a strong if not bitter feeling prevailed among the owners of that class of property against the Lincoln government and from them the poor whites, as they were called, generally took their views, some from fear, and some from policy or principle. Still there were a few who adhered to the Government and they took steps to stay the torrent of secession sentiment that seemed as if it would bear down all opposition. Under the leadership of these men and their associates the friends of the Government rallied and the tide of secession was held at bay.

"As the feeling of the opposing parties became more and more embittered many acts of violence were committed upon Union people in unprotected situations amid all this turmoil of contending factions. I continued in the discharge of my duties often with fear and trembling as the news of preparation for the strife flashed over the wires.

"On the night of July 10, 1863, I was called up at midnight to telegraph to headquarters at Pilot Knob for a detachment of troops to intercept the noted guerilla Hildebrand and his gang who had rode into Irondale eight miles south from Mineral Point and robbed the store of a Union man who on that account was considered a fit subject for plunder. The guerillas, however, crossed the Mississippi and escaped into Illinois. About this time General McCormick came to Mineral Point and established his headquarters for the purpose of completing the organization of a provisional regiment. This filled the village with blue coats and brass buttons and as most of them had never been away from home before the general had to furnish me with a guard at my office, as it was besieged from morning to night by the wonder stricken crowd who could not comprehend the great mystery of the telegraph. Some likened it to a sewing machine and many were the quaint speculations indulged in by the veterans of the provisional regiment. The general was a pleasant officer full of business, but as a scribe he stood unequaled even by the great Greeley. Of course it was his business to write and the operator's to read and I found it a most difficult task.

"No day passed without its alarm, rumors of surprise and attack seemed to pervade the air. No one felt safe even within the cordon of the picket line. The wires were often grounded or down, the lines south from Pilot Knob being strung to the forest trees that skirted the road to Patterson then to Cape Girardeau, and points still further south. The lines so placed were disturbed by every storm; to repair them was a task of no little danger, from the prowling bands of guerillas that infested the county intent on murder and robbery. Many were the narrow escapes of the hardy repairer as he travelled through all kinds of weather, often at night and by lonely paths, at times concealed, then again pushing forward, testing his line, startled by the snapping of a twig, or the sound of a hoof on the road, again concealing himself until assured no enemy was near. It was a life of constant peril. While not surrounded with the glory that attaches to the soldier's life, the telegraph repairer discharged his duty with a fidelity and courage of the highest order, and his labors contributed their full share to the grand result.

"In October, 1863, a small post at Lamson's Station six miles north of my office was attacked, the wires having been first cut, by Jefferson Thompson, who had quite a large force of cavalry under him. The guard of about 100 men which was under the command of Captain Lippincott of Illinois—was surprised at breakfast and being overpowered broke to the woods, losing several in killed and wounded. After our men fell back Thompson burned the bridge, and then proceeded to burn the bridge across Big River still further north. Captain Lippincott col-

lected his men at Mineral Point and having provided for his wounded, returned to his post with his command. In the meanwhile, I had telegraphed to Pilot Knob for relief. The wires to St. Louis having been cut, I then started the repairers out to put up the line. It was dark but the work of getting the wire repaired was pushed throughout the night, and at an early hour the next day communication with headquarters at St. Louis was restored. It was an anxious night and I did not leave my office until nearly day-break.

"In January, 1864, I was called before a court martial to testify in the case of a Lieutenant in regard to the delivery of a telegram. The court met in St. Louis, and I did not wish to go but Colonel Robert C. Clowry thought it best that I should report as ordered and I did so, although my notion of a court martial was that it was something terrible. I however found it a courteous and dignified body of officers whose only aim seemed to be the execution of justice on evil doers.

"In May I was ordered to headquarters at Pilot Knob to relieve J. H. Byrne, who had a furlough, and I remained there for about three weeks. During this time an attack was threatened at Patterson twenty-three miles south of the Knob, where our outpost was stationed. The wires were cut, and my repairers had to have a guard to enable them to put up the line. When Mr. Byrne reported for duty, I returned to Mineral Point.

"In September, 1864, rumors of an invasion of the state by the forces under General Price reached us and I was again ordered to Pilot Knob. Major Wilson was now in command of that post. About the 21st of September it became certain that the invasion was in progress. Shortly after, our advance posts near the Arkansas line were driven back to Patterson and from thence fell back to Pilot Knob, where our forces under Major Wilson made preparations to give them battle. I was ordered back to Mineral Point, and found the place full of soldiers concentrated for the expected conflict. General Ewing soon arrived and telegraphed to Major Wilson at Pilot Knob as to his ability to hold the post and the same evening the General and his staff left by special train for Pilot Knob. In the meantime troops continued to arrive at the Point. They belonged to General A. J. Smith's command. Although fighting was in progress at and near Pilot Knob the wires were not interrupted until September 27. Our forces abandoned the fort at that point on the night of the 26th retreating westward while General Price pushed forward, as was supposed for St. Louis. On the 27th we were prepared at Mineral Point to receive General Shelby who was now known to be moving in our direction from Pilot Knob with 2,500 cavalry. Before the enemy appeared, however, General Smith had

orders to call in all of his outposts. This was done and the guns placed in position to resist the anticipated attack on the Point. All communication with Pilot Knob was now cut off and the woods swarmed with the Confederate advance under General Shelby.

"An operator who came on a train from Irondale relieved me after I had been on duty for two days and two nights. About noon, General Smith was ordered to fall back toward St. Louis and by 3 o'clock all were on the trains ready to start. Every male citizen in the town joined the soldiers fearing the conscription. My father and mother and sister with her small children also got on the train. Finally the last train moved off with a few saluting shots from the Confederates as it passed Cole's Bridge half a mile north of us. Then all was quiet for a short time. My sister and myself remained behind hoping to be able to protect our home from being burned or destroyed. We now hurried to hide all signs of the telegraph and watched for the coming of the enemy. From our window we could overlook the village and my office at the depot. Suddenly the Confederates deployed from the timber, and rushed upon the town from all directions.

"We felt our hearts sink as we saw them go from house to house. At last as we saw them coming toward us, we hastened to meet them at the door, and learn what we had to expect. The man who first addressed us was not in uniform, but spoke civilly, and assured us that our property would not be harmed if we would give them something to eat. We happened to be well supplied with food, as our house was a sort of headquarters for the Federal troops, and we hastened to put before the invaders the best and all we had. The house was soon filled and the intruders looked into every nook and corner of the premises, and appropriated what suited them in the way of blankets and clothing. Some of the men were bare-footed and ragged; others clothed in queerly colored patterns of curtain damask. A more motley command could not be imagined. Each trooper and his horse was a traveling country store loaded with all manner of plunder. What they could not carry they threw into the street, and their trail could be followed by the numerous articles dropped by the way.

"By 5 p. m., after firing the railroad buildings they had all passed and it was quiet again. The raiders inquired for the telegraph operator and I told them that he had gone with the train to St. Louis. As they did not seem to know or suspect they were conversing with the real operator, I escaped detection, or it would have doubtless proved worse for me, as they would have taken me to headquarters.

"It was several days before we received any information concerning the Union troops. Then I was informed that they were rebuilding the

ber started along the line of the railroad towards Desoto, determined to reach headquarters. On mounting an elevation near Blackwell's Station, we discovered in the road before us a party of mounted men, coming in our direction. We soon found the party to consist of a Union Lieutenant, a repair party repairing the wires, and my brother, R. C. Volker, accompanied them as operator. They were on their way to Pilot Knob. We soon pushed on toward Big River while the repair party continued south along the line of the railroad.

"After various adventures we arrived at Desoto and took the next train for St. Louis, where we arrived in the evening. The next day we started back for Desoto and arrived at Mineral Point the following afternoon. I then found an instrument set up at our house, and the familiar tick of the telegraph sounded sweet to my ear. I almost forgot the terrors of the past week, at again being in communication with headquarters at St. Louis and Pilot Knob, where my brother, R. C. Volker, was in charge of the telegraph office. October 21 the Point was again made a military post, and garrisoned with state troops and hundred day men.

"In March, 1865, the railroad was washed out and communication cut off, save by telegraph. On April 15 the news of the assassination of President Lincoln flashed across the wires and the troops were terribly excited while the people seemed stupefied with horror at the act. Peace being now assured, my services were no longer required by the Government, but I continued in the service of the Iron Mountain Railroad Company, finally leaving their employ in 1886. I afterward entered the employ of the Western Union, but finally retired from the service in December, 1875."

How Telegraph Messages Came to be Read by Sound.

Editor Telegraph and Telephone Age:

I notice on page 351, of your issue of May 16 an article headed: "How Telegraph Messages Came to be Read by Sound," consisting of an interview with Alonzo B. Cornell, wherein he claims to have discovered in the early fifties that he could take press dispatches by sound, and considers that he was the first telegraph operator that made this discovery. The interview does not state in what year of the early fifties this occurred. It may not be amiss for me to state, however, as a matter of early telegraphic history, that in 1848 I took by sound the returns of the election of President Zachary Taylor, in the village of Marshall, Mich. I was then thirteen years of age, and was operating at that place under the management of Mr. Jabez Fox, on the old Speed Line, the first telegraph wire that was strung west of Detroit to Chicago.

Inasmuch as this ante-dates Mr. Cornell's claim by at least two years we will need to go back to 1848 to find the first person who discovered that the Morse alphabet could be read by sound.

Alfred Weller,

Laporte, Ind. May 25, 1910.

Editor Telegraph and Telephone Age:

Telegraph and Telephone Age of May 16 contains an interesting article on "How Telegraph Messages Came to be Read by Sound," by Mr. E. J. Edwards, placing Mr. Alonzo B. Cornell in the post of honor, as, perhaps, the pioneer of the corps of Morse "sound readers." The reference made by Mr. Cornell to the date of his first attempt (and success) at reading by sound, as in the early fifties, permits me to solicit the favor of a distinct mention of which one of the "fifties" is alluded to, for I have a clear recollection of witnessing the most superior possible receiving by sound which was emitted from a Chubbuck (Utica) register, in the second half of 1852, or during the early part of 1853, in the City of Montreal, and I know that the operator referred to had been receiving by sound for at least eighteen months before I witnessed his work. Furthermore, I can give you his name and at the same time I conscientiously believe, produce a certificate from a very well known person who was his chief and knows to the day when the operator referred to commenced reading by sound.

"Montreal."

Guatemala, May 25, 1910.

A New England farmer believed that the telegraph company meant what it said when it advertised that it would deliver messages free within a radius of a mile from the telegraph office. He accordingly addressed a message to a friend living less than a mile distant from the office and was greatly surprised, upon presenting it to the receiving clerk, to find that if he wanted the message delivered he would have to pay for it.

Suggestive of the song of the goat who ate a red flannel shirt and afterward saved his life by coughing up the shirt and flagging the train, is the story of an Ohio railway telegrapher who inadvertently accomplished the same purpose by means of a pair of red hose, which he was wearing. It was a warm day and forgetting the color of his hose he had thrust his feet out of the window to cool them. A fast train coming along about this time the engineer saw the danger signal and immediately stopped his train. Thereupon the operator getting up to see why the train had stopped removed the signal and the block being clear the train proceeded.

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June 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Los Angeles Convention.

The Association of Railway Telegraph Superintendents will next week meet at Los Angeles for the twenty-ninth annual convention. As is usual with the gatherings of this body there are many important subjects which will come up for discussion. The list of papers which will be found elsewhere in this issue indicates to some extent the multiplicity of the problems which will be considered by those who are present. A comparison of this list with the subjects which were discussed when the Association was formed in 1882 or even ten years ago, would show that nearly all of the questions which are of moment to the railway telegraph superintendents now are of recent origin. This condition of affairs has been largely brought about by the adaptation of the telephone for uses which it was formerly thought the telegraph only could serve. For any one superintendent to solve all of these problems successfully would be a task which few men would be able to perform but

by the co-operation which is secured through this association all of the superintendents throughout the country are enabled to profit by the failures and successes of their fellow men who have to conquer the same obstacles.

That this co-operation is effective is shown by the fact that there have been no failures among the many telephone train despatching installations which have been placed in service during the past three or four years. Considering the fact that there are now over forty-five railroad systems which use the telephone for despatching purposes this record is most remarkable. It is true that in many cases apparatus originally installed has been replaced but this has usually been done not because of failure of the first equipment but by reason of improvements over the original which were discovered by studying the problem from the operating standpoint. While no special attempt has been made to standardize telephone train despatching there are certain features of construction and operation which will be found on practically every telephone despatching system in use to-day. This is because the individual superintendents have each been seeking the best methods of construction and operation to be found and when they have themselves hit upon something of value been glad to impart their knowledge to others. If it were not for this the use of the telephone for train despatching instead of being extended to over twenty-four thousand miles of railroad to-day would probably be limited to a few isolated instances as was the case a few years ago.

Since the convention at Detroit a year ago the mileage of railroads on which the telephone is used for despatching purposes has doubled. From present indications the same comparative increase will take place during the next year. Several of the larger railway systems and in fact all of the more important ones are extending the use of the telephone as fast as is practicable. It should not be inferred, however, that telephone despatching has been perfected so that there is little chance or need of improvement. The defects can only be discovered by actual operation. Just what these faults are and how to remedy them is one of the principal questions with which the superintendents have to deal at present and one which will occupy a part of their attention at the coming convention. It is no longer a question of why should the telephone be used for directing train movements but rather how can it be used to the best advantage.

When a system and apparatus has been devised which is as near perfection as human ingenuity can make it other inventions may in turn do away with the use of the telephone in much the same way that the telegraph is now being superseded. Ten years ago the possibilities of wireless communication were not very highly regarded. Now the value of this inven-

tion for some purposes has been thoroughly demonstrated and there is a strong possibility that it will in the future be improved so that it can be adapted to many purposes for which it is not now available. Its use as a supplement to the telegraph and telephone service in case the latter fails, is already being investigated by two of the principal railway systems of this country. While it may not seem probable at the present time no thinking person will deny the possibility that the railroads will, in the future, be able to do a great deal of their more important telegraphing and telephoning without wires. Whatever may be accomplished along this line, however, it seems safe to predict that as long as the railroads are the principal means of transportation, one of the departments most essential to their safe and economical operation will be that of the telegraph superintendent or at least one whose functions correspond to those now exercised by that department.

Patent Reform Legislation.

There are quite a large number of bills now before Congress designed to effect reforms in our present patent system. Among these are several bills designed to correct the injustice of the United States appropriating patents without proper compensation to the patentee. While the United States Supreme Court has said that a patented invention cannot be appropriated or used by the Government without just compensation, on the other hand, it was held that Congress has never provided for suits founded upon wrongful acts, and that, therefore, the United States is not liable to suit for infringement of patents, no matter how wanton such infringement may be.

Another bill provides for the creation of a court of patent appeals to sit at Washington and hear appeals from the nine United States Circuit Courts throughout the country. It is stated that patent litigation as at present conducted, with nine courts of appeal with equal authority and with separate jurisdiction, involving the necessity for many independent suits on the same matter, frequently followed by diametrically opposed final decisions in the various jurisdictions, is an intolerable burden to the owners of patents and to manufacturers, regardless of the side of the litigation with which they may be connected.

President Brown on Governmental Regulation.

In the annual report of the New York Central Railroad, recently issued, President W. C. Brown included a statement of his views regarding government regulation of railways of which the following is an extract:

"The relations of the road with its patrons and the communities served by it have been harmonious and pleasant. This mutually satisfactory condition has been fostered and encour-

aged by the efforts of the Public Service Commission in New York State and the Massachusetts Board of Railroad Commissioners in composing and adjusting differences which, handled with less wisdom and moderation, might have resulted in serious friction and controversy. The influence and the co-operation of these commissions have been uniformly beneficial to the road, and have done much to improve the service for the public. Does not this very desirable result emphasize the advantage of appointing to positions so vitally affecting every business interest of the country, men qualified by experience, temperament and ability to discharge the important duties of their office. Governmental regulation of railroads, within proper limitations, is of benefit to the public, to the railroads and to those who hold their securities; but, in order to secure the maximum benefits for all interests, it is important that there be natural breadth and ability, and in addition thereto a willingness to undertake the conscientious, painstaking study of conditions necessary to enable them to deal intelligently with the complex and delicate questions affecting transportation that are constantly arising. General conditions were never more favorable, and every visible indication points to renewed and increasing prosperity for the country at large, in which the railroads may hope to participate."

Annual Convention of A. I. E. E.

The twenty-seventh annual convention of the American Institute of Electrical Engineers will be held at Jefferson, N. H., June 27-30. Among the papers which will be presented will be "Notes in the History and Practice of American Telegraph Engineering," by Messrs. William Maver, Jr., and Donald McNicol of New York, and "Telephone Engineering Around the Golden Gate," by Mr. Arthur Bessey Smith, of Chicago. The newly elected officers of the Institute are: Mr. Dugald C. Jackson, president; Messrs. P. H. Thomas, H. W. Buck and Morgan Brooks, vice-presidents; Messrs. H. H. Barnes, Jr., C. E. Scribner, W. S. Rugg and R. G. Black, managers; Mr. George A. Hamilton, treasurer; Mr. Ralph W. Pope, secretary.

Among the pictures painted by Professor Samuel F. B. Morse, the inventor of the telegraph, which are still preserved, is the fine oil painting of Lafayette, which hangs on the wall of the governor's room in the New York City Hall.

The Continental Telegraph Company, which is the telegraph department of the Chicago, Milwaukee and St. Paul and the Chicago, Milwaukee and Puget Sound Railroad Companies, has opened an office in Spokane, Wash., and is now prepared to handle commercial business between any points reached by their lines.

What is a Selector?

BY EDWARD E. BACKUS.

In these days the question, "What is a Selector?" or its practical equivalent in one form or another is heard from many quarters, particularly from those who contemplate the installation of selective signaling devices in connection with the departmental service under their management or control.

Not more than three or four years ago one was more often challenged to reply to the inquiry, "Why is a selector?"

In those days the answer was not always convincing and one's reasons why were not always received with entire credence or even tolerance.

The extensive adoption of the telephone in lieu of the less flexible and slower telegraph as a means for despatching trains, with the consequent rapid increase in railroad telephone lines with which the selector has kept pace, indicates that the selector itself has proven a sufficient and convincing answer to that question.

In the "other days" there were a few railroad men who were not incredulous, to whom the arguments advanced in favor of the selector appeared sound, and who with the courage of conviction, albeit in the face of skepticism, criticism and opposition, went ahead and tried out the selector. The results obtained with these early experimental installations were not only such as to warrant substantial extensions of the selective system by the first users, but were so excellent as to attract the attention of railroad men generally, and in the comparatively short time that has elapsed since the first experimental selective telephone despatching circuit was put in operation the use of the selector has become quite general. If the growth in the use of the selector were not sufficient answer to the inquiry, "why is a selector?" the articles that have from time to time appeared in electrical and railroad journals from the pens of Mr. S. L. VanAkin, Jr., of the New York Central, Mr. W. F. Williams of the Seaboard Air Line, Mr. C. H. Gaunt of the Santa Fé System, Mr. J. B. Sheldon of the Union Pacific, Mr. R. H. Corson of the Erie and others, have effectually disposed of it.

It is therefore, no longer necessary to reason why. However, it appears that we are now confronted with the question: "What is a selector?"

To the layman the obvious and sufficient answer to this question would doubtless be, "one who, or that which, chooses from a number by preference." The telegraph superintendent, the signal engineer, the selector user in short; the man charged with the choosing of a selector for use in connection with the service for which he is responsible, and by the reliability and success of which service his personal reliability and success must be measured, demands, however, a more comprehensive answer, and the writer has been requested to reply to the general question in some measure of detail.

THE DEVELOPMENT OF SELECTIVE SIGNALING.

The desirability of developing devices to enable the selective operation of bells or other audible or visual signals on telephone party lines was recognized by engineers and others engaged in the early development of the commercial telephone and beginning in the early eighties numerous selective signaling systems have from time to time been evolved by the telephone people.

By far the greater number of these devices have been so complex or have contained such fundamental faults or weaknesses of one kind or another, that, for these reasons, and also because such selective devices invariably increased maintenance and operating costs and reduced speed of switchboard operation, the telephone companies have as a rule given them only brief and often perfunctory trial, and have then discarded them. The wonderful development of the telephone industry and of the telephone habit has had a steady tendency to reduce the length of lines, to reduce the number of party lines, and where party line service is given to reduce the number of stations per line. This is of course particularly the case in cities and thickly settled communities. Selective signaling has therefore been regarded as of steadily diminishing importance by the telephone companies.

The selective problem as presented to the telephone people, was never the same as that which is involved in the railroad train despatching and message service.

It was never necessary for the telephone people to consider or provide for the selective calling of more than say ten or twelve party line stations, and there was never a necessity for the use of selective calling devices on long telephone trunk lines.

The application of the telephone to railroad train despatching and message circuits, however, created a demand for a selector that would be reliably operative on long lines, and a system capable of selectively signaling an indefinite number of stations, a number, in fact limited only by the telephonic limitations of the service.

Previous to the introduction of the telephone on railroad lines a reliable selector had been developed for use on telegraph lines by means of which bells could be selectively rung at telegraph stations calling the operator promptly to attention, and avoiding the necessity of interrupting service while his office call was indefinitely repeated on the telegraph circuit. It required merely a step ahead for the engineer who had developed the reliable telegraph selector to adapt the same instrument to telephone circuit requirements, and the selector referred to is in successful operation on many circuits operated by a large number of railroads in the United States and Canada.

It has been stated that previous to the advent of the long railroad telephone line, a great many

selective devices applicable to short lines and a small number of stations had been devised by the telephone people and it is a matter of common knowledge that subsequent thereto a great many arrangements and combinations of electrical and mechanical apparatus have been offered to the consideration of selector users all designed for use on the long lines. It seems evident therefore, that to one somewhat skilled in the art the arrangement of electro-mechanical apparatus in combination to enable the selective operation of signals more or less perfectly or imperfectly is by no means a difficult matter. In fact one is inclined to the belief that the number of different ways in which selective signaling may be more or less successfully accomplished is practically limited only by the number of skilled individuals who may give the problem sufficient consideration.

SELECTOR ESSENTIALS.

It used to be said that there was never a "sure enough" telegrapher who did not invent a repeater, and the saying was not far from the truth; but the old timers will all remember that not many of the repeater devices were good, and all telegraphers know that very few indeed have survived. I venture to say that the numerous selector devices will fare much as did the many telegraph repeaters. One or two will live—the rest will be consigned to the junk pile.

Just now, however, the superintendent or other official who is called upon to choose a selector for use in connection with a service for which he is responsible, is confronted with such a multitude of devices, all of which lay claim to superior or superlative merit, that it may not always be entirely easy to choose, hence the inquiry: "What is a selector?"

It would seem that a selector to fulfil all that is expected of it, and the service requirements are exacting, should be reliable, free from troublesome complications, such as numerous electro-magnetic devices and contact points, brushing contacts, dash pots and permanent magnets. It should be durable, inexpensive to maintain and conveniently operative.

It should be reasonably rapid in operation, but should have a good factor of safe operation with which excessive speed is not consistent.

It should never require adjustment or lubrication, should be immune to climatic and atmospheric variations, and should be dust and damp proof.

The selector should require very little current for its successful operation but should be safely operative through a very wide current range.

The electro-magnetic system should be so constructed that the number of selective stations possible for a single circuit will be practically without limit and so that the selector equipment will not sensibly impair telephonic transmission.

The controlling apparatus at the calling station should be so arranged that the calling device as-

sociated with any one selector may be quickly removed or changed for repairs or other purposes without interrupting service between the calling station and other selector stations.

The selector should be adaptable to the many uses, on telephone, telegraph, and signal circuits for which selectors are now employed extensively, and to other purposes for which they are beginning to be used. To insure durability and reliable action moving pivoted parts should never be under strain; and all moving parts should be as light as possible consistent with necessary mechanical strength in order to minimize wear and consequent changes in action. The restoring spring should be subjected to the least possible strain, the retractile spring should be practically a constant and the magnet armature should move between fixed limiting stops.

To further insure reliability and uniformity of action, and to prevent unnecessary drain upon the line battery it is important that the resistance of each selector bridge should be so proportioned to the difference in potential across the line at the point of attachment, that the flow of current in each selector magnet will be approximately the same.

To accomplish this it is of course only necessary to insert resistances in the bridge in series with the selector magnet, the greatest being placed in the bridge nearest the source of energy, and diminishing gradually at other stations dependent upon the resistance of the line or distance from the source until at the most distant station or group of stations no additional resistance is required.

In order that the selector may be satisfactorily operated with a very small amount of current and through a great current range it is important that the electro-magnet be of the highest possible efficiency, and also that it be a highly efficient retardation coil.

To insure both, the best practice would seem to be to construct the electro-magnet with a continuous or closed core of substantial size and to wind it with the greatest possible number of turns within saturation limits under normal working conditions.

A magnet so constructed is of course capable of powerful action under the influence of the very feeble direct current impulses for which it is designed, and at the same time offers an apparent resistance or retardation to the high frequency telephone currents greatly in excess of its ohmic resistance, so that the shunting effect of the selector bridges is practically negligible in so far as the telephone currents are concerned.

The history of both the telegraph and telephone and the experience of all who have been closely concerned with the development, operation and maintenance of telegraph and telephone appliances seems to justify the conclusion that an instrument embodying a sound selective

principle that has withstood the most severe and critical service tests and also embodying the structural and electrical details and principles that have been briefly described, is a selector, and moreover, a reliable and satisfactory selector, and one that will survive as becomes the fittest.

The Hazardous Work of a Telephone Cable Splicer.

Mr. Edwin Nicol, writing for a western publication remarks that few people know enough about electric appliances to understand the transmission of the telephone current. Fewer, in fact, realize the complexity of knitting together the wires of our modern telephone system. But absolute necessity, nowadays for more telephones, which means more wires, more branches, more intricate knitting and joining into compact masses, has evolved a method for accomplishing this end, known as cable splicing.

When Gardiner G. Hubbard financed Professor Bell, after the first public telephone demonstration in 1876, he paved the way for cable splicing. At first, however, telephone possibilities were not fully realized. The only lines were individual ones, connecting a man's office with his factory or his town house with his country house. Telephones with exchange facilities first began in 1878, thus inaugurating a national system.

In 1880 a so-called long-distance line was built between Boston and Lowell, Mass., followed by one, more serviceable, between New York and Boston. Upon the formation, in 1884, of the American Telephone and Telegraph Company for long-distance messages, began the first efforts in cable splicing. Comparatively slow growth of their business until 1899 limited, however, the number of men versed in this art. At that time, only large cities had underground conduits. The first connections between subscribers and exchange were made by "open" or overhead single wires. Then the metallic circuit necessitated wore wires. Growing need called for so many connections that they were put in cables to save space. So cables were made containing fifty copper wires, insulated with paper and incased in lead. When overhead cables proved inadequate to meet the demand for more telephones, all large exchanges installed underground ones.

The number of men who knew how to knit telephone wires grew from ten in 1880 to thirty in 1890 and in 1900 there were 300 engaged in this industry. Up to 1895, cable firms, like the Western Electric Company and Roeblings, in their own factories, taught men how to splice. But these men knew more about plumbing than electricity. Local telephone companies would borrow these factory-trained men whenever important extensions or repairs required. As the amount of work increased, this habit became too expensive, so, like the Southwestern Telegraph and Telephone Company of Texas, others soon

organized and trained their own staffs. To-day, as a result, the number of splicers throughout the country approximates 3,000.

Many personal dangers confront these men. Their work requires calm nerve and ready presence of mind. Crawling out on spans between poles, sixty feet from the ground, without support, is perilous. Yet added danger lies in imminent shocks from electricity or lightning. Especially hazardous is cable work over trolley wires, where a fall means death. Dreaded are the "joint construction" poles, which carry both telephone cables and power lines, the telephone cables on top. Only a few years ago such poles ran out Market Street of San Francisco. St. Louis, also, up to 1894, had poles with fourteen cross-arms, holding ten cables each. The telephone cables on top, being only six feet from the power leads, men working there were electrocuted at the rate of one a week. But by placing telephone wires underground, inventive genius arrested this death-harvest.

The paraffine used by splicers to boil out the moisture will sometimes cause explosions, fatal to those handling it. Gas, too, accumulates in manholes, endangering the life of him who goes down with lighted torch. Often the splicer's torch ignites some pocket of gas, the odor of which he has failed to detect. The atmosphere in both manholes and river mains exposes splicers to disease or asphyxiation. Well do they appreciate the improved system of drainage in many cities where they are forced to work.

But whether splicing high in the air, or in deep water mains; whether surrounded by death-dealing currents, or standing on threadbare supports, splicers are of one mind in their loyalty to duty in perfecting the great telephone systems. Daily they risk limbs, and even life itself, brave almost to a fault.

Railway telegraphers who work nights at lonely points along the road and who do not care to keep a revolver for protection should provide themselves with a nickle-plated bicycle wrench, as this is said to be just as effective and certainly is not so dangerous. A girl who was employed as night operator at an isolated point in Massachusetts used this weapon recently upon a burglar who was trying to break into the station and succeeded in holding him at bay until she summoned assistance from a station ten miles away to come and take the intruder into custody.

Mr. M. H. H. Duvall, until recently superintendent of the Postal Telegraph-Cable Company at Augusta, Ga., but who is now engaged in the real estate business at the same place, in renewing his subscription for another year, writes: "While no longer identified with the telegraph service, I have by no means lost interest in either my old friends of the former days or in matters pertaining to the telegraph, and I find the Age an excellent medium to keep one in touch with both."

Some Predictions of Thomas A. Edison.

In a recent interview Thomas A. Edison expressed the belief that there will be found at some time a new power, a force to be drawn from the ether, an as yet undiscovered something that will cause as great a revolution as electricity has caused.

"I cannot guess what this power will be," he said, "nor how it will be discovered, but its discovery will be an accident. There are many forces at work around us, but we shall not find them unless something happens that will reveal them to one of our five senses. Something will have to happen to agitate or excite this force and transform it into light, or heat, or some other manifestation that we can understand through our senses.

"There are any number of undulations in the ether right here in this room, but what they are we don't know. To illustrate our ignorance: Once when dining with a learned physiology professor of the University of Berlin I shook my forefinger at him and asked him what made it move. He couldn't tell. There you have a form of motion that we don't know anything about—we don't know what it is.

"And so, there is yet to be a discovery in the domain of motion in the ether, something that we shall be able to carry on wires to great distances, and that, perhaps, will afford us power, but I cannot guess what it will be."

In the mean time, while this hypothetical force remains undiscovered, what may we expect electricity to accomplish in the immediate future?

"Lots of things," said Mr. Edison in reply to a question along this line. "It is the power of to-day and nearly everything which requires power or motion will soon be in the form of electricity. It will almost entirely displace gasoline in automobiles. In vehicular transportation in the cities of the United States it will bring about a complete revolution. The railroads cover this country with a vast network, yet almost everything that is now pulled to them or pulled away from them is drawn by horses. People do not realize the magnitude of horse traffic, and that is why I say electricity will revolutionize this phase of motive power.

"The greatest invention in the electrical field, in my judgment, was the dynamo; then the telephone, and then the incandescent light as a unit. Of all human inventions, not my own, I should rather have invented the steam engine, because of what it has accomplished for civilization.

"There will be a vast improvement in the telephone, especially as to volume of sound and clearness of articulation. To-day you cannot send over the telephone a message which contains a lot of, say, Hungarian names. The articulation ought to be better than on the phonograph and it must be made. I believe the telephone will eventually displace the telegraph on railroads."

Replying to a question as to which of his inventions he thought most likely to receive the homage of posterity, Mr. Edison said at once:

"The phonograph, because of its sentimental side. In the development of the phonograph and the moving picture we have now reached a point at which we can make the picture sing and speak very naturally, and the public will get this invention in the near future.

"Another big advance in the electrical field will most likely be along the line of high efficiency in the wind motor, which will produce power for isolated communities, and there is also hope for the sun motor in the arid regions."

"Progress in electricity will continue during the next twenty-five years," he declared emphatically. "The demand for everything is unlimited. The more light you have the more light you want. And in its possibilities electricity seems unlike almost anything else—unlimited. What the farmer produces is limited, but the demand is always strong upon him.

"As to the various methods of applying the means, there is, of course, a question as to which is best. It is likely that there will always be a tussle between the slot, the trolley and the storage battery car, for instance."

In reply to a question Mr. Edison declared that of all his work the incandescent light and motor system was the most difficult.

"The public sees only the electric light," he said. "It does not appreciate the difficulties of the details. I sweat blood for six years, and took out 130 patents on various systems," he said, "but the light itself is all that is apparent to the general public."

He expressed the belief that steam has reached the point of its highest development, especially on the railroads, unless they widen the gauges, and declared his opinion that the use of electricity will become general in railroading.

An order has been issued by the War Department that hereafter telegraph operators who served in the federal army during the civil war cannot be buried in the national cemeteries. The ruling is based on the fact that these men were not enlisted soldiers, but employes of the quartermaster's department.

The manager of a branch district messenger office in New York was called upon one evening recently to furnish a messenger to deliver a baby which was brought to the office by a young man of name and address unknown. The boy detailed for this duty found the designated address without any difficulty, but careful inquiry failed to discover anyone of the name to which the infant was sent, or, in fact, anyone who was expecting a baby. After inquiring at every house on the block the messenger finally gave up in despair, and took the baby back to the office, vowing that he would resign before he would accept another such commission.

The Poulsen System of Wireless Telephony and Wireless Telegraphy.*

BY C. F. ELWELL.

As soon as the methods of signaling through space first given to the world by Marconi were well understood, scientists throughout the world recognized the shortcomings of both the transmitting and receiving apparatus. Transmission was first effected by means of strongly damped oscillations generated by means of powerful sparks from condensers charged by means of large induction coils, in the primary circuit of which a suitable telegraph key was inserted.

Many improvements have been made in this type of transmitting circuit. Commercial transformers working at a frequency which would give the maximum sensitiveness to the telephone receivers at the receiving station have been substituted for inefficient spark coils. Many attempts have been made to suppress the noise of the sparks, which with the increased use of large amounts of power became distressing to the operator besides betraying the message to unauthorized parties. Apparatus doing this successfully also decreases the efficiency of the apparatus. Keys had to be devised to break the necessarily large primary currents and quite an array of electromagnetic and oil-immersed keys are now in use. For heavy power working the speed is limited by such apparatus. Sending condensers have been improved both as to bulk, durability and cost.

Signals were received by means of the Branly coherer on which much time and money were fruitlessly spent. Then came the magnetic, electrolytic and thermo detectors with increased sensitiveness and automatic decohering features. But these detectors have not the well defined resistance which is necessary for accurate resonance tuning effects.

The Danish inventor, Valdemar Poulsen, took up the study of the wireless transmission of signals and recognized the fact that further advance depended on decrease of the damping of the oscillations and increase of sensitiveness of detectors. He determined to follow up the generation of undamped waves as being the line on which more selective telegraphy would be obtained and telephony also be made possible. After a profound study of the "singing arc" following in the footsteps of Elihu Thomson and Duddell, he evolved his present type of arc generator. This generator, with suitable capacity and inductance in shunt to the arc, sets up trains of practically undamped waves of frequencies from 200,000 to 1,000,000 per second, according to the values of capacity and inductance in the shunt circuit. Not only this, but he has been able to transform as much as thirty kilowatts of direct current to high-frequency current in the shunt circuit.

This generator applied to telegraphy gives improved selectivity of the instruments to an extent never reached by spark methods, permits of duplex working, gives great range with small amounts of power, better results over land, better daylight working and, last but not least, a great increase in speed. For the purposes of telegraphy he had to invent a new type of detector which is now known as the "ticker" and which has been shown to be much more sensitive than any other detector. This detector was necessary in order to render the telegraph signals audible because the alternations take place at a speed much above the limits of audibility.

In the Poulsen generator the arc takes place between a water-cooled copper anode and a revolving carbon cathode. The anode and cathode project through two opposite sides of a water-cooled chamber. The arc takes place in the presence of a powerful magnetic field at right angles to the flow of current. A small motor revolves the cathode very slowly and prevents a deposit of carbon taking place and so shortening the arc gap, which is maintained at from three to five millimetres in length. The chamber is equipped with an inlet and outlet for supplying the arc with a hydrogen-containing gas. Drops of alcohol on being introduced into the chamber are immediately vaporized and this method of gas supply is in use on shipboard. In the chamber there is a yoke which is attracted by the magnetic field when the current is switched on and a small copper tip serves to strike the arc. This automatic arc-striking feature was devised for wireless telephoning, so that talking and listening could be carried on with ease.

A large amount of heat is produced in the water-cooled chamber which is removed by means of the cooling water. A certain amount of power is absorbed in the regulating resistance in series with the arc. Of the power which is converted into high-frequency oscillations, part is dissipated as heat in the capacity and inductance and part is radiated by the antenna.

A wattmeter may be used to measure this radiated energy by using a direct-coupled antenna and measuring the watts at some point in the condenser circuit with and without the antenna. The difference will be the watts radiated.

Fleming has shown that if W represents the energy in ergs radiated per second, when the oscillations are persistent, $W = 128 A^2$, where A is the current read on a hot-wire ammeter. Thus a current of two amperes would give a radiation of 512 watts, showing that when working with persistent oscillations and open antennas, we can use very small antenna currents, and obtain powerful radiation effects.

The generation of high-frequency alternations in a shunt circuit to a continuous-current arc is somewhat as follows: If the arc is steady and is then shunted by a condenser, the current rushes into the condenser and momentarily robs

*Abstract of a paper read before the San Francisco Section of the American Institute of Electrical Engineers.

the arc of current, causing the potential difference in the carbons to rise and continue charging the condenser. When the condenser is full the arc current returns to its former value, the potential difference falls, and the condenser discharges from the arc, and the cycle repeats itself. A part of the energy of the continuous current arc is thus changed into the energy of electric alternations in the condenser circuit.

The characteristic curve of the arc is, as is well known, a falling characteristic, i.e., the voltage decreases as the current increases, and for a carbon-arc is comparatively flat. It has besides a persistency which renders it irresponsive to rapid variations of current. Hence only slow alternations can be obtained from a large-current carbon-arc.

With the Poulsen arc, with its carbon negative and cooled copper positive, immersed in hydrogen, a very steep characteristic is obtained and one which responds to exceedingly rapid variations of current through it. A condenser of small capacity may be employed in the shunt circuit and yet convey to it a considerable amount of energy because of the large variation of the difference of potential at the arc caused by small arc current variations. So alternations of high frequency can be produced.

This theory is confirmed by the study of small-current carbon-carbon and carbon-aluminum arcs in air. For they have steep characteristics and can produce alternations of high frequency. The theory of the part played by the hydrogen on large-current carbon and metal arcs is not yet well understood. It appears to be partly due to its greater conductivity compared to air, thus helping to cool the arc electrodes. Poulsen also considers that hydrogen increases the conductivity of the arc.

Practically, the "ticker" consists of two fine crossed gold wires, which are vibrated at the rate of 100 vibrations per second, by means of an electromagnet or clockwork. This may be connected to a secondary circuit which is coupled electromagnetically with the primary circuit.

The rapid telegraph transmitter is operated by means of a punched tape. The tape has a series of small holes down the center. The holes on each side of this central line are punched by hand and those on one side represent the dots, while those on the other represent the dashes of the Continental code. The central line of holes engages the teeth of a sprocket wheel which serves to feed the tape forward at a regular rate. The tape gear wheel has a number of very small and light radial pins, which tend to fly out except when they are held in position by the tape. Wherever a hole occurs a pin is allowed to spring outwards. These pins are mechanically connected to larger pins on a further attachment of the spindle which fly out when the smaller pins are actuated by the tape. Spring contacts are in series with a set of brushes which press on the

segments of three rotating commutators, one of which has a comparatively large number of alternate conducting and insulating segments, and is reserved for the dots, while the other two have longer spacings of commutator segments, which are kept for the dashes. In this way all the actual making and breaking of the current is accomplished on these larger segments, while the tape controls the whole apparatus by means of the lightest possible form of mechanical construction. This reduces the effect of inertia to the lowest limit. There are seventy-two pins, each representing a dot and space. An average word has five letters, so it is possible to transmit three words for one turn of the transmitting combination, and the speed of the machine, which is driven by a direct-current motor, can be varied between the limits of ordinary hand speed to a transmission of 300 words or more per minute. The practical limit at present is in the receiver and not in the sender.

A complete rapid receiver consists essentially of a form of string galvanometer in which a gold string is used in connection with a thermocouple. The absence of inertia permits the string to follow the rapid impulses sent out by the rapid sender. A coating of soot is placed on the wire, and the wire itself is mounted in the beam of a Nernst or arc lamp. A suitable optical condenser throws the light on a narrow slit behind which moves a band of photographically sensitized paper. The shadow of a small portion of the wire as it vibrates to and fro in response to the signals from the sending station is thus imprinted on the band, which is then drawn, first through a developing bath, then through a fixing bath, and then through water to wash it. The message may be read on the developed band as soon as it emerges from the light-tight box and may be kept as a permanent record. The signals are read above the zero line which is traced by the shadow of the wire when no impulse is present. A short impulse makes a dot and a long impulse a dash.

The problem of wireless telephony involves essentially three things: (1) The production of undamped or persistent waves in a transmitting antenna. (2) Means for modulating these waves in accordance with the wave form of the spoken voice. (3) Means for detecting the waves at the receiving end and their reproduction into articulate speech.

The Poulsen generator offered a means of supplying the undamped waves in the transmitting antenna and it was only necessary to connect a microphone at or near a node of current in the antenna to supply a means of modulating these waves in accordance with the wave form of human speech.

At the receiving end almost any self-decohering detector will do, but the production of good clear articulation depends quite a little on the degree of coupling of the primary circuit with the secondary circuit. This also applies to the send-

ing circuits in which quite loose coupling is employed.

Poulsen has transmitted good, clear, articulate speech over the 180 miles between Esbjerg and Lyngby, Denmark. Majorana claim to have talked 312 miles over water with a specially constructed microphone of his own devising. More recently I have carried on successfully two-way working between Stockton and Sacramento, Cal., a distance of fifty miles over land, and while working between these two stations was heard by St. Helena and Palo Alto, distances of seventy-five and eighty-five miles respectively.

There is no doubt that wireless working gives telephony of a higher grade than wire working. There is absolutely no noise in the receiver until spoken words are heard. To one who has talked over long-distance wire lines with considerable induction this feature readily appeals. Low-resistance receivers are not necessary.

With the Poulsen generator of continuous waves it is possible to telegraph at hand speed, i. e., twenty-five words per minute in many ways. For example, it is possible to signal by: (1) Short-circuiting a resistance in the generator circuit; (2) short-circuiting a resistance in the antenna circuit; (3) making and breaking the arc; (4) altering the length of the arc; (5) altering the strength of the transverse magnetic field; (6) altering the flow of gas through the arc.

In practice the inventor short-circuits a turn or two of the sending inductance by means of an ordinary Morse sending key. The absence of the spark permits the use of an ordinary key when telegraphing 2,000 miles, for the current is even then quite small. For receiving, Poulsen uses the ticker which has the great advantage of not being receptive to ordinary damped wave signals.

The tuning possible with the Poulsen arrangement for telegraphy is extremely close. One-half to one per cent. change in the capacity of the resonant circuit is readily noticed on the received signals. Duplex working has been carried out with 3.9 per cent. change in wave length.

The rapid wireless-telegraph transmitter and receiver have already been described. In practice the transmitter is connected in, just where the Morse key would be for hand-speed telegraphy. Good, clear, readable records have been received over 180 miles, mostly land, at the rate of 300 words per minute. Over 600 miles good records have been received up to 150 words per minute. As a means for handling large quantities of business and with a record at both transmitting and receiving stations the rapid system has a good future. Poulsen estimates that he can handle 100 words per minute across the Atlantic with a sixty kilowatt generator and suitable antenna.

In the first place the absence of all noise is brought home forcibly in a Poulsen station. It seems hard to believe that anything is being done at all. The key may be of the ordinary Morse type, for the currents handled are quite small even for large distances. There are no insulation difficulties, for the voltage at the top of the antenna is not estimated to be over 3,000 volts. The sending helix may be handled without shock, even though the voltage be over 1,000.

Very small capacities are used with heavy-power working, eliminating a source of expense and a very bulky part of large "spark" stations. The capacity in connection with a twelve-kilowatt set is about 0.0017 microfarad. At the Cullercoats (England) station the condenser takes up less than a tenth of the space occupied by the condensers for a "spark" system of the same power installed in the same stations.

Undamped waves of small amplitude are less obstructed by atmospheric conditions and suffer less absorption over land than damped wave trains. For example, in coming around the north of Scotland the undamped wave signals are picked up long before the damped wave signals of equal power.

The form of the resonance curve of the receiver circuit depends on the decrement of the transmitter and receiver. If the transmitter is undamped, a very small change in the period of the receiver will put it out of tune, hence, a receiver circuit can be employed which is sensitive to undamped waves of some exact period, but which is exceedingly unresponsive to waves differing by a very small fraction of one per cent. in wave length from the syntonie value.

In the matter of energy, good signals have been transmitted over 500 miles with one kilowatt, and over 2,000 miles with six kilowatts and a limited antenna. The efforts of Marconi and others to reduce the damping of their wave trains is evidence that undamped wave trains will be the means of communication of the future.

In telephony at the present time better articulation is obtainable than with wires and it is quite probable that a method of obtaining secrecy will soon be devised.

In telegraphy there is no doubt that the Poulsen system has great range for little power and that it works readily over land and in daylight. I look to see the present records of distance now held by spark methods broken by stations using the continuous waves. The present speed of the rapid telegraph sender is dependent on the receiver, but a newer type of rapid telegraph detector is coming out which will no doubt result in the handling of greater speed than 300 words per minute. Great advances can be expected in the next five years in wireless working, but they will be along the lines of work with continuous wave trains.

The Delany Telegraphic Keyboard Transmitter.

Patent No. 957,312, for telegraphic keyboard transmitting apparatus, granted recently to Patrick B. Delany, of Nantucket, Mass., covers a form of transmitting apparatus of the keyboard type in which the details of operation seem to be worked out very carefully. As described by the inventor the equipment comprises an arrangement of multiple branch circuits, each in series with a controlling device at which they are in succession closed and opened. The signal to be made or transmitted is formed by closing the signal circuit in advance of the actuation of the controlling device. In the particular form described the controlling device has a contact maker or trailer traversing a series of insulated contact pieces to each of which one of the branch circuits is electrically connected. The branch circuits include a series of parallel contact bars and the signal forming contacts are carried upon a series of endwise moveable contact making bars, arranged at right angles to the parallel branch circuit bars and of which there is one for each letter or signal to be formed. Each of the series of parallel branch bars, when a signal forming contact is brought into connection with it, furnishes the circuit for transmission of a dot signal. To transmit a dash a succession of two, three or more of such bars are connected into the circuit and as the trailer of the controller bridges the contact pieces traversed by it, such prolonged closure of the circuit is thereby effected as may be desirable for the transmission of a dash. Spaces are formed between the component parts of the signal by leaving on open circuit one or more of the branch current bars lying between those which are connected on either side for the formation of the successive component parts of the signal.

The keyboard has the appearance of an ordinary typewriter keyboard and may have, of course, as many characters as desired. The key levers are all pivoted on a horizontal bar, and each has a downward bifurcated extension between the arms of which extends an upright piece on the end of the horizontal contact carrying bar which is arranged to slide in supports or standards near its two ends. The contact pieces are adjusted by clamps on these bars by means of set screws and extend downward in order to make contact with the parallel branch circuit contact plates or bars, which are placed directly below and at right angles to the contact carrying bars. When the key lever is in its normal position, the contact pieces stand between the contact plates. When a key lever is depressed the corresponding bar is moved laterally so as to bring the contacts which it carries into contact with the plates below. These plates are each insulated, being mounted upon a plate of insulating material. They are consecutively connected by circuit connections to the insulated contacts of the controller. The contact carrying bars are

all electrically connected to the frame of the instrument.

The contact maker, trailer or brush, has a reciprocating motion over the insulated segments which form an arc of a circle and normally rests on the first segment of the circle, which is always dead. The contact brush is carried on a radial arm fastened to an insulated vertical rotatable shaft which is connected to one pole of a local battery, the other pole of which is connected through the winding of an electromagnet, relay or transmitting device to the frame of the instrument. If a key lever is depressed its endwise moving bar is caused to make contact with certain of the branch circuit contact plates. If, for instance, we desired to send the letter J in the Morse Code, contacts would be made on plates 1, 2, 3, 5, 7, 8, 9 and 11. If then the trailer was set in motion the circuit of the local battery would be closed while the brush was passing over the segments named, but would be opened when passing over segments 4, 6, 10, 12 and the succeeding segments. The closing of the local circuit would energize the relay therein, which, in turn, would transmit impulses from the main battery to the line, the duration of these impulses, of course, depending upon the length of time that the circuit was closed. The time required for the brush to pass over three segments corresponding to the length of a dash, it will be seen that we would, in this case, transmit to the line the required signals for the letter J, namely, dash, dot, dash, dot.

To prevent a second key being depressed before the first signal is completed the first one, upon being depressed, strikes the lower arm of a pivoted yoke extending the whole length of the keyboard and rocks its upper arm into engagement with notches in the ends of the undepressed levers thereby locking against depression all of the key levers except the one then being operated. At the same time another device in the form of a latch catches the end of the depressed lever in order to hold it down until the signal is completed. This latch, which extends the length of the keyboard, carries at one end the armature of an electromagnet which when engaged withdraws the latch and permits the lever under the stress of a retractile spring to return to its normal position.

The depression of the key also closes the circuit of a local battery through a magnet, the armature lever of which carries an idler gear meshing with a continuously driven gear. Turning with these gears are two grooved rolls between which is an endwise moveable bar formed with rack teeth which mesh with a gear on the trailer shaft. A coiled spring acts normally to hold this bar in a retracted position with the trailer upon the dead segment as previously mentioned. When, however, the magnet is engaged by the depressing of a key and the consequent closing of its circuit the grooved roll carried by its armature is forced

toward the companion roll so that the bar is frictionally grasped between them and is by the action of the continuously driven gear drawn forward causing the rotation of the trailer shaft and the traversing of the trailer over its contacts. As the key returns to its normal position the circuit of the magnet being broken the grip of the rolls on the bar is released and the trailer is automatically returned to its normal position by the coiled spring mentioned.

For the purpose of releasing the depressed key when the signal is completed the branch circuit connected with the segment upon which the signal is completed or some succeeding segment is also connected, through an extra contact made by depressing the key lever, with the magnet previously mentioned which is used to release the latch which holds the key down. From this magnet the circuit is traced through a local battery to the trailer arm. Hence, when the trailer makes the contact which closes this circuit the magnet being energized the key is released and this in turn opens the circuit which allows the trailer to return to its normal position.

A keyboard of this type may be easily adapted for cable working. In this case each endwise moveable bar would be replaced by a composite bar composed of two metal conducting plates separated and insulated from each other by blocks of insulating material. Each conducting strip carries contacts which co-operate with the branch circuit bars as previously described. The operation is as has already been described except that instead of being electrically connected to the frame of the instrument each conducting strip of the composite bar is connected through a separate magnet to the local battery and thence to the trailer arm. When contact is made by one side of the endwise moveable bar the magnet connected in circuit with that side is energized and by operating a pole changing device sends an impulse of a certain polarity to the line. When contact is made by the other side of the bar an impulse of the opposite polarity is sent to the line.

The number of branch circuit contact bars required depends of course on the length of the signal to be transmitted. If the Morse alphabet is used the longest character, the period, will require fifteen contacts. As the contact for releasing the key is in the plan outlined the second one following the last signal contact seventeen bars will be required. If the Continental code is used its longest characters will require nineteen contacts, hence twenty-one bars would have to be provided.

To provide against the possibility of failure of the automatic device to return the trailer arm to its normal position when the signal is completed provision is made that when the trailer has passed over all of the segments it shall be dis-

connected from its driver and returned to normal position by its spring.

It is claimed that the principles of this invention are applicable not only to direct transmission as described but also for the transmission of wireless signals; for use locally for making a record as for instance by perforation of a tape to be used for transmission in an automatic or machine rapid telegraph system and for various other purposes.

So far as signal transmission is concerned it is, of course, adapted to any code, whether the transmitted signals be composed of component parts represented by impulses of long and short duration, of uniform duration or variable polarity.

A Story of Sir William C. Van Horne.

The retirement of Sir William C. Van Horne from the Chairmanship of the Board of Directors of the Canadian Pacific Railway on May 9 recalls the following story of this great railway executive who started his railway career as an operator on the Illinois Central:

"One day a stout, bearded, elderly man was a passenger on a Canadian Pacific local running into Montreal. By his side sat a very pretty young woman.

"The attention of the bearded man was attracted by the audible maneuvers of two young men who sat behind him. The two sat on opposite sides of the aisle, and first one and then the other would tap on the metal arm of his seat with his pen-knife.

"Presently it dawned upon the bearded man that his fellow passengers were holding a conversation in Morse.

"How do you suppose old Whiskers got the lulu?" said the taps.

"She's a bird," was the reply, 'the old man's darling, probably.'

"Isn't it disgusting?"

"After the tapping had continued in this vein for some minutes, the bearded man suddenly began rapping sharply on the arm of his own seat with the seal ring that adorned his little finger.

"Whiskers is doing his best not to look around at the two Canadian Pacific telegraphers behind him. Ask the conductor.'

"Dismayed, the two young men sat a while, like statues. Finally one arose and hurriedly left the car. The other soon followed. In the baggage-car they found the conductor, and told him what had happened.

"It's lucky for you fellows said the conductor that 'Whiskers' is who he is. If he was somebody else, you'd be out of your jobs right now. Know why he didn't look around?"

"It was because he wanted to spare you the humiliation of knowing that he had identified you. That is Sir William Van Horne, president of this railroad."

Telegraphic Development in the Northwest.

Mr. Z. G. Simmons, who died February 11 at his home in Kenosha, Wis., and who was for twenty-five years president of the Northwestern Telegraph Company, was regarded as one of the best business men in that state. In a series of articles appearing in "System," which were prepared before his death, he gives an interesting resume of his business experiences. Early in life he was a storekeeper in Kenosha and while thus engaged became interested in the telegraph. His connection thereafter with the industry is told as follows:

"Charles Sholes, brother of the typewriter inventor, was one of my customers. He owned half of the stock of the Wisconsin State Telegraph Company, then operating a line between Milwaukee and Madison. In common with other telegraph lines in the west, it was losing money and Mr. Sholes was trying to get rid of it. He had promised to settle his bill at the store when he closed the sale of his stock. The deal falling through, he asked for further time, explaining his difficulty. Yielding to the fascination the telegraph had always exerted over me, I offered to buy his stock.

"So important a means of communication, it seemed to me, must be susceptible of development and management on a paying basis. Mr. Sholes accepted my offer and transferred his interest to me for \$500, only a fraction of the cost of construction. My bargain, I soon discovered, was a white elephant. Not enough messages were sent to pay operating expenses; business men had not yet learned to use the lines. My task was to cut expenditures squarely in two or find some new use for my wires and operators. This was in 1856.

"Revolving my dilemma, it struck me that the railroads ought to employ my service in handling their traffic. The telegraph would enable headquarters to keep in touch with trains out along the line, to give conductors running orders, to meet emergencies, to frame up a schedule much faster than the current, go-it-blind method allowed. I carried the idea to E. H. Goodrich, the president and manager of the road from Milwaukee to Prairie du Chien. He derided it.

"'Preposterous,' he said. 'The idea of trusting a railroad train to telegraphic orders! I'd be sent to an asylum if I attempted a thing like that.'

"I hung on, however. The scheme was so safe and simple; it met the needs of the railroad and my own necessity to reduce expenses so exactly that I was sure it would succeed. In the end Goodrich capitulated and agreed to try the plan on one hundred miles of his road between Milwaukee and Portage. Literally it proved itself in a day. Goodrich gave me no peace until I carried my wires to Prairie du Chien.

"'We've got to have the telegraph,' he declared.

"Between here and Portage it's daylight and safety. Beyond Portage it's midnight until each train returns and reports itself safe.'

"That was the beginning of a quarter century given chiefly to the extension of the telegraph. I sold the store to my brother, my construction work leaving me no time to give it the personal attention which, I had learned, was the basis of success in merchandizing. With the railroads eager to co-operate, the opportunities in telegraphs were endless. Virtually our outlay ended with the establishing of the lines. The contracts gave us a free right of way and provided for all minor repairs by section gangs. The operators were paid by the railroads and we received all the money taken in for commercial messages. When these reached twenty a day we agreed to start a company office. Later when our lines began to cover the whole northwest, the railroads were given franking privileges up to a certain amount each year, not only over our own lines but over those of other systems with which we had reciprocal agreements.

"With one exception, marrying railroads and telegraphs was to be my sole business for many years. I borrowed money and strung wires wherever the iron rails led and traffic promised. I organized the Northwestern Telegraph Company and effected a connection at Chicago with the Western Union, which Hiram Sibley and J. H. Wade of Cleveland had evolved from a tangle of wild cat lines in Ohio, Indiana and Michigan, rehabilitating the best of them. Pushing on to Minneapolis, I went thence to the coast along the Northern Pacific and up into Canada.

"In all I built 20,000 miles of lines and managed the Northwestern for twenty-five years. But the value of my original idea—co-operation with the railroads—outweighed all my later service. It bridged the barren years when trade and industry were learning to utilize, but failing to support, the new engine of communication. It freed the railroads from guesswork and initiated modern railroading.

"It was not a march from success to success by any means. At one time the Minneapolis office, for instance, would have been closed but for a citizens' subscription to pay the operator's salary. But progress was fairly uniform. The important lines were built along railroads: the only exception being the line from Minneapolis to Winnipeg, then Ft. Geary, the stockaded trading post of the Hudson Bay Company. This I constructed along the old trail of the Red River carts through the woods and across the prairies before the railroads pushed northward. Even that was not a speculation, our contract with the Hudson Bay Company guaranteeing us profits from the outset. When I retired from the Northwestern presidency in 1881 to manage my manufacturing business at Kenosha, the Northwestern had 1,800 offices, 300 of them supported entirely by commercial messages, the others operated in conjunction with the railroads. My original investment of \$500 had grown to be a \$4,000,000 property.

Passions are as easily evaded as impossible to moderate.

How Edison Solved a Difficult Problem.

In a recent newspaper article Mr. E. J. Edwards tells the following story of how Thomas A. Edison solved a problem which was puzzling the minds of many inventive geniuses over twenty years ago.

When New York city, back in the late eighties, passed an ordinance forbidding the stringing of telegraph and telephone wires overhead and ordering the miles of wires already overhead to be placed underground a commission was appointed to take charge of the work of burying them. A member of this commission was the late Jacob Hess, at one time very prominent as a Republican organization leader in New York, and one of the group of very energetic young men who were trained in politics by Chester A. Arthur when he was a power in New York city politics.

"The most impressive evidence I ever had of Edison's genius I received when I was a member of what I believe was the first authoritative body to deal with the problem of laying a city's wires underground," said Mr. Hess to me a few years before his death.

"When we started out we knew that it wouldn't do just to place the wires in trenches and let it go at that; anybody knows that wires so placed would not work and would soon be destroyed. So we had authority to spend money to make experiments in order to get at least one satisfactory system of burying the wires, and to enter into contracts with inventors of satisfactory systems. One of our first moves, therefore, was to advertise our needs.

"You can't imagine the number of inventions that were brought to our attention—they simply were legion, as the saying is. Most of them were worthless.

"One day, after we had been struggling with the problem for weeks, and were as far away from solving it apparently as when we first tackled it, it was suggested that we call on Thomas A. Edison and ask him to invent something that we could use, or, at least, give us a suggestion that we could have worked out. We wrote him, and he invited us to visit him at his laboratory in New Jersey.

"Presenting ourselves before him at the appointed time, we found him wearing an old linen duster and a much battered straw hat. As we stated the object of our call a queer little smile passed over his features. Finally, he said: 'I suppose you have had all sorts of inventions offered to you?'

We nodded acquiescence.

"Well," he said, 'chuck them all out. Most of them are no good, and, besides, you don't need any invention.'

"We looked surprised, and Edison was clearly amused at our astonishment. Then he proceeded to elucidate. 'All you have to do, gentlemen, is to insulate your wires, draw them through the

cheapest thing on earth, lead pipes, run your pipes through channels or galleries under the street, and you've got the whole thing done.'

"There he was telling us in that simple, offhand way how to do the thing we had spent the best part of a year puzzling over; for none of us doubted that he had solved the problem, and afterwards the experiments which we conducted proved conclusively that he had.

"Before we left Edison we asked him what his bill was for the advice he had given us.

"Not a cent," he replied. 'Do you suppose I'd stick you for so simple a thing as that?'

"And yet," concluded Mr. Hess, "the plan that Edison gave us offhand and free gratis is the one now universally employed when wires are to be placed underground."

How to Locate a Break in a Telegraph Wire.

A magazine which claims to have over a million readers in ten cities spreads broadcast the following remarkable information regarding the location of a break in a telegraph line.

"When a telegraph wire is broken or damaged, say several hundred miles away, how does the operator sitting in his office, know exactly where the accident occurred?

"The explanation is simple. It requires, as everyone knows, considerable force to send electricity through a wire. The longer the wire, the greater, of course, must be the force required. This force is measured in units called by electricians ohms. Let us suppose that a wire between a New York office and a point one hundred and fifty miles away has broken somewhere. The telegrapher knows that when the wire was intact there were required, say, twenty-one hundred ohms to facilitate the current, or fourteen ohms to the mile. He now finds that he can send a current with only seven hundred ohms. Dividing seven hundred by fourteen, he finds that the break in the wire is fifty miles from his end.

A Possibility of the Future.

An exchange, in speaking of the recent approach of Halley's Comet to the earth, and commenting thereon remarked that when this comet visited the earth in 1836, seventy-four years ago, there was not a railroad on earth. There was no telegraph, telephone or trolley car. There was no electric lighting or applied electric power. There were no subways for public travel, no suspension or steel bridges, no coal as fuel, no artificial ice, no cold storage, no beef trust, no Standard oil, no Barnum and Bailey show, no seedless oranges or grape fruit.

If like advance is to be made within the next three-quarters of a century along the line of scientific research, the comet may find itself captured when it returns in 1984 and made to stand and contribute of its energies and heated aerolites toward power for transportation and communication.

More Reminiscence of the Boston Office.

Editor Telegraph and Telephone Age:

It has afforded me great pleasure to read the article in your June 1 issue, speaking of the presentation to Mr. J. S. Redlow, who was later superintendent of the Western Union Telegraph Company, at Portland, Me., of an album containing the pictures of and giving the names of my old associates in the Boston office of the American Telegraph Company in 1863.

In looking over the names of those men, with all of whom I was so closely associated in the telegraph service, fifty years ago, in Boston, I have had the pleasure of seeing their faces, in my mind's eye; and almost realize the joy of actually meeting them.

Having, with my family, occupied part of a house with Mr. G. F. Milliken we shall ever have cause to remember with pleasure his genial face, and the many happy hours enjoyed in his home, with his estimable wife and family.

The year 1853 brought me to the first steps in the telegraph service in Boston. I first had three weeks experience in pulling up the dummy boxes which carried the messages between the receiving department and the operating room, the case for which was outside of the building and exposed to the cold northeasters, so well known in Boston. I many times enjoyed the luxury of having blistered hands while thus employed.

During the succeeding two weeks, the care of the operating room, on the third floor of the Traveller Building on the corner of Devonshire and State Streets, devolved upon me, while the manager, Mr. James N. Ashley, with his assistant, Mr. Thomas Miler (both long since dead) with the linemen were called out to repair the two-wire line, which a sleet storm had carried down, and buried in the ice between Boston and Providence.

In the meantime the public were attended to by the receiving clerk, Mr. Gilson, who took business subject to indefinite delay. The customers were told that the other line (Union Morse line) was working but many persisted in leaving messages for New York with us, saying, "we want them to come out at the other end printed."

Working direct with New York, at that date, was considered an interesting experiment, and undertaken only during exceptionally favorable weather, the regular service, being a repetition of all business at Springfield, Mass., of which office, Mr. George B. Prescott was manager, with Mr. J. L. Edwards, William Blanchard and Charles Simonds, operators. Mr. A. A. Lovett was superintendent between Boston and New York, Mr. Prescott acting as assistant superintendent from Springfield to Albany.

A northeast storm was the signal to prepare duplicates of business to go by train to Spring-

field; and to New York if Springfield failed to work south. In 1862 Superintendent C. F. Wood came to New York and in response to the very flattering picture drawn by him of the position offered at Boston, the writer was led to accept, and became night manager and Associated Press operator, relieving from that post one of the most expert operators of his day, that most estimable gentleman, Mr. Henry H. Ward, who for many years until his retirement from the service about seven years ago was cashier for the Western Union Telegraph Company, at 195 Broadway, New York.

The following three years found the night press operator at Boston on duty daily at five-thirty p. m., and during this most exciting period of the Civil War, the pen was scarcely dropped from eight p. m. until four or five the following morning, the Associated Press matter alone averaging forty-five to fifty pages of foolscap and a pause in Associated Press matter being filled in with long specials to Boston papers.

Following, what were known as the draft riots, at New York, when all wires throughout that city were torn down, and temporary offices were established at William's Bridge, Boston became the scene of a similar attempt by the riotous element. The crowd besieged the telegraph office, about eight o'clock in the evening, but before any well defined plan to interfere with the wires was decided upon, some leader of the mob cried out "Forward to Faneuil Hall Square and get fire arms." This pleased the mob and all started for the Square. Before any of the gun shops had been broken into, the city authorities had come upon the scene, the riot act was read, and the crowd refusing to disperse a charge of grape shot was sent into them, which put an end to rioting in Boston.

For several weeks succeeding the streets were thoroughly patrolled at night by the police.

At 8.30 p. m. intermediate offices except those taking press report, were closed, thus enabling us to detach relays, keys, etc., and release a sufficient number of operators to go to Roxbury and other suburban points to keep up communication with New York in case the rioters interfered with us.

The writer's health beginning to fail, efforts were made to find a relief, which was finally accomplished by inducing a robust young man and an excellent operator, Mr. A. W. ("Win") Todd, from Bangor, Me., to accept the position which I held with the understanding that he was to be relieved one night (Saturday) each week. After three weeks service two extra operators were called on duty nights to relieve the Associated Press man, of Boston specials. Thus began an increase of the night force which not long after became nearly as large as that employed during the day, with a manager responsible only for the proper conduct of business.

Mr. Walter P. Phillips, so well known and highly esteemed by the entire telegraphic fraternity, from an intimate knowledge of the Associated Press service on this circuit familiarly known as No. 4 east has told the story so well in his series of article on "Old and Recent Tournaments" appearing in *Telegraph and Telephone Age*, from October 1, 1909, to March 1, 1910, that very few words of interest may be added thereto.

Mr. Phillips has, through the medium of a Morse register and an embossed tape, given us a complete reproduction of the service on this wire. The writer calls vividly to mind having sat back in his chair and laughed until the tears came, listening to this record. From eight until eleven p. m. the operators at New York were apparently selected at random from the force, some good, others, indifferent senders.

The relief came, when at about eleven o'clock a touch at the New York key was at once recognized, and welcomed by all. The initial "M" (Mr. D. F. Marks, the well known and honored night manager), was the signal for a general bracing up along the line. Thereafter, a break had to be acknowledged or the receiver left to beg for the last words, during a rarely occurring interval of service.

Our esteemed friend Mr. Potter at Fall River, Mass., the eastern terminal of the circuit, having so often to dispute a charge of breaks by some office signing "P. F." Boston was the point always called upon to settle disputes as to the cause of the frequent breaks.

During heavy weather, the service would often lag, much time being lost by breaks and requests for New York to go back half a dozen words or so. To the question: "B. are you getting this?" Boston could easily answer: "Yes," notwithstanding that Bridgeport or New Haven the two nearest offices to New York failed to get signals.

The unfailing success at Boston was due to the fact, that when report ("Rep." "Rep.") was announced the wire was switched to one side of a set of Milliken repeaters having a 500 ohm relay with cores about five inches long and a local circuit made up of any desired portion of a combination local system in use at that date.

Gerrit Smith.

Astoria, L. I., June 5, 1910.

A Reminiscence of John W. Mackay.

Mr. J. D. McLelland, manager of the Postal Telegraph-Cable Company of Texas, at Houston, Texas, sends us the following story told him by a broker of that city concerning the late John W. Mackay. As far as we are aware this has never before appeared in print but is well worth publishing, illustrating as it does one of the characteristic traits of that great telegraph developer, namely his love and devotion for his comrades and friends of his earlier days before

he became wealthy. In the late eighties there lived in Galveston a wealthy coffee importer and sugar dealer named Isaac Heidenheimer. One day he suddenly took a notion that the price of wheat was going to advance and told his bookkeeper to buy one hundred thousand bushels. Following this there was a sudden rise in the price of wheat and the bookkeeper was told to repeat the order. Wheat kept advancing and Mr. Heidenheimer kept buying more. This continued until he had purchased one million bushels. Thereupon telling his bookkeeper to repeat his original order again Mr. Heidenheimer was very much surprised to learn the amount which he had purchased as he supposed that he had bought ten lots of ten thousand bushels each. Wheat had been going up all the time, however, and he was able to dispose of the whole amount at a substantial profit.

The fascination of speculation was strongly rooted in him by this deal and he again began to trade and his entire fortune was soon swept away. About this time an elderly gentleman arrived in Galveston and inquired for Mr. Heidenheimer stating that he was an old friend. The newcomer was John W. Mackay the founder of the Commercial cables and the father of the Postal Telegraph-Cable Company and there was a happy reunion between him and Mr. Heidenheimer whom he had met in California in 1849, when both were prospecting for gold. In those days Mr. Heidenheimer had rendered Mr. Mackay a great service and when the latter learned his friend's misfortune he immediately gave him a check for one hundred thousand dollars telling him to make a fresh start.

The two friends parted and Mr. Heidenheimer plunging into speculation again soon lost the hundred thousand dollars which had been given him. Mr. Mackay learned of this and made a substantial loan to Mr. Heidenheimer. This was well invested and the proceeds were sufficient to enable that gentleman to live in comfort the remainder of his life.

That in some lines of endeavor men of practical experience have the advantage over those whose training is largely theoretical is generally admitted. That it is true in regard to smoking has now been proven conclusively. Several Cornell professors held a contest recently to determine who could smoke a cigar the longest. The best that any of these men of science could do was about eighty-four minutes. Almost immediately and apparently without any special training for the event a Washington telegrapher established a record of ninety-four minutes and thirty seconds. Now a Chicago operator has made the efforts of the professors look small indeed by raising the record to one hundred and fifteen minutes and thirty seconds.

Annual Convention of Railway Telegraph Superintendents

The telegraph department of a railroad is often looked upon by other departments as of little consequence, because of the fact that it is not a revenue producing branch of the service. Those connected with the passenger or freight departments are likely to forget that it is only by reason of the existence of a telegraph or telephone system that they are able to move their trains to the best advantage and operate their departments at the highest efficiency. It is hard



I. T. DYER, LOS ANGELES, CAL.

First Vice-President of the Association of Railway Telegraph Superintendents, and Presiding Officer of the Convention.

to imagine the condition which would prevail in railroad circles to-day if there was no telegraph or telephone available for use in directing train movements. A slight indication of what would be the result if these two agencies were suddenly done away with is sometimes afforded when we see railroad traffic practically crippled by reason of the breaking down of the wires by sleet, or wind storms. Upon the efficiency of the service of the telegraph department depends not only the safety of every passenger carried over the railroad, but also the efficient operation of the freight service as well.

Hence, a great responsibility rests upon the shoulders of the superintendent of telegraph of a railroad and if he is wide awake to the importance of his position he will use all means within his power to maintain a service which is as safe and reliable as any human agency can make it.

The result of this natural desire on the part of the superintendents of telegraph of the railroads of this country to use every known means to increase the efficiency and reliability of their systems was the formation twenty-eight years ago of the Association of Railway Telegraph Superintendents. The various superintendents at that time realizing the advantages of co-operation, banded together to assist each other and the

members of this association all agree that the information which they have derived from their associates through the discussion of important problems at their annual meetings has been of incalculable value to them.

The twenty-ninth annual convention of the Association of Railway Telegraph Superintendents which meets in Los Angeles June 20 to 24 will afford those superintendents who are able to attend an opportunity to discuss with each other many important problems which confront them at the present time. In spite of the great advances which have been made since the association was formed and the many interesting problems which have been successfully solved the coming assemblage will probably have as much business of importance to occupy its attention as any convention which has ever been held.

Twenty-eight years ago the use of high voltages in the transmission of electric currents had not been thought of. In the last decade, however, high tension transmission systems have been



G. A. CELLAR, PITTSBURG, PA.

Second Vice-President of the Association of Railway Telegraph Superintendents.

springing up like mushrooms all over the country and the telegraph superintendents have been confronted with the problem of how to avoid any possible contact between these deadly wires and the low voltage telegraph and telephone lines in places where the one crossed or came in close proximity to the other. For the past two years a committee of members of the association has been carefully studying this question. Their report, which will be presented at Los Angeles for discussion and adoption, will recommend to meet various conditions the safest types of construction which human ingenuity has yet devised.

Although the telephone was coming into use at the time the association was formed, it was not until many years afterward that it had been

perfected so that anyone realized that it had great advantages over the telegraph in the way of facility in directing train movements. Now its value has been recognized and the introduction of this new system of train despatching has brought before the superintendents an entirely new set of problems, the more important of which will be carefully considered at the coming meeting. With the rapid increase in the use of the telephone it has been recognized that it would be of advantage to have some standard to go by in the interchange of business with the telephone companies. With this end in mind the American



P. W. DREW, CHICAGO, ILLS.
Secretary and Treasurer of the Association of Railway Telegraph Superintendents.

Telephone and Telegraph Company has proposed a standard agreement to be entered into between the two parties and a committee of the association which has been carefully investigating this contract during the past year will report on the same to the convention and the subject will come up for discussion and action.

The following is the complete list of papers which will be presented before the convention: "Wireless Telegraphy," by William Maver, Jr., of New York; "Education for Efficient Railroad Service," by D. C. Buell, head of the electrical bureau of information, Union Pacific Railroad, Omaha; "Protecting Telephone Lines from Lightning and other Disturbances," by M. E. Launbranch, of the United States Electric Company, Chicago; "Automatic Block and Highway Crossing Signaling," by H. P. Ryner, of the Hoeschen Signal Company; "Telephone Train Despatching," by E. E. Dildine, assistant superintendent of telegraph of the Northern Pacific Railway, St. Paul; "Testing of Telegraph and Telephone Circuits," by V. T. Kissinger, superintendent of telegraph of the Chicago, Burlington and Quincy Railroad, Chicago; "Telephoning to and from Trains," by E. P. Griffith, superintendent of telegraph of the Erie Railroad, New York; "Composite Telephone Blocking," by W.

F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va.

The best informed men available have been selected to lead the discussion on these papers and there is no doubt but that in the discussions and questions which follow the presentation of the various papers many points of information of great value will be brought out.

The association is now in the most prosperous condition it has enjoyed at any time in its history. Twenty-three active and eleven associate members have been added to the roll since the last annual meeting.

The Hotel Alexandria, the headquarters of the convention, is one of the finest and most handsomely equipped hotels in the west and the rates given to those who attend the convention are as reasonable as could be obtained for similar accommodations in most eastern cities.

The majority of the eastern people who will attend the convention left Chicago on Tuesday evening, June 14, over the Santa Fé route. They were joined by others at Kansas City, June 15. This early start was made to enable them to stop off one day at Williams, Arizona, to visit the Grand Canyon.

The entertainment committee, of which Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railway, Los Angeles, is chairman, has worked hard to give the visitors the best entertainment possible and from the program prepared it is evident that their labors will meet with great success. Other members of the committee are F. S. Rawlins, E. A. Klippel, B. F. Frobes, B. A. Kaiser and P. W. Miller. The Ladies' Reception Committee consists of Mrs. B. F. Frobes, Mrs. I. T. Dyer, Mrs. F. S. Rawlins, Mrs. E. T. Raymond, Mrs. H. C. Chace and Mrs. J. B. Sheldon. The visiting ladies will be given an automobile ride around the city on the afternoon of the first day of the convention. Among the other features of the entertainment will be a trip to Mt. Lowe, with a stop-over at the Ostrich Farm and in Pasadena going, and at Mt. Lowe Observatory returning; a trip over the Kite-shaped track, through the orange groves, Redlands, San Bernardino and Riverside; returning via "Lucky Baldwin's" ranch; the Balloon route trip over the Los Angeles Pacific Railway to Redondo Beach via Hollywood, Soldiers' Home, the Palisades, Santa Monica and Ocean Park, returning via Venice and the short line to Los Angeles; and, a trip to Avalon, Catalina Island over the Salt Lake Route to San Pedro and from there on the ship Cabrillo. The last business session of the convention will be held on Friday and the trip to Catalina Island will be made on Saturday for the reason that some of the party may wish to remain over until Sunday or possibly longer. Many of those attending the convention will return via the Southern Pacific.

STATISTICAL INFORMATION REGARDING THE USE OF THE TELEPHONE.

The information which we collected a year ago in regard to the use of the telephone for train despatching was the first comprehensive data that had ever been published showing the extent to which the telephone was used for the purpose of directing train movements. These statistics were received with so much interest by all who saw them that we decided to gather and publish similar information to show the extent to which the telephone is now used in order to keep our readers informed as to the extent to which the telephone is superseding the telegraph. In compiling the table which we present herewith we pursued the same course as was followed a year ago, namely a printed slip was prepared containing several questions in this connection about which information was desired and which would be interesting to all concerned. These slips were sent to every railway telegraph

superintendent in the United States, Mexico and Canada together with a personal letter explaining in detail our object in asking for the answers to the questions. The responses to our request showed that the various superintendents had a lively interest in this subject and were glad to assist us in accomplishing this very desirable object. As a result the table which we have now prepared is more complete than the one which we published in 1909 containing reports from about 5,000 miles more of road than the former one. The information which is given therein is accurate and up-to-date showing the extent to which the telephone is now used for despatching purposes. In the personal comments which follow the table will be found much additional information in regard to what the different superintendents are doing at the present time and what they contemplate doing during the present year in the way of extending their telephone systems.

NAME OF RAILROAD.	Head of Telegraph System.	Total Mileage.	No. of Miles on which Trains are Despatched by Telephone.		No. of Miles on which Trains are Despatched by Telegraph.	Is an extension of the telephone system contemplated?
			(a) Single Track.	(b) Double Track.		
Atchison, Topeka and Santa Fe Ry.....	C. H. Gaunt.....	10,602	1,684	493	8,425	Yes.
Atlantic Coast Line R. R.....	W. P. Cline.....	4,476	114	26	3,900	Yes.
Baltimore and Ohio R. R.....	Chas. Selden.....	4,460	0	0	4,460	Yes.
Bessemer and Lake Erie R. R.....	F. W. Smith.....	206	0	0	206	Yes.
Boston and Maine R. R.....	S. A. D. Forristall..	2,242	88	51	2,103	Yes.
Canadian Northern Ry.....	W. E. Muir.....	3,355	443	0	2,912	Yes.
Canadian Pacific Ry.....	W. J. Camp.....	9,608	633	12	8,963	Yes.
Central R. R. of New Jersey.....	F. G. Sherman.....	646	0	0	646	Yes.
Central Vermont Ry.....	M. Magiff.....	586	0	0	586	No.
Chesapeake and Ohio Ry.....	J. S. Stevens.....	1,955	560	79	1,027	Yes.
Chicago and Alton R. R.....	T. M. Haston.....	1,448	0	0	1,448	No.
Chicago and Eastern Illinois R. R.....	C. McCormack.....	965	0	0	965	No.
Chicago and North Western Ry.....	Wm. Bennett.....	7,853	260	292	7,101	Yes.
Chicago, Burlington and Quincy.....	V. T. Kissinger.....	9,020	2,386	154	6,480	Yes.
Chicago, Cincinnati and Louisville R. R.....	R. M. Stone.....	284	0	0	284	No.
Chicago Great Western Ry.....	A. T. Hollenbeck.....	1,460	0	0	1,460	Yes.
Chicago, Indiana and Southern R. R.....	W. L. Connelly.....	365	50	0	315	Yes.
Chicago, Milwaukee and St. Paul Ry.....	U. J. Fry.....	7,265	222	223	6,820	Yes.
Chicago, Milwaukee and Puget Sound Ry.....	U. J. Fry.....	1,570	749	37	784	Yes.
Chicago, Rock Island and Pacific Ry.....	J. G. Jennings.....	8,022	1,371	223	6,428	Yes.
Chicago, St. Paul, Minn. and Omaha R. R.....	Geo. Boyce.....	1,739	0	0	1,739	No.
Cincinnati, Hamilton and Dayton Ry.....	J. L. Orbison.....	1,038	0	0	1,038	No.
Cleveland, Cin., Chicago and St. Louis Ry.....	C. S. Rhoads.....	2,542	230	203	2,109	Yes.
Colorado and Southern Ry.....	J. L. Henritzy.....	1,952	0	0	1,952	Yes.
Colorado and Wyoming Railway.....	E. E. McClintock.....	112	0	0	112	No.
Delaware and Hudson R. R.....	C. E. McKim.....	845	0	0	845	Yes.
Delaware, Lackawanna and Western Ry.....	L. B. Foley.....	956	414	519	0	
Denver and Rio Grande R. R.....	J. M. Walker.....	2,597	45	0	2,552	Yes.
Denver, North Western and Pacific Ry.....	C. A. Parker.....	217	217	0	217	Yes.
Duluth, South Shore and Atlantic Ry.....	J. S. Harland.....	714	0	0	714	No.
El Paso and Southwestern Ry.....	H. W. Cutshall.....	896	0	0	860	Yes.
Erie R. R.....	E. P. Griffith.....	2,429	101	104	2,224	Yes.
Georgia R. R.....	W. S. Brand.....	307	0	0	307	Yes.
Grand Trunk Ry.....	W. W. Ashald.....	4,745	310	0	4,435	Yes.
Great Northern Ry.....	E. J. Little.....	7,100	1,835	35	5,230	Yes.
Gulf and Ship Island R. R.....	W. L. Oakley.....	306	0	0	306	Yes.
Gulf, Colorado and Santa Fe Ry.....	W. M. Knowd.....	1,700	200	0	1,500	Yes.
Houston and Texas Central R. R.....	H. L. Bennett.....	1,020	0	0	1,020	No.
Illinois Central R. R. (Northern Lines).....	F. T. Wilbur.....	3,000	775	375	1,850	Yes.
Illinois Central R. R. (Southern Lines).....	B. Weeks.....	1,559	759	137	663	Yes.
Intercolonial R. R.....		1,448	0	0	1,448	No.
International and Great Northern R. R.....	C. W. L. Mickley.....	1,106	0	0	1,019	No.
Iowa Central Ry.....	F. E. Martin.....	583	0	0	583	Yes.

Kansas City Southern Ry.....	R. L. Logan.....	900	0	0	900	No.
Lake Shore and Michigan Southern Ry.....	E. C. Keenan.....	1,756	214	181	1,361	Yes.
Lehigh Valley R. R.....	J. F. Caskey.....	1,441	183	135	1,123	Yes.
Long Island R. R.....	L. S. Wells.....	384	0	0	384	No.
Louisville and Nashville R. R.....	C. P. Phelps.....	4,398	211	30	4,157	Yes.
Maine Central R. R.....	E. A. Hall.....	925	0	0	925	No.
Mexican Central Ry. Co.....	G. O. Perkins.....	7,000	0	0	7,000	No.
Michigan Central R. R.....	J. J. Ross.....	1,746	327	271	1,124	Yes.
Minneapolis and St. Louis Ry.....	C. P. Stembel.....	1,028	0	0	1,028	No.
Minn., St. Paul and Sault Ste. Marie Ry.....	H. A. Tuttle.....	2,451	0	0	2,451	No.
Missouri, Kansas and Texas Ry. System.....	W. H. Hall.....	3,072	0	0	3,072	Yes.
Missouri, Pacific Ry. System.....	E. A. Chenery.....	7,136	92	0	7,044	Yes.
Mobile and Ohio R. R.....	J. B. Murphy.....	1,246	0	0	1,246	No.
Nashville, Chattanooga and St. Louis Ry.....		1,230	0	0	1,230	No.
New York Central and Hudson River R. R.....	A. B. Taylor.....	3,394	0	300	3,094	Yes.
New York, Chicago and St. Louis R. R.....	G. C. Todd.....	523	92	40	132	Yes.
New York, New Haven and Hartford R. R.....	N. E. Smith.....	2,044	100	0	1,944	Yes.
Norfolk and Southern Ry. Co.....	M. W. Maguire.....	581	46	0	535	Yes.
Norfolk and Western Ry.....	W. C. Walstrum.....	1,951	174	290	1,225	Yes.
Northern Pacific Ry.....	O. C. Greene.....	5,707	1,320	203	5,184	Yes.
Oregon Railroad and Navigation Co.....	E. A. Klippel.....	1,979	10	0	1,943	No.
Oregon Short Line R. R.....	B. F. Frobes.....	1,800	48	0	1,752	No.
Pennsylvania Lines West of Pittsburgh.....	G. A. Cellar.....	4,915	51	75	4,789	
Pennsylvania R. R.....	J. C. Johnson.....	5,362	1,172	0	3,713	Yes.
Pere Marquette R. R.....	W. K. Tasker.....	2,356	0	0	2,356	No.
Philadelphia and Reading Ry.....	C. M. Lewis.....	3,471	0	0	1,497	No.
Pittsburg and Lake Erie R. R.....	L. A. Lee.....	191	0	0	191	Yes.
Pittsburg, Shawmut and Northern R. R.....	C. L. Lathrop.....	240	30	0	210	Yes.
Queen and Crescent Route.....	W. S. Melton.....	630	0	0	630	No.
Richmond, Fredericksburg and Potomac.....	T. R. Gooch.....	120	0	112	8	Yes.
San Pedro, Los Angeles and Salt Lake R. R.....	R. I. T. Dyer.....	1,030	0	0	1,030	Yes.
Seaboard Air Line Ry.....	W. F. Williams.....	3,000	426	0	2,574	Yes.
St. Louis and San Francisco R. R.....	H. D. Teed.....	6,000	725	37	5,238	Yes.
Sunset Lines in Texas and Louisiana.....	Percy Hewett.....	2,364	0	0	2,364	Yes.
Southern Railway.....	W. H. Potter.....	7,068	125	0	6,943	Yes.
Southern Indiana Ry.....	F. H. Van Etten.....	385	0	0	385	No.
Southern Pacific R. R.....	F. S. Rawlins.....	5,446	262	0	4,911	Yes.
Terminal Railroad Association of St. Louis.....	F. E. Bentley.....	37	15	10	12	Yes.
Texas and Pacific Ry.....	Frank Tremble.....	1,885	0	0	1,885	No.
Union Pacific R. R.....	J. B. Sheldon.....	3,310	459	133	2,718	Yes.
Virginian Ry.....	George Reith.....	442	442	0	442	Yes.
Wabash R. R.....	G. C. Kinsman.....	2,515	0	0	2,141	Yes.
Wabash, Pittsburg Terminal R. R.....	C. O. Dambach.....	84	76	5	3	Yes.
Totals, June 1, 1910.....		217,782	20,046	4,785	189,939	Yes, 58, No. 26
Totals June 1, 1909.....		213,552	6,681	4,951	200,049	Yes 50, No 30

Mr. C. H. Gaunt, superintendent of telegraph and assistant general manager of the Atchison, Topeka and Santa Fe Railway Company, Topeka, reports that his company is preparing to double the mileage this year of telephone despatching circuits in use on their system.

Mr. Charles Selden, superintendent of telegraph of the Baltimore and Ohio Railroad Company, Baltimore, has had no experience with telephone despatching, but states that his company is contemplating the installation of a trial circuit of 104 miles.

Mr. F. W. Smith, chief train dispatcher of the Bessemer and Lake Erie Railroad, Greenville, Pa., says that his company is making an installation of 75 miles and that the question of extending the use of the telephone upon their lines will depend upon the satisfaction given by this trial circuit.

Mr. F. G. Sherman, superintendent of telegraph of the Central Railroad of New Jersey, New York, in answer to the question as to which system he regarded as most useful in meeting all around business demands from the standpoint of the railroad,

said that he considered the two systems as about equal, everything being considered, and that his company would try the telephone when conditions made it advisable.

Mr. J. S. Stevens, superintendent of telegraph of the Chesapeake and Ohio Railroad Company, Richmond, Va., regards the telephone as superior to the telegraph in so far as the despatching of trains is concerned.

Mr. V. T. Kissinger, superintendent of telegraph of the Chicago, Burlington and Quincy Railroad, Chicago, states that his company considers the telephone as superior to the telegraph for handling trains and will gradually extend its use.

Mr. A. T. Hollenbeck, superintendent of telegraph of the Chicago Great Western Railway, Chicago, writes: "We have no telephone train despatching system at all as yet. We are figuring on installing such a system covering 245 miles of our line this season. I am personally very favorable to the telephone."

Mr. George Boyce, superintendent of telegraph of the Chicago, St. Paul, Minneapolis and Omaha Railroad, St. Paul, reports that while his company has not yet authorized any telephone despatching circuits, they have about 400 miles of main line on which trains are blocked by telephone, about 65 telephones being used in this service.

Mr. U. J. Fry, superintendent of telegraph of the Chicago, Milwaukee and St. Paul and of the Chicago, Milwaukee and Puget Sound Railway Companies is strongly in favor of the telephone for despatching purposes. He is now engaged in constructing 647 miles of new telephone circuits on the former system and 488 miles on the latter.

Mr. C. S. Rhoads, superintendent of telegraph of the Cleveland, Cincinnati, Chicago and St. Louis Railway Company, Indianapolis, considers the telephone as far superior to the telegraph from the railroad standpoint and says that his company expects to install about 850 miles more of telephone despatching circuits during this year.

Mr. J. L. Henritzky, superintendent of telegraph of the Colorado and Southern Railway, Denver, states that while they use the telephone at present on only 119 miles of track, which is operated jointly with the Santa Fe system, they expect to install it on 400 miles more of road later in the year.

Mr. C. E. McKim, general superintendent of transportation of the Delaware and Hudson Railroad Company, Albany, states that for certain territory he considers the telephone the better from the railroad standpoint, while for other territory the telegraph is superior. His company expects to install the telephone between Wilkes-Barre and Carbondale, Pa., a distance of 35 miles.

Mr. L. B. Foley, superintendent of telegraph of the Delaware, Lackawanna and Western Railroad, New York, is the first superintendent to report his entire system equipped with telephones. It is hardly necessary to say that Mr. Foley considers the telephone preferable to the telegraph for handling trains.

Mr. C. A. Parker, superintendent of telegraph of the Denver, Northwestern and Pacific, Denver, states that the telephone and telegraph are used jointly for despatching purposes on the entire 217 miles of the system with which he is connected. As soon as they get a first-class metallic circuit the telephone will be used exclusively.

Mr. H. W. Cutshall, superintendent of telegraph of the El Paso and Southwestern System, El Paso, Tex., says:

"At the present time no definite plans have been formed, but this company is investigating the merits of different makes of apparatus and as soon as some standard is established will probably equip the entire system. At present, about seven hundred miles of the telegraph line is equipped with composite sets and the trainmen carry portable sets, which they attach, whenever necessary and have found them to be dependable and save much time and delays. So from this

limited experience I do not hesitate to recommend the use of the telephone altogether."

Mr. E. J. Little, superintendent of telegraph of the Great Northern Railway, St. Paul, says that his company contemplates installing telephone train despatching circuits on 2,400 miles of road in addition to those already in service. This will give them approximately 4,300 miles of such circuits in operation by January 1, 1911.

Mr. W. L. Oakley, superintendent of telegraph of the Gulf and Ship Island Railroad, Hattiesburg, Miss., reports that his company contemplates installing the telephone system on their main line, a distance of 160 miles.

Mr. H. L. Bennett, superintendent of telegraph of the Houston and Texas Central Railroad, Houston, Texas, states that his company recognizes the advantages of the telephone, but on account of the expense of the change have not as yet begun its use.

Mr. W. S. Brand, superintendent of the Georgia Railroad, Augusta, Ga., reports that his company is constructing 249 miles of telephone lines which, when completed, will be used exclusively for handling trains.

Mr. F. E. Martin, chief dispatcher of the Iowa Central Railway, Oskaloosa, Iowa, states that while his company has had no experience in the use of the telephone for despatching trains the subject has been under consideration by them for some time.

Mr. E. C. Keenan, superintendent of telegraph of the Lake Shore and Michigan Southern Railway, Toledo, Ohio, says that his company expects to extend the use of the telephone to cover the entire system.

Mr. J. F. Caskey, superintendent of telegraph of the Lehigh Valley Railroad, South Bethlehem, Pa., writes as follows: "In addition to the circuit we now have installed, I have just received authority to equip the entire road in the states of New Jersey and Pennsylvania, a total geographical mileage of 337 miles. These circuits will not be in service before the summer months, and the time when they will be completed will depend entirely upon our ability to obtain material and apparatus. It is the intention of the management to equip the entire road as rapidly as possible."

Mr. L. S. Wells, electrical superintendent of the Long Island Railroad, New York, states that although that company does not at present contemplate the adoption of the telephone the question is being carefully considered.

Mr. C. P. Phelps, superintendent of transportation of the Louisville and Nashville Railroad, Louisville, says that the system with which he is connected is extending the use of the telephone, having three new circuits under construction.

Mr. E. A. Hall, superintendent of telegraph of the Maine Central Railroad Company, Portland, Me., reports that the use of the telephone for train despatching is not being seriously considered by his system.

Mr. G. O. Perkins, superintendent of telegraph of the National Lines of Mexico, states that the tele-

phone despatching system is not feasible for his company to use as their despatchers speak English and their operators Spanish. Their train orders are handled in English, which is easily done by telegraph but could not be done by telephone without English-speaking operators.

Mr. J. J. Ross, superintendent of telegraph of the Michigan Central Railroad, Detroit, reports that there are 425 miles of telephone despatching circuits under construction upon the lines over which he has charge.

Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific, St. Louis, states that for local service he considers that the telephone is without doubt the most useful. The system with which he is connected is now installing a telephone circuit 124 miles in length.

Mr. W. H. Hall, superintendent of telegraph of the Missouri, Kansas and Texas Railway, Denison, Texas, says that while he has had no experience with the telephone, his company expects to install two circuits this year.

Mr. A. B. Taylor, superintendent of telegraph of the New York Central Railroad, New York, states that the trend of opinion on his system is toward the telephone and that its use will be largely extended this year.

Mr. O. C. Greene, superintendent of telegraph of the Northern Pacific Railway, St. Paul, considers the telephone system as the best, although not the simplest. There have been authorized on his system 734 miles of new circuits to be installed in the near future.

Mr. L. A. Lee, superintendent of telegraph of the Pittsburg and Lake Erie Railroad, Pittsburg, reports that it is likely that the question of adopting the telephone on that road will be taken up this year.

Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad, writes that the telegraph is entirely satisfactory, but that his company is in favor of the telephone and will adopt it when they are in better position financially.

Mr. H. D. Teed, superintendent of telegraph of the St. Louis and San Francisco Railroad, St. Louis, writes as follows: "We have two paralleling metallic circuits over 750 miles of our line, and as soon as the selector equipment arrives the entire 1500 miles of circuit will be put in operation, one of the circuits for the train despatchers' use and the other for message service. We have not placed any of these circuits in operation to date as we are doing a great deal of experimental work." Since this letter was written a large part of the equipment mentioned has been placed in service.

Mr. F. H. Van Etten, superintendent of telegraph of the Southern Indiana Railway, Chicago, says that as the lines of that road are now operated the telegraph is most beneficial and most economical and useful in meeting all around business demands. Personally, however, and under different conditions he favors the telephone.

Mr. F. S. Rawlins, superintendent of telegraph of the Southern Pacific Railway System, San Francisco, states that his company is now installing an additional telephone despatching circuit of 291 miles, which will be completed before June 30. He also has authority for equipping 216 miles more, on which work has not commenced. In addition to this he has requests pending for 909 miles more, which he expects will be authorized soon.

Mr. G. C. Kinsman, superintendent of telegraph of the Wabash Railroad, Decatur, Ill., has had no experience with the telephone, but has submitted estimates for four circuits between Chicago and Kansas City, a distance of 552 miles. It is uncertain whether approval will be secured for these, but at any rate, they can hardly be placed in operation before the end of the year.

EXHIBITS AND REPRESENTATIVES AT THE CONVENTION.

John A. Roebling's Sons Company will be represented by Mr. G. W. Swan, of Buffalo, N. Y.

The Sandwich Electric Company of Sandwich, Ill., will be represented by Mr. H. O. Rugh, who will exhibit a full line of Sandwich selectors and other appliances peculiar to the art of railway telephone train despatching.

J. H. Bunnell and Company, Incorporated, of New York, will be represented by Mr. J. J. Ghegan, president. Mr. Ghegan has, for many years, been an associate member of the association and is a familiar figure at the annual conventions.

The General Railway Signal Company of Rochester, N. Y., will have an exhibit of their selector, No. 32,800, and automatic caller, No. 33,000. They will be represented by Mr. G. H. Groce, assistant to the president and the inventor of their selective system, Mr. M. F. Geer, sales engineer and Mr. E. Parsons, special agent.

The exhibit of the Western Electric Company will be in charge of the San Francisco and Los Angeles houses of the company. They will display a full line of telephone apparatus for use in connection with telephone train despatching, including the new selector which they have recently placed on the market.

The United States Electric Company of New York will display a full line of their Gill selectors and will also show the application of their selective system for use in connection with semaphore equipment. Mr. Charles N. Sigison, treasurer of the company, New York, and Mr. M. E. Launbranch, Chicago representative, will have charge of the exhibit.

The following is a list of the places at which the conventions have been held and the officers of the Association since its formation.

Year.	Place.	President.	Vice-President.
1882	Chicago	W. K. Morley	William Kline
1883	Chicago	W. K. Morley	Charles Selden
1884	Philadelphia	Charles Selden	E. C. Bradley
1885	Cleveland	C. W. Hammond	Geo. L. Lang
1886	St. Paul	A. R. Swift	Geo. L. Lang

1887	Boston	George L. Lang	G. C. Kinsman
1888	New York	G. C. Kinsman	C. A. Darlton
1889	Washington	C. A. Darlton	G. T. Williams
1890	Niagara Falls	G. T. Williams	G. M. Dugan
1891	Cincinnati	C. S. Jones	L. H. Korty
1892	Denver	L. H. Korty	U. J. Fry
1893	Milwaukee	U. J. Fry	O. C. Greene
1894	Detroit	O. C. Greene	E. R. Adams
1895	Montreal	M. B. Leonard	J. W. Fortune
1896	Old Ft. Comfort	G. M. Dugan	J. W. Lattig
1897	Niagara Falls	J. W. Lattig	W. W. Ryder
1898	Omaha	W. W. Ryder	L. B. Foley
1899	Wilmington, N.C.	L. B. Foley	W. E. Williams
1900	Detroit	W. E. Williams	C. F. Annett
1901	Buffalo	C. F. Annett	F. P. Valentine
1902	Chicago	J. H. Jacoby	W. J. Holton
1903	New Orleans	C. S. Rhoads	C. P. Adams
1904	Indianapolis	H. C. Hope	E. E. Torrey
1905	Chattanooga	E. E. Torrey	E. A. Chenery
1906	Denver	E. A. Chenery	E. P. Griffith
1907	Atlantic City	E. P. Griffith	W. J. Camp
1908	Montreal	W. J. Camp	J. B. Fisher
1909	Detroit	J. L. Davis	H. T. Dyer
			G. A. Cellar

C. S. Jones was the first secretary and treasurer of the Association. In 1883 Mr. P. W. Drew was elected to this office and has served continuously since that time.

SOMETHING ABOUT LOS ANGELES.

Los Angeles has probably grown more rapidly in the past ten years and is now growing faster than any other city of its size in the United States. Although it was first settled in 1781 one hundred years later it had only about 11,000 inhabitants. The first railroad from the east was completed in 1885 and since then its growth has been remarkable. In 1900 its population was 100,000 and to-day it is over 300,000. The three features to which this remarkable progress may be attributed are climate, soil of the surrounding country and location. While it is situated a short distance from the coast, San Pedro Harbor which is now included in the city is being improved so that it will be one of the best harbors along the Pacific coast. Los Angeles is also reached by four different railroad routes. The visitor will be impressed by the numerous fine residences in Los Angeles and the surrounding suburbs.

Twenty years ago there was not a single paved street in the city. Now there are over 450 miles of graded and graveled streets and 63 miles of paved streets. It was the first city in the United States to entirely abandon gas for street lighting and replace it by electricity. This was done twenty-five years ago and it is now one of the best lighted cities in the Union.

Among the buildings which will attract attention may be mentioned the Auditorium, County Court House, Pacific Electric Railway Terminal and the new Government Building now in course of construction at a cost of \$1,250,000. The Auditorium is a reinforced concrete structure containing an assembly hall which will accommodate 4,000, two large concert halls and a large number of offices. The

Pacific Electric Railway Terminal located at the corner of Sixth and Main Streets is the starting point for electric cars to Long Beach, San Pedro, Pasadena and many of the other suburbs of the city. It is also the largest office building west of Chicago.

The street railway system of the city comprises over three hundred miles of track and the suburban lines radiating in all directions aggregate 767 miles of single track.

There are about a dozen parks within the city limits aggregating over 600 acres. Westlake Park, thirty-five acres in area at the end of the Seventh Street car line is one of the most popular open-air resorts. It has a lake with boats, fine drives, and extensive views from the adjacent hills. The oldest and best improved of the city parks on Sixth Street, not far from the business center is known as Central Park.

The temperature at Los Angeles is probably as nearly uniform as at any place in the world. Weather Bureau observations covering a period of over thirty-one years show that during that time the lowest temperature recorded was twenty-eight degrees and only twenty-three times did the thermometer drop to freezing. On the other hand during this period the number of days on which the temperature rose to one hundred degrees or above was only thirty-four. The monthly average temperature of July is but fifteen degrees above that of January.

At the Chamber of Commerce Building, 122 South Broadway, the visitor can obtain any desired information. The exhibit of natural and manufactured products which occupies the second and third floor of this building is well worth visiting, showing as it does the great variety of vegetable products which can be grown in the semi-tropical climate of Southern California.

Taken altogether it is doubtful whether the Association has ever met in a city which affords more of interest to the visitor than Los Angeles and those who are unable to attend the coming convention will miss a fine opportunity to see the attractions of the metropolis of Southern California.

The twenty-fifth annual convention of the National Electric Light Association, which met in St. Louis May 23 to 27, was the most successful in the history of that organization, over 2,600 being in attendance. The membership of the association during the past year, during which Mr. T. Commerford Martin has been secretary, increased from 3,215 to 5,533. The following officers were chosen for the ensuing year: W. W. Freeman of Brooklyn, president; J. F. Gilchrist, of Chicago, and F. M. Tait, of Dayton, Ohio, vice-presidents; General George H. Harries, of Washington, D. C., treasurer and T. Commerford Martin, of New York, secretary.

The Railroad.

The annual convention of the Train Dispatcher's Association of America will be held at Spokane, Wash., June 21.

A meeting of the Railway Signal Association was held in New York June 14. A paper was presented by J. M. Waldron on "Speed Controlled Signals," and a description of the World signal was given by J. H. Wisner, Jr. The sub-committee on standards presented several designs for consideration and proposed standard specifications for various signaling materials and appliances were discussed.

Mr. C. McCormack, whose appointment as superintendent of telegraph of the Chicago and Eastern Illinois Railroad was briefly mentioned in our June 1 issue, was born at Perrysville, Ind., August 10, 1867, and entered the telegraph service in 1883 as operator for the Chicago and Eastern Illinois at Otter Creek Junction, Ind. With the exception of one year spent with the Evansville and Terre Haute Railroad, Mr. McCormack has been employed by the Chicago and Eastern Illinois during his entire telegraphic career. From 1886 to 1896 he served as train despatcher and since the latter date has been assistant chief despatcher, night chief despatcher and chief despatcher, which position he held at the time of his recent advancement.

The railroad telegraph profession has lost a valuable member in the retirement from the service of Mr. Nelson C. Griswold, from the position of manager of the Northern Pacific Railway's telegraph office at Tacoma to engage in the lumber business, as was briefly announced in our June 1 issue. Mr. Griswold was born at Springfield, Mass., October 30, 1850, and has been actively engaged in the telegraph service since 1864, when he entered the ranks as an operator at Cleveland, Ohio. He was afterward employed at Chicago, Cincinnati, Erie, Pa., Buffalo, New Orleans and Pittsburg, as manager for the Western Union Telegraph Company at Portsmouth, Ohio, and as assistant superintendent of telegraph of the Baltimore and Ohio Railroad at Pittsburg.

Apparatus necessary to equip about 4,600 miles of its line with telephones for despatching trains has been ordered by the Atchison, Topeka and Santa Fe Railroad. The outside construction work is already well under way. Eventually all traffic and train movements on the Santa Fe will be directed by telephone. At the present time 2,275 miles of their system are equipped with telephones. The Santa Fe was one of the very first to supplant the telegraph for this kind of work, and the accuracy of its operation has strengthened the belief of the officials of this road in the value of the telephone despatching system. Telephone circuits will soon be installed from Newton, Kan., west to Mojave, Los Angeles and San Diego, Cal.; from Newton south to Gainesville, Tex.; from Temple, Tex., to Galveston, Tex.; from Temple to Brownwood, Tex., and from Wichita, Kan., to Clovis, N. M.

Mr. W. E. Harkness, sales engineer of the Western Electric Company, New York, has resigned to accept a similar position with the United States Electric Company.

At the annual convention of the Order of Railroad Telegraphers, Despatchers, Agents and Signalmen, held in Baltimore May 16 and 17, the following officers were elected: President, J. R. T. Auston, Philadelphia; secretary and treasurer, Adam Reed, Philadelphia; vice-presidents, G. Q. Eppelimer, Philadelphia; H. T. Biddle, Elkton, Md.; R. I. Hunter, Jersey City; J. Webb Richman, Washington, and J. E. Stebbins, Williamsport, Pa.

Mr. T. W. Evans, who has recently been transferred from the superintendency of the Rochester division of the New York Central Railroad to a similar position on the Buffalo division began his telegraphic career in 1881 as a telegrapher on the Fall Brook Railroad. He was afterward employed as operator, train despatcher and chief train despatcher on the New York Central Lines until 1901 when he was appointed trainmaster.

Canadian Notes.

The Dominion Parliament has appropriated \$278,000 for renewals, improvements and extensions of the Government telegraph system during the current year.

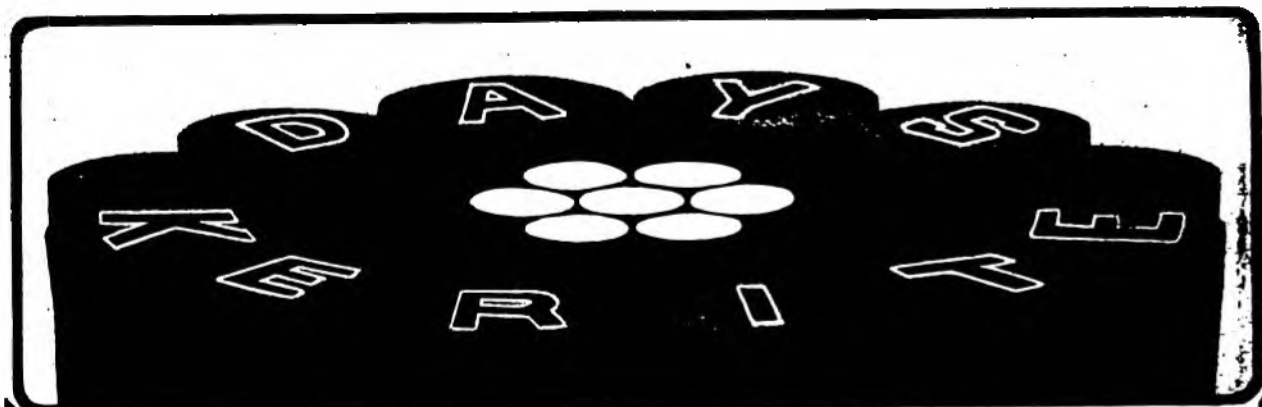
Wm. Jenkins, father of B. S. Jenkins, general superintendent of western lines of the Canadian Pacific Railway's telegraph at Winnipeg, died at Madoc, Ont., May 14, aged ninety-one years.

Mr. R. H. Hathaway, chief clerk in the press and commercial news department of the Great North Western Telegraph Company, Toronto, has been promoted to the position of superintendent, vice M. R. F. Easson, retired, as announced in our June 1 issue.

The Grand Trunk Pacific Railway now has 1,118 miles of pole lines and 3,871 miles of telegraph wires in operation. During the present year 600 miles of new lines will be constructed. Four wires are in operation between Winnipeg and Edmonton.

Annual Reunion of Old Time and Military Telegraphers.

The Auditorium Hotel, Chicago, will be the headquarters of the twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association, and of the Society of the United States Military Telegraph Corps, which will be held in that city September 8, 9 and 10. President William J. Lloyd, of the Old Time Telegraphers' and Historical Association, Chicago, is busily engaged in making arrangements for the reception and entertainment of the visiting members of these two organizations and a most enjoyable time is assured for all of those who attend. The convention headquarters is centrally located and faces the lake. First-class accommodations at reasonable rates can be secured by all visitors and taken altogether, a more desirable place for holding the reunion could not be found.



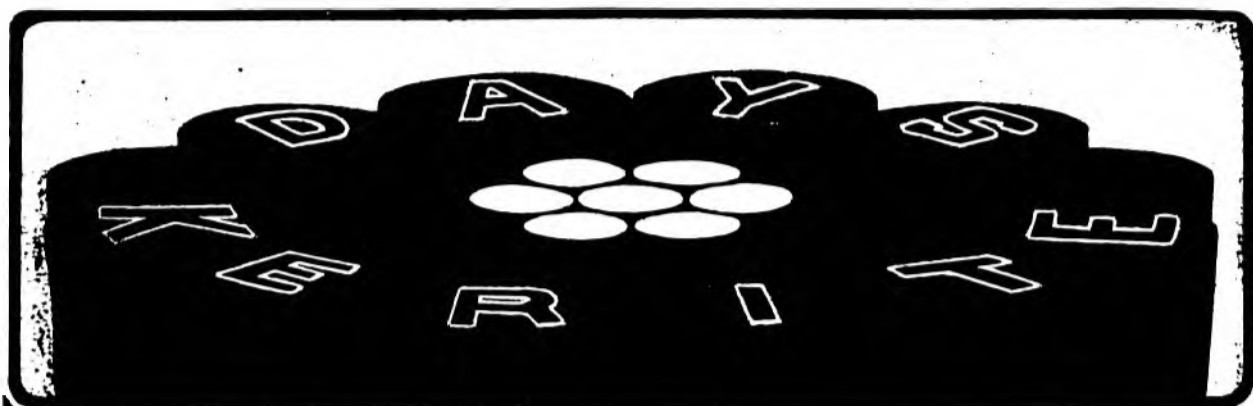
KERITE Insulation has proved its
Everlasting durability under all conditions.
Records of all its performances
Instantly convince the expert
That it is the insulation for
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Radio-Telegraphy.

It is reported that a wireless station will be established soon on the top of Pike's Peak, to be used as a relaying station for messages from the Atlantic to the Pacific Coast.

The Great Lakes Radio Telephone Company is installing a wireless station at Houghton, Mich. They have stations already working at Duluth, the Soo and Escanaba.

A patent, No. 958,181, for a receiver for wireless telegraphy, has been issued to W. Schloemilch, of Berlin, Germany. A detector is combined with a thread galvanometer acting as an indicator.

A patent, No. 958,209, for a portable station for wireless telegraphy, has been awarded to G. Von Arco, of Berlin, Germany. A metal mast made of sections with an umbrella-shaped aerial.

At the regular monthly meeting of the "Wireless Institute of New York, held June 1, Mr. Frederick W. Midgley presented a paper on "The Obtaining and Influence of a Good Ground in Wireless Telegraphy."

At the annual meeting of the Marconi Wireless Telegraph Company of Canada, held in Montreal May 20, the following officers were elected: Andrew A. Allan, president; G. Marconi, vice-president; and Robert Bickerdike, J. N. Greenshields, H. Jamieson Davis and John Bottomley, directors.

A patent, No. 959,510, for receiving apparatus for wireless telegraphy, has been granted to R. R. Goldthorp, of Hartford, Conn. This comprises a hollow tubular coil, a condenser located within the coil and a condenser regulator on the coil, together with a detector within the coil.

Mr. Raymond Phillips, an English inventor, has exhibited recently at the London Hippodrome a model of a dirigible balloon controlled by wireless. The balloon was provided with four propellers, two on the vertical and two on the horizontal axis. Each propeller was operated by a separate motor and any motor desired could be started by sending out electric waves for a certain length of time.

In a recent lecture on Wireless Telegraphy and Wireless Telephony before the Schenectady section of the American Institute of Electrical Engineers, Dr. A. E. Kennelly pointed out defects and errors in early experiments, and improvements and corrections that have been made. In simple terms he explained the action at the receiving station of a wireless telegraph system, comparing it to a single commutator bar in a generator in which the moving field is a succession of magnetic flux lines produced by the progression of ether waves. Dr. Kennelly expressed the belief that it will be possible in the near future to arrange apparatus so that interference by crossing messages may be satisfactorily prevented.

A patent, No. 959,100, for an aerial conductor arrangement for wireless telegraphy, has been granted to G. Von Arco, of Berlin, Germany. A central conducting support insulated from the ground, such as a tower and an umbrella-shaped group of wires running toward the ground, connected at one end of the support and the other to ground.

The aerial of the high-power wireless station recently established by the Austrian Government at Pola is supported by a mast over 300 feet in height. The range of this station extends to Rome, Paris, Berlin, Nauen and Norddeich, 720 miles distant. Messages are occasionally received from the Poldhu, England, station which is 900 miles distant.

The Chilean Government, after a careful study of the relative cost of the two systems of telegraphy between Santiago and Punta Arenas, has decided that the wireless is the most practical, as it will cost less for up-keep, as most of the route is through a wild and rough country. At present the only telegraph line between the two points is via Buenos Ayres. The Chilean Congress has been asked for an appropriation of \$243,000 to install the wireless system.

Under the provisions of the International Radio-Telegraphic Convention of Berlin, all French wireless telegraph stations are now open to receive home and international communications for or from ships at sea. The following stations in France are open day and night: Boulogne, Ushant, Porquerolles, St. Marie de la Mer (Marseilles), Fort de l'Eau (Algiers), Ajaccio (Corsica), Brest, Cherbourg, Dunkirk, Lorient and Rochefort. Boulogne is equipped with the Bellini-Tosi system for determining the position of ships at sea. The rates for messages transmitted to ships at sea have been fixed at forty cents a word, except in the Mediterranean stations, whence messages for vessels plying regularly between France, Corsica, Algeria and Tunis are accepted at fifteen cents a word, and from vessels at sea to these stations at ten cents a word.

In a recent paper in a German publication, Count Arco described several new devices used in the Telefunken system of wireless telegraphy. Among these is a mechanical apparatus for demonstrating sounds, and a device for demonstrating at the same time acoustically the sound and optically the regularity of the spark discharge. A sending station of eight kilowatts primary power was described; the power at the antenna being 5.8 kilowatts, the efficiency was 72.5 per cent. Duplex wireless telegraphy is possible with two transmitters of equal wave-length, the pitches differing by twenty per cent. At the receiving end a single detector receives simultaneously the two messages, the currents received pass through the two series-connected primaries of two resonators tuned to the sounds with the two pitches. One resonator increases the sound of the one transmitter and the other the sound of the other transmitter.

Trade Notes.

The Electric Storage Battery Company of Philadelphia has recently issued two new bulletins entitled "Attitude of Central Stations toward Electric Automobiles" and "The Exide Battery in Emergency Service." A little booklet which they are also circulating, entitled "The Story of the Storage Battery," gives some valuable information and interesting facts concerning the manufacture and use of storage batteries.

The General Railway Signal Company of Rochester, N. Y., has prepared a new bulletin, No. 119, which will be distributed at the Los Angeles Convention of the railway telegraph superintendents. This bulletin contains illustrations of and describes the telephone despatching system developed by this company. This system can be arranged for calling from the despatcher's office only, or for calling between stations, in either of which cases the instruments are bridged on the line, and calls are made without the use of local battery. Alternating or direct current ringers may be used in either case.

Elsewhere in this issue will be found the announcement of the American Telegraph Typewriter Company, which is now placing on the market a telegraphic typewriter which serves both as a sender and receiver. Tests have been made on this device extending over a period of two years past. For eleven months some of the instruments have been in successful use on the Long Island Railroad. Mr. L. S. Wells, superintendent of telegraph of that system makes the following statement in regard to the new system of telegraphic transmission.

"We have had in continuous use during the past eleven months on a circuit between Long Island City and the Brooklyn terminals, two telegraph typewriters manufactured by the American Telegraph Typewriter Company.

"These typewriters are connected on a telephone circuit and the operation is being carried on simultaneously with telephonic conversation, without in any way interfering with the latter. The system, which is economical, flexible and rapid, having no complicated mechanism, will prove a most valuable substitute for present methods and its use will undoubtedly be many times greater than that of the "Morse." We are anxiously awaiting delivery of a quantity of the typewriters ordered some weeks ago."

This typewriter is in daily operation between Philadelphia and New York and orders have already been received for instruments from the Government and from several railroad and terminal companies.

Laying Submarine Cables in San Francisco Bay.

All wires of the Postal Telegraph-Cable Company out of San Francisco, says the Postal Telegraph, are carried through four and a half miles of submarine cables in San Francisco Bay 8,000 feet of which is between San Francisco and Yerba Buena Island commonly known as Goat Island,

on which is located the Government Naval Training Station and 16,000 feet between Yerba Buena Island and West Oakland. A mile of pole line fills the gap across the island.

Recently, new ten pair (twenty wire) cables have been laid between those points. This cable is dry paper core, covered with lead sheathing over which is laid an armor of twenty-four strands of No. 4 gauge galvanized iron wire, separated from the lead by a heavy jute cushion. Over the armor wire is spun two layers of marine, which is soaked with tar; this outer covering is put on to prevent chemical action on the armor wire. The cable is two and a half inches in diameter and weighs nearly ten pounds per foot.

It was shipped in approximately 4,000-foot lengths, making one intermediate splice necessary in the 8,000-foot section and three in the 16,000-foot section. The work was handled in this manner: First, the large cable reel, which is eleven feet in diameter over all with a six foot four-inch drum, eight feet six inches long, was loaded on a barge, together with a donkey engine to operate it. The first 4,000-foot section was then reeled on and a splice made, after which the next section was reeled up, and so on.

The reel could hold but 12,000 feet, making it necessary to lay that amount from the Island to a point in the Bay towards Oakland, where it was buoyed, when the barge was towed back for the remaining section. After this had been laid, the last splice was made on the barge.

Two tugs were employed to tow the barge, one piloting and the other alongside. Owing to the swift current in the Bay, when the tide is flooding or ebbing, the trip across must be made at the turn of the tide, usually at high water, and as quickly as possible, so that a straight course may be maintained.

The work was handled without any trouble and the men who had it in charge are entitled to great credit.

Among the recent gifts to the library of the American Institute of Electrical Engineers was one by Thomas A. Edison, of manuscript of the daily journal of Professor Samuel F. B. Morse, containing the correspondence of Mr. Morse and the secretary of the treasury and others, relating to the installation of his original telegraph line. It also includes a description of his meeting with Mr. Bain, the inventor of the Bain alphabet.

A recent number of Leslie's Weekly contains an interesting article by Mr. Marion H. Kerner, in which he gives some of his experiences while employed as a military telegrapher during the Civil War. Among the stories which he relates is the one of his capture by the Confederates and how his life was saved by Nancy Hart, a Confederate spy, who was also the cause of his capture and confinement in Libby Prison.

QUESTIONS TO BE ANSWERED.

[The lists of questions which we published under this heading in previous issues, the answers to which may be found in the first four chapters of Jones' Diagrams, were much appreciated. Students in telegraphy have found them of great assistance in helping master the contents of this standard text book of telegraph engineering. We will continue to print similar lists of questions, taking up each chapter in turn. If students will carefully study the subject matter to which each set of questions applies until he is able to answer all of them without referring to the book, he will, by the time he has gone through the book in this way have gained a thorough knowledge of all the principles underlying telegraphic operation.]

CHAPTER V.

For what two reasons should we not always equalize the current in circuits by regulating the electromotive force?

What danger would arise if we should attempt to do this?

What is the rule for the amount of heat produced in a conductor by a current flowing therein?

What would happen if a long high resistance circuit supplied by a high electromotive force should become grounded near the source of supply?

Why are high resistance relays used in connection with weak currents?

Upon what does the magnetic strength of a relay depend?

Does a variation in the size of the conductor at different points in a circuit cause a variation in the strength of the current at those points?

What is the chief advantage of using fine wire for the winding of a relay?

Why could not the same magnetic effect be obtained in a relay by using an equal number of turns of coarser wire as we do of the fine wire?

What is the practical limit for the thickness of the winding of a magnet?

What is the reason for this limit?

CHAPTER VI.

What is a switchboard?

Why does the construction of a switchboard intended for a terminal station differ from that of one intended for an intermediate station?

Describe and draw a sketch of the simplest form of intermediate switchboard?

Sketch the switchboard arrangement necessary for two wires in order to make the instruments at the intermediate station interchangeable for either circuit desired?

How would you locate an "open" in your office west with this arrangement; (a) with the instruments cut out of the line and (b) with the instruments cut in?

What is the purpose of the ground wire at the top of the switchboard?

How would you locate an "open" in a circuit by means of this ground?

How would you locate an "open" in your office by this means?

How can you determine very quickly whether the "open" is in your office?

What is the object of a lightning arrester?

What principle governs the action of a lightning arrester?

How are the plates of a lightning arrester usually made to facilitate its action?

Why does not the lightning arrester interfere with the normal operating current?

Obituary.

Elbridge G. Fish, a member of the United States Military Telegraph Corps, died at his home in Kansas City, Mo., May 9.

Patrick J. Burke, an old time telegrapher and a pioneer in electric railway construction, died at Cheshire, Conn., June 1, aged sixty-four years.

Walter T. Mulholland, a telegrapher who was employed for many years in brokerage offices in New York, died May 21, of cancer, aged fifty years.

Frank E. Reid, manager of the Pittsburg Stock Exchange branch office of the Western Union Telegraph Company, died in that city May 24, aged fifty-five years.

Joseph R. Powers, an Associated Press operator employed on the Evening Eagle, of Pittsfield, Mass., died of blood poisoning in that city, May 30, aged thirty-two years.

Albert F. Kelly, whose death occurred May 27, as briefly announced in our June 1 issue, entered the service at Syracuse, his birthplace, as a clerk in the office of Superintendent S. B. Gifford, of the Western Union Telegraph Company. He was soon appointed chief clerk and held that position until the superintendency in that city was abolished seven years ago. He then came to New York, where he entered the office of District Superintendent E. M. Mulford as a clerk, and later chief clerk. Two months ago the company decided to divide the Syracuse district and restore the superintendency at that point. Mr. Kelley was chosen for the office and went to Syracuse to make arrangements for assuming charge May 1. A few days after returning to New York, however, he was taken ill with what is thought to have been cerebro-spinal meningitis, which caused his death.

Book Review.

"Telephone and Telegraph Engineers Handbook" (Technical Supply Company), Scranton, Pa.; 398 pages; illustrated) is a handy reference book, three and a half by five inches in size. The aim in preparing this work was to present to the public a pocket-size book containing the rules, formulas, tables and circuits that are most generally used and needed by linemen, wiremen, troubleshooters, operators, foremen of construction, manufacturers of and dealers in telephone and telegraph apparatus and supplies, wire chiefs, managers and superintendents of telephone and telegraph companies. A large number of useful tables are

given and the formulas shown are, wherever possible, illustrated by practical examples. Considerable space is devoted to electricity, magnetism and storage batteries. The section on electrical measurements, comprising over seventy pages, is especially complete, giving much practical information on the subject of testing both telegraph and telephone lines. Circuit diagrams of the more common telephone connections are given, including magneto, common battery, intercommunicating and automatic systems. Another section of the book describes and illustrates the general principles of telegraphy, wireless telegraphy and telephony, simplex and composite telegraph and telephone circuits and duplex and multiplex telephony.

The price of this work is \$1.50, and a copy will be sent to any address upon receipt of that amount by J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

Legal.

The Court of Appeals of New York State has reversed the judgment of the lower courts granting Stephen M. Weld and others \$10,000 damages against the Postal Telegraph-Cable Company, due to a mistake in a telegram. A new trial has been ordered. Weld and his partners are New York cotton brokers, and members of the New York and New Orleans Cotton Exchanges. They sent a telegram to New Orleans brokers to sell 20,000 bales of cotton at 12.70 cents a pound. When received the telegram read 12.07 cents. Damages aggregating \$27,565 were claimed because of the mistake.

Telepathy, mind reading or mental acquiescence across intervening space cannot affect a contract according to the Supreme Court of Indiana.

To be binding on two parties, in the opinion of that court, a mental process working through the brain of the party of the first part must be communicated to the party who is to be affected.

In addition, acquiescence in a contract to make it binding, must be communicated by the agreeing party to the person making the offer.

Michael Shea, of Indianapolis, sought to collect from the Big Four Railway for materials furnished and work done for the Ohio Contracting Company. Shea failed to get his money from the contractors and threatened to sue the road, but an engineer in the railroad's employ is said to have told him that the railroad company would pay him for his work.

The Supreme Court declares that the contract was imagined by Shea and his mental processes were not transferred to the intelligence of the corporation. Further, the court says that the engineer had no power to create any new contract for his company if the telepathic agreement suggested by Shea actually had been entered into. The effect of the decision is that a person cannot make good imaginary contracts in Indiana.

Postal Telegraph Club of Atlanta.

The Dutch lunch given by the Postal Telegraph Club of Atlanta, Ga., at the Merchants' and Manufacturers' Club rooms on the seventeenth floor of the Candler Building, in that city on the evening of May 28, was a success in every respect, nearly the entire membership being present.

Short speeches and anecdotes of the profession were given by each member, and a general good-fellowship prevailed.

The club is prospering and expects to give another dinner in the near future, to which the ladies will be invited.

The club sometime ago decided to take up a course in electricity and accounting, as those subjects apply to the telegraph business. At the Dutch supper this question was discussed, and text books were decided upon, Mr. J. P. Edwards, electrical engineer, and A. D. Holcomb, chief operator of the Atlanta office, were chosen as instructors of the electrical course. Mr. W. C. Daviet of the general offices and Mr. G. W. Oliver, cashier of the local office at Atlanta were elected instructors in the accounting course. Arrangements were made to hold classes once a week in each course.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

A. J. Reader has returned from his wedding trip.

J. Harold Morecroft, professor of electrical engineering at Columbia University, lectured to the Electrical Society June 3, on "Electro-magnetism."

A number of night and summer offices are being opened in Superintendent Mulford's district and operators for these offices are being furnished from this department.

The decorators have finished painting the operating room. Tungsten and arc lights have been installed, the tables have been cleaned and revarnished, the walls have been kalsomined, a vacuum cleaner has been installed for keeping the room clean, the brass work on the switchboards has been burnished and everything possible done to brighten up the appearance of the room. The employees of the department greatly appreciate the improvements in their working quarters.

David W. McAneeny, assistant eastern wire chief in this office, died May 28, aged sixty-three years. Mr. McAneeny was one of the veteran operators of this office and was well known as a fine tenor singer. He had the honor of being the first person to sing through a telephone. Mr. McAneeny was born at Toronto, Ont., and entered the service at Utica, N. Y. He has been continuously employed in the New York main office since 1865. The funeral and interment were at Utica, where a high mass of requiem was celebrated. The floral tributes from his associates were numerous and beautiful.

Boston Electric Club.

The second banquet of The Electric Club of Boston took place in the Western Union Building in that city, May 26. Seventy-five members were present and after a talk on several different topics connected with telegraphic apparatus by Professor Burnham, Superintendent C. F. Ames and Manager A. Woodle, of the Boston office made short speeches which were very timely and much appreciated. A vote of thanks was given Messrs. Burnham, Ames and Woodle for the assistance given the club both in lectures and facilities. Following this the caterers took charge and until 11 p. m. the members enjoyed a lobster supper with all the accessories.

Supplementary meetings of such members as may be at liberty to attend will be held occasionally on Sunday mornings in the main operating room under the guidance of a chief, to study and become acquainted with the practical working and care of quadruplexes, duplexes, repeaters and kindred apparatus.

General Mention.

The National convention of the Commercial Telegrapher's Union began its deliberations in Chicago June 13.

The Goddard Telegraph Transmitter Company has been incorporated at Dover, Del., with a capital stock of \$500,000, to manufacture and sell a telegraph transmitter. The main office of the company will be in New York.

The Publishers' Press, a news-gathering and disseminating agency, has been chartered in New Jersey, with an authorized capital of \$500,000. The incorporators are C. N. Jones and Frank C. Coleman, Jr., of New York; W. F. Downs and John R. Turner, of Jersey City, and E. L. Heydicker, of Mount Vernon, N. Y.

The report of Mr. James E. Cole, commissioner of wires of the city of Boston, for the year ending January 1, 1910, has just been issued and shows that about fifty per cent. more underground construction work was done in 1909 than in 1908. During the past year the New England Telephone and Telegraph Company installed 111,015 feet of underground cable. During the past fifteen years over 59,000,000 feet of wire or about 11,000 miles have been removed from overhead service.

The second census bureau report covering central electric light and power stations is now on the press. Mr. T. Commerford Martin, secretary of the National Electric Light Association, New York, is the author of a chapter in the report dealing with the technical side of the industry. This report, which covers the year 1907, shows that the telephone companies of the country, at that time, had a capitalization of \$814,616,004. This figure does not include over 17,000 independent farmer's telephone lines. The capitalization of the telegraph companies was \$253,019,817, including \$32,726,242, which represented the capital stock of wireless telegraph companies.

The annual convention of the Canadian Electrical Association will be held this year at the Royal Muskoka Hotel, Muskoka Lakes, Ont., on July 6, 7 and 8. Mr. T. S. Young, Toronto, is secretary of the association.

Mr. Ralph W. Pope, for the past quarter of a century secretary of the American Institute of Electrical Engineers, was previous to that time in the telegraph service. In 1873 he was an operator identified with the Western Union Telegraph Company. He was engaged by the "Telegraphice" to report a game of baseball played between two contending telegraph clubs, but before the manuscript reached the publication office that paper had suspended. Mr. Pope sends us his report which he wrote at that time and thinks it is not yet too late to appear in print, although many of the participants have long since died. On examining the copy we find that among those who took part in this memorable game, which was played June 7, 1873, in Brooklyn, which was then a country town, were: George L. Wiley, now eastern representative of the Standard Underground Cable Company in New York and P. H. Shaughnessy, now of the quadruplex department of the Western Union Telegraph Company, at 195 Broadway, New York. All of the others mentioned are now dead.

WANTED—Financial assistance to extend the business of manufacturing a well known telegraph device which has a good field of usefulness. Address, Financial Assistance, care of Telegraph and Telephone Age, 253 Broadway, New York.

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Telegraph and Telephone Age

No. 13.

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Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons in Electrical Measurements.

PART V.

In the formulas previously given for determining the value of current, resistance, and electromotive force by means of Ohm's law, $\frac{E}{R} = C$ the student should understand that under some conditions the results obtained merely show the apparent value of the factor measured. The answer however, will be correct in the way of representing the effective value under the conditions existing in the circuit in which the measurement is made. In some circuits the value obtained, say, for R , will represent the true ohmic resistance of the conductor itself, while the same wire placed in another circuit subjected to different electrical influences will give a somewhat different value. Ohm's law is correct in both cases, but the apparent discrepancy calls attention to the importance of first understanding the electrical and other conditions existing in a circuit before accepting the results obtained as final. In other words, while the value obtained for R will represent the resistance of the circuit under any and all conditions, it does not always represent the actual ohmic resistance of the material conductor itself. The interaction of currents flowing through the coils of magnets in a working circuit retards, diminishes or impedes the development of initial values, so

that R in Ohm's formula really represents not only the ohmic resistance of the conductor, but also the apparent resistance called impedance. In some circuits the impedance is greater than the ohmic resistance of the wire itself.

In order to understand this statement the student should study the electric properties of a working circuit, which consists of inductance, capacity and ohmic resistance, each of which creates an individual effect of its own.

In one circuit each of these factors may exert a detrimental influence, while in another the introduction or enlargement of one factor often gives beneficial results. The usual method of dealing with them is to cause one factor to offset the effect of another by exerting equal values of forces in opposite directions. The manner in which this is done will be apparent after the student understands the actions of inductance and capacity respectively, in an electric circuit.

INDUCTANCE

Every conductor carrying an electric current is surrounded by a whirlpool of magnetic lines of force. The space they occupy is called the magnetic field. In a straight line conductor the air immediately surrounding the wire constitutes the field. Now, we know that whenever the lines of force in one field are cut across by another similar group an electromotive force will be developed. Hence, if two separate circuits, each carrying a current are extended in parallel close enough together to permit the intermingling of the two magnetic forces in one field, an additional electromagnetic force will be developed in each wire, the polarity of which will not only be opposite to the original, but the potential developed in each circuit will oppose the impressed electromotive force of the dynamo which creates the current in the conductors.

This phenomena is called electro-magnetic induction. When it is caused by two or more currents in separate parallel conductors, it is called mutual induction in contradistinction to self-induction, which refers more properly to induction created by one and the same current reacting on itself in one field, as it flows through the many convolutions of wire side by side in the coils of a relay or other magnet.

In a straight conductor the magnetic field, owing to the absence of iron as a medium for the circulation of the lines of force, is not only very weak, but there is no clashing of forces, hence, such circuits are called noninductive. A noninductive circuit, therefore, is very fast, because the current is not retarded in building up to maximum value when a signal is made.

When a coil of wire is inserted in the circuit, however, each set of magnetic lines of force cre-

ated by the current flowing in the various convolutions of the winding cuts across the field of every other convolution in the coil and, therefore, creates a back pressure, or counter-electromotive force in the conductor. The effective value of the electromotive force at a given instant is, therefore, only equal to the initial voltage of the dynamo minus the back pressure, hence the value of the current flowing is diminished.

Now, as it is evident that the dynamo is still impressing its full value of electromotive force in the circuit, and the resistance of the conductor itself has not altered, the counter electromotive force developed in the coils must be considered as so much ohmic resistance having been added to the circuit, in order to account for the diminished volume of current flowing. Hence this back pressure is merely apparent resistance, or impedance.

When the coils surround an iron core, as they do in the case of a relay, the counter effect is greatly increased, because that metal being the natural conductor of magnetic lines of force, the number of such lines is correspondingly increased. This fact is nicely demonstrated in the regulation of a medical battery device. When the length of the iron core is lessened by pulling the moveable core out the "shock," which is due to counter-electromotive force, is diminished correspondingly for the reason that air is not so good a conductor as iron.

For fast transmission, therefore, inductance is harmful, but, as previously stated, under some conditions it is beneficial and purposely inserted in a circuit. Without it simultaneous telegraphy and telephony would be almost impossible. The explanation illustrates another peculiar property of an electric circuit through the action of inductance.

Every circuit in which an electric current flows acts as though it possessed magnetic inertia. It seems to resist every change in the volume of current flowing, and is particularly opposed to sudden changes. Self-induction in the coils of a magnet, therefore, tends to oppose every rise or fall in the strength of the current in the circuit in which such coil or coils are placed. The consequence is that the final value of the current is not reached at the instant the maximum electromotive force is impressed on the circuit, but lags a little behind. Obviously it must also be a little late in disappearing when the next signal is made.

The degree in which the current falls behind the electromotive force varies with the conditions of the circuit, and is expressed in terms of having a certain angle of lag.

In simultaneous telegraphy and telephony sudden rises and falls in the value of the current in a Morse circuit create a noise in the telephone which is readily heard, but by smoothing out the changes by means of inductance coils inserted in the Morse wire, the noise is practically eliminated.

Another property of an electric circuit is that of capacity, or ability, to absorb current, so to

speak. Now, the action of capacity is just opposite to that of inductance, inasmuch as the current leads the impressed electromotive force instead of lagging behind. The student should readily see, therefore, that by means of a proper combination of inductance coils and capacity in one circuit, one may be caused to neutralize the effect of the other, and an otherwise slow wire be rendered fast. Indeed it is somewhat on this principle that Dr. Pupin solved the great problem of rendering ocean cables much less inductive.

A condenser is an excellent capacity device, and being adjustable, is an ideal and convenient apparatus for all demands of this kind, and its angle of lead and other characteristics described explains its presence in all kinds of electric circuits where a "lead" is required to offset a "lag."

(To be Continued.)

Recent Telegraph and Telephone Patents.

A patent, No. 959,485, for an automatic telephone system, has been granted to A. H. Dyson, of Chicago, Ill.

A patent, No. 959,498, for a telephone exchange system, has been secured by S. B. Fowler, of Lafayette, Ind.

A patent, No. 959,765, for a telephone system, has been awarded to A. D. T. Libby, of Elyria, Ohio.

A patent, No. 960,176, for an automatic distributing system, has been issued to L. D. Kellogg, of Chicago, Ill.

A patent, No. 960,458, for a telephone repeater, has been taken out by N. G. Warth, of Columbus, Ohio.

A patent, No. 960,482, for a multiple telegraph system, has been granted to Eugen B. Batzel, of Buffalo, N. Y.

A patent, No. 960,495, for a current reinforcing means, has been secured by R. C. Brown, of Salem, Mass.

A patent, No. 960,731, for a telephone receiver, has been awarded to W. F. Taylor, of Brookline, Mass.

A patent, No. 960,856, for a duplex telephone connection, has been issued to A. W. Ebeling, of Charlottenburg, Germany.

A patent, No. 960,925, for a combined synchronizing and telephone system, has been taken out by G. E. Hoglund, of Chicago, Ill.

A patent, No. 961,146, for a portable telephone and testing instrument, has been secured by N. Macking, Wilkesbarre, Pa.

The following patents have expired:

Patent No. 498,808, for a telephone switchboard annunciator, issued to Frank R. McBerty, Downer's Grove, Ill.

Patent No. 498,911, for copying telegraphic apparatus, issued to Sylvester P. Denison, Belleville, N. J.

Patent No. 498,919, for a telephone, issued to Barton Pickering, of Dayton, Ohio.

Patent No. 499,108, for a telephone, issued to Edward M. Harrison, of Fort Smith, Ark.

Personal.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, accompanied by his wife, returned to New York, June 23, on the Adriatic, after a two months' absence in England.

Mr. John H. Fahey, who is an old time telegrapher, and was formerly publisher of the Boston Traveler, has recently sold his interest in that publication and is now spending several months in Europe.

Mr. C. H. Morris, formerly manager for the Western Union Telegraph Company at Montgomery, Ala., but at present engaged in the fruit and produce business at Atlanta, Ga., was a recent New York visitor.

Major Daniel J. Carr, of the Signal Corps, United States Army, who has been stationed at Fort Wood, New York Harbor, for three years past, has been transferred to Fort Omaha. The many friends of Major Carr in New York will regret his departure to his new post of duty.

Mr. Thomas F. Clohesy, an old time member of the telegraph profession, at one time prominent in telegraph circles at Toledo, St. Louis and Kansas City, and who has been in New York for some time past representing the Blaisdell Machinery Company, manufacturers of vacuum cleaning apparatus, has accepted a position with the Taber Pump Company, and will hereafter make his residence at Buffalo.

The National Press Bureau, of New York, has prepared for publication in the National Encyclopedia of American Biography, an interesting biographical sketch of Mr. John Franklin Howell, the well known old time telegrapher, who has, for the past nineteen years, been engaged in the brokerage business. Mr. Howell has been a member of the New York Consolidated Stock Exchange since 1895 and for several years has been one of the governors of that body.

Mr. Robert H. Prender, a former member of the telegraph profession, who began service in the Post Office Department several years ago as stenographer to Assistant Postmaster-General De Graw, and was subsequently promoted to take the office of Chief Clerk in the Bureau of the Fourth Assistant Postmaster-General, has been assigned to other important and intricate duties in Mr. De Graw's Bureau, namely, those of Assistant Superintendent of Rural Delivery. The service which will now engage Mr. Prender's attention involves the expenditure of more than forty millions of dollars per annum and requires the exercise of exceptional capacity and thought. Mr. Prender's

complete successes in former positions forecast great achievements in his new field.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, and Mr. C. C. Adams, vice-president, were invited guests of the Pennsylvania Railroad Company on its special train through the new North River tunnel on June 24. The new terminal located at Seventh Avenue and Thirty-third Street, was inspected. The Postal Company will have in this great railroad station two of the most up to date branch offices to be found anywhere in the country.

Mr. W. I. Capen, general superintendent of plant, has returned to his office from a trip of inspection of the new transcontinental lines which are now being constructed between Salt Lake City, Utah, and Reno, Nev.

Mr. L. Lemon, division superintendent at New York, is looking after the duties of the superintendent at Pittsburg, while the incumbent of that office Mr. H. Scrivens, is on a vacation.

Mr. C. A. Rhodes, traveling auditor of the company, has returned to his office after a two months' trip, covering the principal offices in the eastern division.

Mr. F. C. Smith, manager at Wilkesburg, Pa., was a recent New York visitor, coming here to see his daughter, who had just graduated from college, start for Europe.

Mr. William S. Spencer, manager of the company's office at Marion, Ohio, is also judge of the Probate and Juvenile Courts of Marion County.

A new office has been opened by this company at New Castle, Ind. Mr. J. P. Randall is manager.

On the arrival of Colonel Theodore Roosevelt from England on June 18 on the steamer Kaiserin Auguste Victoria the newspaper people on board lodged a large volume of press matter to be transmitted from the quarantine station. Two phantom circuits were speedily pressed into service and the newspaper matter was moved without a moment's delay.

The summer offices are now being opened along the Atlantic Coast. Mr. F. G. Lightfoot, of the New York office, has been appointed assistant manager of the Asbury Park office. The other resort offices are being supplied with help from the various large cities in the eastern division.

Quad. Chief W. E. Todd, of the New York office, with an ample force of operators, took care of the large newspaper service at Poughkeepsie, N. Y., during the recent boat races. Three portable quadruplex sets were placed in commission, which afforded the company ample facilities to take care of the large volume of traffic for transmission. Mr. J. H. Hess, of Superintendent Kimmey's office, had charge of the quadruplex sets.

Owing to an increase in business the forces at Wilkesbarre and Scranton have each been enlarged by an additional operator.

The New London, Conn., office has been entirely refitted with new furniture and switchboard, and the room completely renovated, which makes the office first-class and up to date in every particular.

This company has obtained an injunction against the subsidiary Bell Telephone Company in New Mexico for violation of a contract with the Postal Company made by an independent telephone company last July for five years by which the Postal Company reached a number of towns in New Mexico by an extension of its service from El Paso to Silver City, N. M. That contract still has more than four years to run. A few weeks ago the subsidiary Bell Telephone Company bought out the independent telephone company with which the postal had this contract and then the Bell Company notified the Postal that the contract would be repudiated July 1 and connection cut off.

The Postal Company has obtained an injunction against such repudiation from the District Court at Silver City and has set up that this action is due to a conspiracy between the Western Union and the Bell Telephone companies to suppress telegraphic competition between El Paso, Silver City and intervening towns and other parts of the country. The validity of the combination of the American Telephone and Telegraph Company and of the Western Union is directly attacked.

Postal messengers are given a bonus for all "rush" messages delivered inside of five minutes. One afternoon recently it happened that one of the messengers at Wilmington, N. C., had a "rush" message for a customer who was located on the wharf on the bank of the Cape Fear River. The boy, seeing that his time was about up, rode on his bicycle at a rapid rate to deliver the message on time. As he reached the addressee's place of business he noticed that his brake would not work and before he had time to stop himself he dashed into the water, where it was twenty feet deep. His whole mind was apparently centered on delivering his telegram on time, however, as he swam rapidly to the bank, dashed up to the addressee with the message and delivered it right on the minute.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee of this company and vice-president of the American Telephone and Telegraph Company, sails for Europe July 9 on the steamer Minnewaska. Mr. Hall's trip is for rest, and during his absence of two months he will endeavor to avoid all business.

Mr. Belvidere Brooks, general manager of the company, attended the graduating exercises at Williams College, his son, Belvidere, being among those who secured diplomas.

Mr. A. G. Saylor, general superintendent of the eastern division, has returned to his office from a trip of inspection through his territory.

Mr. C. H. Gaunt, assistant general manager and superintendent of telegraph of the Atchison, Topeka and Santa Fe Railway, Topeka, Kansas, has been appointed general superintendent of the Pacific division of this company at San Francisco, vice Mr. Frank Jaynes, appointed special agent.

Mr. William N. Fashbaugh, formerly electrician of the eastern division, but who, for some time past has been in charge of the traffic, has been appointed traffic engineer.

The office of the general superintendent of construction has been abolished, and the duties appertaining to that office have been assumed by Mr. R. E. Chetwood, engineer of construction. Mr. Charles H. Bristol, who since 1902, has been general superintendent of construction, has been retired. Mr. George F. Swortfeger, assistant general superintendent of construction, has been assigned to the staff of the engineer of construction.

Mr. Isaac McMichael, vice-president and general manager of the Great North Western Telegraph Company, Toronto, Ont., was a recent New York visitor, coming here in the interest of the service. Mr. McMichael was accompanied by his wife.

Colonel William Bender Wilson, of Philadelphia, president of the Society of the United States Military Telegraph Corps was also a recent executive office visitor.

Mr. H. C. Worthen, assistant chief operator, at 195 Broadway, New York, has been assigned to special duty in the office of the traffic engineer.

The auditor's department is now located in the new quarters which have been provided for it on the sixth floor. Partitions have been removed so that with the exception of the offices of J. B. Van Every, vice-president, E. Y. Gallaher, auditor, and H. W. Ladd, assistant to Mr. Gallaher, all of the Dey Street side of the building has been made into one large room. The walls of this room have been redecorated, tungsten lamps installed, and new oak tables and desks provided. All of the employes of the department have ample working space and several large windows furnish excellent light to the room. The check bureau and the free message bureau have been added to the auditor's department which now numbers about 180 employes. The check bureau remains in its former quarters on the ninth floor. An improved system of accounting is being developed and uniform methods will soon be adopted for the service throughout the entire country.

The annual outing of the Morse Electric Club will be held at Donnelly's Hotel, College Point, Long Island, Saturday, July 9.

Mr. Frank Kitton, of the office of the engineer of equipment has been spending a well earned vacation at Buffalo and other points.

Mr. Belvidere Brooks, general manager of the company, has issued a notice that the company would not furnish news bulletins either by special wire, by messengers or on its tickers relating to the progress of the Jeffries-Johnson prize fight at Reno, Nevada, on July 4.

Numerous applications have been made for such service in various parts of the country. This company will confine itself to the handling of such messages as may be filed for regular transmission in the ordinary manner at Reno, by press associations, by newspapers and by individuals. Mr. Brooks supplemented this statement with the following explanation:

"The Western Union Telegraph Company is not in the business of gathering news. That is a function of press associations and of newspapers. The telegraph company is a transmitting agency, and as such will confine its activity in this Reno affair to the transmission of news despatches gathered by other agencies and filed with it for delivery to various points.

"The company will endeavor to place at the disposal of the public, and of the newspapers, the very best facilities for transmitting quickly and accurately their despatches, so that people interested in the fight may obtain desired information. A large number of wires are available for such use at Reno, not only on July 4 but at all other times. In addition, such extra facilities will be provided as to render convenient the duties of the reporting agencies.

"The various ticker services of the Western Union Telegraph Company are for the reporting of quotations and matters of official record. They will not be used for giving news descriptions of this prize fight."

RESIGNATIONS AND APPOINTMENTS.

Mr. E. D. Edwards has been appointed manager of the Reno, Nev., office, vice A. E. Littler, resigned. Mr. Edwards has been succeeded as chief operator by L. B. Dobyns, formerly night chief operator, whose position has been filled by the appointment of T. A. Long, advanced from the all night chief operatorship. Mr. E. P. Hearn, of the operating force has been appointed all night chief operator.

C. H. Gaunt, General Superintendent, Western Union Telegraph Company, San Francisco.

The appointment of Mr. C. H. Gaunt as general superintendent of the Pacific division of the Western Union Telegraph Company as announced briefly elsewhere in this issue, brings back to the commercial telegraph service, after an absence of twenty-one years, one of the best known telegraph men in the United States, and one who has for many years occupied a prominent place in the railway field. Mr. Gaunt was born in Steuben County, New York on August 29, 1867. He was educated in the grammar schools in Brooklyn and finished the high school course at Red Bank, N. J. On the completion of this course Mr. Gaunt learned telegraphy

and in 1884 secured employment with the Western Union Telegraph Company in New York City. During his first year of work he continued his studies at the Brooklyn Polytechnic Institute. He worked for four years in minor positions in the offices of the Western Union and Postal in New York and also in the telegraph department of the Baltimore and Ohio Railroad.

Believing that the opportunities for a young man were greater in the west than in New York, Mr. Gaunt, in 1888, joined the telegraph forces of the Northern Pacific Railway at Helena, Montana.

He worked his way through all the successive positions in the telegraph department of this road, such as wire chief, manager of the larger relay



C. H. GAUNT.

General Superintendent of the Western Union Telegraph Company, San Francisco.

offices, agent, despatcher and division chief, and in 1898 was appointed assistant superintendent of telegraph of this road, which position he held until 1902, when he was appointed superintendent of telegraph of the Atchison, Topeka and Santa Fe Railway. As assistant telegraph superintendent of the Northern Pacific, Mr. Gaunt assisted in reorganizing and rebuilding the telegraph system on this road and bringing it up to date.

In December, 1905, he was also made assistant general manager of the Santa Fe, and he has discharged the duties of the two positions since that time.

Under his direction the telegraph system of the company from Chicago to San Francisco and to the gulf has been reorganized. He has replaced all the obsolete machinery in the department with new and up to date apparatus and he rebuilt the entire telegraph property along all of the lines of

the system at a great expense. This reorganization and rebuilding of the telegraph system has practically quadrupled the operating capacity of the lines. Under the supervision of Mr. Gaunt, the Santa Fe was one of the first railroads to begin the use of the telephone for train despatching and the results have been so very satisfactory that as soon as practicable the entire system will be thus equipped. Several important improvements in telegraphy have also been devised by him.

The Western Union Telegraph Company is to be congratulated upon securing for the important post which Mr. Gaunt now assumes a man of his ability. Though the greater part of his executive experience has been in railway lines there is no doubt but that he will apply his talents with equal success in the commercial field.

W. N. Fashbaugh, Traffic Engineer, Western Union Telegraph Company, New York.

Mr. W. N. Fashbaugh, who has been appointed to the newly created position of traffic engineer of the Western Union Telegraph Company as announced briefly elsewhere in this issue, is well known in telegraph circles and his many friends throughout the country unite in congratulating him upon his promotion. Mr. Fashbaugh was born in Denver and at an early age entered the railway telegraph service with the Union Pacific and later was employed by the Denver Pacific



W. N. FASHBAUGH.

Traffic Engineer, Western Union Telegraph Company, New York.

and South Park Railway. In 1882 he joined the forces of the Western Union at Denver and there displayed such ability as an electrician that in 1884 he was made chief operator of the Denver office. In 1889 he was compelled by poor health

to retire from the telegraph service and for a time engaged in other business at Salt Lake City. In 1890, however, he again put on telegraphic harness, joining the operating force of the Western Union at Salt Lake. Two years later he went to Helena, Montana, as wire chief, that office then being the principal relay point for all of the traffic for the northwest. In 1896 he returned to Denver as electrician at that point. He retained this position until 1902, when he came to New York as superintendent of the leased wire service of the company. He was afterward made electrician of the eastern division, which post he occupied until about four months ago when he was attached to the office of the general manager and given charge of the traffic, which duty he continues to fulfil under the new title.

Mr. Fashbaugh has long been considered one of the best electricians in the service and as he is also recognized as the possessor of a high degree of executive ability, there is no doubt that his administration of the affairs of his new position will be eminently successful.

Municipal Electricians.

A new ten-circuit repeater has been purchased for the fire alarm system of Norfolk, Va., and will be installed under the supervision of Mr. R. A. Smith, city electrician.

The Gamewell Fire Alarm Telegraph Company is installing a police and fire alarm system, including call boxes, automatic switches and flash-light signal service in Victoria, B. C.

Extensive improvements are being made in the fire alarm system of Macon, Ga., under the direction of City Electrician Humphreys. A new switchboard has been installed in more commodious quarters and the majority of the wires have been placed underground.

The fifteenth annual convention of the International Association of Municipal Electricians, which meets in Rochester, N. Y., September 6 to 9, ought to be well attended. Rochester is an ideal convention city and those who attend the gathering are sure to have an enjoyable time. Mr. Frank P. Foster, of Corning, N. Y., is also arranging an unusually interesting and instructive program for the business sessions of the convention.

The Board of Aldermen of New York have appropriated the sum of \$2,200,000 for the general improvement of the fire department. Fire commissioner Rhinelander Waldo announces that \$207,000 of this amount will be spent in bringing the fire alarm telegraph system of the Boroughs of Manhattan and Richmond up to date. This will include a thorough overhauling of the system in the two boroughs. To put the fire alarm telegraph wires underground in Brooklyn will take \$150,000 of the appropriation. The work will be begun immediately.

The Cable.

The new cable which the Commercial Cable Company has been laying between Waterville, Ireland and Weston-Super-Mare, England, was completed June 15 and has been placed in service. The new cable is of unusually heavy construction, the armor varies from a minimum of nine tons to a maximum of fifteen tons to the mile. It is hoped that this type of cable will be heavy enough to resist the attacks of the trawlers.

Charles Trippe, superintendent of the Anglo-American Telegraph Company, at New York, died June 16, aged sixty-seven years. Mr. Trippe entered the telegraph service in England in 1857, and in 1864 joined the forces of the Anglo-American Telegraph Company, which was then preparing to lay a trans-Atlantic cable. Two years later he was on the Great Eastern when the first successful cable was finally laid. He was then appointed superintendent of the cable station at Heart's Content, Newfoundland. He remained there until 1887, when he was transferred to the station at St. Pierre, Miquelon, off the Newfoundland coast. In 1894 Mr. Trippe again took charge of the station at Heart's Content, where he was on duty until 1897, when he was appointed superintendent of the New York office, which position he has since held. By his conduct of the affairs of the company in New York, Mr. Trippe has made a host of friends among those who have occasion to use the cables.

Annual Reunion of Old Time and Military Telegraphers.

Plans are now nearly complete for the twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association, and of the Society of the United States Military Telegraph Corps, which meets at the Auditorium Hotel, Chicago, Michigan Boulevard and Congress Street, September 8, 9 and 10. The program, which has been arranged by President W. J. Lloyd and his corps of able assistants in Chicago, is as follows: Thursday, September 8, 10 a. m., business meeting of United States Military Telegraph Corps, Auditorium Hotel; 11 a. m., business meeting of Old Time Telegraphers' and Historical Association; 3.30 p. m., baseball game, National League, Cincinnati vs. Chicago. In the evening tickets to various amusement parks of the city will be provided for the visitors. Friday morning a special train on the Chicago and Northwestern Railway will be taken to Highland Park, where all will be the guests at a luncheon at the Hotel Moraine, given by Mr. Frederick W. Cushing, vice-president of the Old Time Telegraphers' and Historical Association, whose home is at that place. On Friday evening a theatre party is on the program. Saturday morning will be given over to sight-seeing, including a visit to the Union Stock Yards, and other points of interest about the city. Saturday afternoon will be free for each one to go

where he may desire. The reunion will come to an end with the banquet at the Auditorium Hotel, Saturday evening at 6.30.

The following rates obtain at various hotels, all being conducted on the European plan:

AUDITORIUM HOTEL,

Michigan Boulevard and Congress Street.
Single rooms without bath, \$2.00 and up.
Same if occupied by two persons, \$3.00 and \$4.00
Single rooms with bath, \$3.50.
If occupied by two persons, \$5.00 and up.

GRAND PACIFIC HOTEL,

Northwest Corner Clark Street and Jackson Boulevard.
Single rooms without bath, \$1.50 per day.
Same if occupied by two persons, \$1.00 per day each.
Single rooms with bath, \$2.00 per day.
Same if occupied by two persons, \$1.50 per day each person.

GREAT NORTHERN HOTEL,

Dearborn Street and Jackson Boulevard.
Single rooms without bath, \$1.50 and \$2.00.
Same if occupied by two persons, \$1.50 per day each person.
Single rooms with bath, \$2.50, \$3.00 and \$3.50.
Same if occupied by two persons, \$4.00, \$5.00, and \$6.00.

KAISERHOFF HOTEL,

270 Clark Street.
Single rooms, \$1.00 and \$1.50.
With bath, \$2.00 single and double, \$3.00.

HOTEL GRACE,

Jackson Boulevard and Clark Street.
Single rooms, \$1.00 per day.
With bath, \$2.00 single, and double, \$3.00 per day.

Any other information desired may be obtained by addressing Mr. F. J. Scherrer, 195 Broadway, New York, secretary of the Old Time Telegraphers' and Historical Association, or Mr. D. H. Bates, 658 Broadway, New York, secretary of the United States Military Telegraph Corps.

United Wireless Being Investigated by the Government.

Two of the officers of the United Wireless Telegraph Company and the president of the New York Selling Agency were arrested on June 16 by the Post Office authorities charged with using the mails to defraud by sending out literature designed to mislead the public in regard to the Company's stock and capitalization. A hearing before United States Commissioner Shields in New York was appointed for July 12. In the mean time a Federal grand jury has begun an investigation of the affairs of the company and has subpoenaed several persons supposed to have an intimate acquaintance with the business of the company to appear and testify.

As the result of the advertising campaign carried on the United Wireless Company soon became well known. Its executive committee met at regular intervals and arbitrarily increased the price of its stock, jumping it from \$12.50 to \$15, to \$25, to \$35, and so on up to \$50 per share.

For a short time the stockholders in the defunct American DeForest Company had an offer

from the United Company to exchange their stock on a ten for one basis. Soon after this the officers raised the price of the United stock and declined to accept any more exchange from the holders of the DeForest stock except at \$10 premium or more per share.

It is alleged that there are 28,000 stockholders throughout the country, many of whom have placed their savings in the stock of the company through representations that have been made by its officers. A portion of the business has been done by soliciting agents in a house-to-house canvass, but the greater portion of the stock selling has been done by the use of the mails, either through newspaper advertising or circulars."

In the statement issued to the stockholders on December 31, 1909, it was stated that there was a surplus of \$6,882,329, when it is claimed by the post office authorities, as a matter of fact the company had not made its operating expenses the year before.

President Wilson issued a reply to the claims of the postal authorities in which he said that the statement that the operating expenses have been much greater than the receipts is untrue, and that the receipts from operation of the active land and boat stations for commercial business have exceeded the expenses of operation, and the surplus of receipts has been invested in additional stations and equipment.

"The Company," said Colonel Wilson, "is, and for the past three years has been engaged in conducting a commercial wireless telegraph business, and for all practical purposes it may be regarded as the only wireless telegraph company on this continent. It has equipped 310 ships plying the waters of the Atlantic and Pacific Oceans and the Great Lakes with its system of wireless telegraphy. These ships are in actual daily operation and communicating with the company's 100 land stations, which are also in daily operation. The United Wireless has more land and boat stations than all the other wireless companies of the world combined, and the equipment of the United Wireless Telegraph Company does by far the largest percentage of the world's wireless telegraph business."

Since the action against the company was started the following announcement has been made to the stockholders:

"Inasmuch as certain charges have been preferred against certain officials of this company, the management would prefer to have judgment in this matter passed upon by such Directors of the company as are not officers, and to that end a special meeting of the Directors has been called to appoint a special committee to institute a thorough investigation of the company's affairs to ascertain whether there is any basis in fact for the charges in question, and to make their report to the stockholders and the public.

"In order that the Directors may be unhampered in the choice of the investigating committee, none

of the Directors who are officers in the company will take any part in the selection of the committee."

What Our Friends Say About This Publication.

Mr. F. W. Conger, superintendent of the Postal Telegraph-Cable Company, Chicago, in renewing his subscription, says: "Telegraph and Telephone Age is what we need and must have in this age."

Mr. P. W. Drew, superintendent of telegraph of the Minneapolis, St. Paul and Sault Saint Marie Railway Company, Chicago, writes: "Telegraph and Telephone Age is better than ever."

Mr. B. F. Thompson, telephone inspector of the Baltimore and Ohio Railroad Company, Baltimore, Md., in remitting to cover his renewal for another year, writes: "Your paper gets more interesting with every issue."

Mr. G. F. Wilson, of the Western Union Telegraph office at Ashland, Ore., when asked recently if he wished to continue his subscription to Telegraph and Telephone Age, replied: "Yes, please keep it coming, sure."

Mr. J. W. Tillinghast, manager of the Western Union Telegraph Company, Cleveland, Ohio, writes: "It is with pleasure that I enclose check renewing my subscription to the Age. It is a valuable publication and should be read by every one in the telegraph and telephone service."

Mr. C. H. Simpson, manager of the Western Union Telegraph Company, Niagara Falls, N. Y., writes: "To keep well informed a manager must read Telegraph and Telephone Age. I can't get along without it; therefore, keep it coming along regularly."

Major J. Orton Kerbey, of the South American Correspondence Bureau, Washington, D. C., an old time and military telegrapher, in a recent letter has this to say regarding Telegraph and Telephone Age: "I congratulate you on the work you are doing in making the Age better if possible every year. I confess I was one of those who entertained the view that our fraternity would not sustain a paper in the interest of telegraphy, but you have succeeded and I give you personally the glory and congratulate you on getting out a good looking as well as an interesting publication."

A former telegraph official, who is now retired, in renewing his subscription, says:

"I don't think there is one of your readers who takes such pleasure in the paper as I do. There is always something interesting in the news department, and the special articles are so valuable to the profession that the telegraph companies should see that their employes are supplied with the journal even if the dividends had to be reduced in order to pay for it. It is impossible to exaggerate the importance of Mr. Jones' articles, especially the current series on electrical measurements, and that was a fine display of technical mastery given by William Finn in his description of the Barclay system."

Radio-Telegraphy.

The New York State Wireless Telephone and Telegraph Company has been incorporated with a capital stock of \$2,500,000 by Harry Darlington, E. R. Devine and E. R. Cochra, Jr., all of Wilmington, Del.

The amateurs in wireless telegraphy throughout the country, under the lead of those in New York and Philadelphia, are organizing to resist the proposed Federal legislation restricting wireless operation.

The North German Lloyd Steamship Company has recently ordered Telefunken wireless equipment for fifteen of its ships on the Eastern Asia and Australian lines, and other German steamship companies are rapidly equipping their vessels with wireless.

A patent, No. 960,304, for wireless telegraphy, has been issued to Roberto C. Galletti, of Rome, Italy. A closed oscillating circuit is used to accumulate energy which is emitted periodically by an antenna, the duration of the emission of the energy by the antenna being continued until the emission reaches the steady condition.

A patent, No. 961,645, for a receiver for wireless transmission of signals, has been secured by Valdemar Poulsen, of Copenhagen, Denmark. An oscillation circuit, an electromagnetic apparatus and a device for intermittently connecting and disconnecting the device to and from the oscillation circuit.

The United Wireless Telegraph Company has applied for a license to erect and operate wireless stations in Canadian territory bordering the Great Lakes. They propose locating stations at Port Arthur, Colinwood, Sarnia and St. Thomas. In order to secure its Canadian franchises the company agrees to exchange messages with any other systems or companies.

The bill of Senator Frye, of Maine, requiring ocean going vessels carrying more than fifty passengers, after July 1, 1911, to be equipped with wireless telegraphic apparatus before being permitted to leave any port in the United States, has been passed by both branches of Congress. An amendment to the original bill passed by the Senate was added by the House of Representatives, requiring such vessels to exchange messages with all shore or ship stations using other systems of wireless telegraphy.

A recent illustrated article in an English technical journal gives a description of the Helsby wireless telegraph and telephone systems, the principal feature of which consists in the production of a spark discharge with a high and uniform group frequency by an electric method instead of by mechanical means. The method consists in rectifying high-tension alternating current and charging condensers with a high unidirectional potential, a small proportion of the charge being withdrawn continuously to energize the actual oscillatory circuit.

A patent, No. 959,967, for a wave receiving device, has been secured by F. G. Sargent, of Westford, Mass. Wireless receiver or coherer having a zinc electrode and a carbon electrode.

A patent, No. 961,265, for apparatus for determining the direction of space-telegraph signals, has been granted to J. S. Stone, of Boston, Mass. Two separated elevated receiving conductors, two receiving circuits, each associated with a different one of the conductors; two artificial lines, each connected with a different one of the circuits, and an oscillation detector connected with said lines.

The Marconi Wireless Telegraph Company has obtained the consent of the French Government to the erection of a wireless station at St. Lazaire, and has agreed with the Spanish Government to take over stations already erected by Spanish companies at Cadiz, Teneriffe and Las Palmas, besides constructing new stations at Cape Finisterre, Barcelona, the Balearic Islands and other places on Spanish territory.

New equipment of Fessenden wireless telegraph apparatus has been installed in the United States Navy's wireless station at Colon, Panama. The new outfit has a twenty-five kilowatt generator and the transmitting apparatus is of the high frequency 500 cycle type, with rotating spark gaps. Key West, New Orleans and Guantanamo are within the working range of the new station, which is much more efficient than the one formerly in use.

A patent, No. 960,631, for wireless signaling, has been awarded to R. A. Fessenden, of Brant Rock, Mass. For producing and receiving wireless signals without interference, by means of a generator of continuous impulses at the sending station, a generator of continuous impulses at the receiving station, and means at the receiving station whereby the impulses silence the locally produced sound, except when the sent impulses are interrupted by signaling.

At a recent meeting of the Washington, D. C., section of the American Institute of Electrical Engineers, Mr. Hayner Gordon gave a talk on "Wireless Telephony," with particular reference to the theory of high-frequency oscillations and their generation and application to the wireless transmission of signals and speech. The meeting then adjourned to the engineering building, where an elaborately equipped wireless telephone station had been installed for the purpose of carrying on experimental work between that point and the laboratory of the United States Signal Corps. Mr. E. R. Cram, of the Signal Corps, assisted by Mr. Bermann, discussed and exhibited the singing arc and various other apparatus and accessories and with Mr. E. F. W. Alexanderson, gave an exhibition of the 100,000 cycle alternator of the latter's design. An interesting discussion accompanied the exhibit, participated in by General James Allen, chief signal officer, United States Army, General H. C. Dunwoody, retired, General George H. Harries and others.

The Telephone.

The Cumberland Telephone and Telegraph Company has declared a regular quarterly dividend of two per cent., payable July 1.

The Pacific Telephone and Telegraph Company reports a gain of 10,033 subscriber's stations during the first three months of 1910, an increase of 2.8 per cent.

Mr. James G. Wray, chief engineer of the Chicago Telephone Company, has been elected an honorary member of the Wisconsin University Chapter of the engineering fraternity Tau Beta Pi.

Mr. John Schlarb has been appointed district commercial manager of the Pacific Telephone and Telegraph Company at Tacoma, Wash., vice Mr. C. H. Moore, transferred to a similar position at Portland, Ore.

Arrangements have been made by the United States Weather Bureau in Texas whereby all telephone subscribers in that state may be supplied with the weather reports free of charge by application to their central office.

The annual report of the Mexican Telephone and Telegraph Company for the year ending March 1, 1910, shows gross revenue of \$480,609 and net earnings of \$251,017, an increase of \$94,842 and \$69,581 respectively over the previous year.

The report of the Cumberland Telephone and Telegraph Company for April shows a gross revenue of \$565,054, and net income after paying all charges, including interest and taxes of \$195,084. The gross revenue increase for the month over the corresponding month last year was \$33,168.

It is reported that the American Telephone and Telegraph Company is preparing to build a new long distance line between Omaha and Denver and thus give more direct communication between these two points. Telephone service from Omaha to Denver at present is by way of Kansas City.

A new telephone line has recently been completed by the Missouri and Kansas Telephone Company, the Kansas Telephone and Telegraph Company and the Pioneer Telephone and Telegraph Company between Wichita, Kansas and Oklahoma City. Additional facilities will soon be provided from the latter place to Dallas and other points in Texas.

The statement having been made that about 900 kilowatt hours of electrical energy are required for the handling of a million telephone messages in this country, one of our English contemporaries has figured that one English ton of coal would be required to furnish this amount of power. As the telephone business in this country is now said to amount to about 11,000 million messages per year, the power needed for transmitting the entire number would require the consumption of 11,000 tons of coal annually.

An ordinance has been passed in Norfolk, Va., permitting the Southern Bell Telephone Company to take over the franchise of the Southern States Telephone Company in that city. Following this action it is announced that the Southern Bell Company will expend \$200,000 in extending and improving the telephone service in Norfolk, Portsmouth and vicinity.

The report of the Kansas City Home Telephone Company and of the Kansas City Long Distance Telephone Company for the year ending March 31, 1910, shows gross earnings for the two companies of \$1,263,975, and net earnings of \$569,474, an increase of \$163,894 and \$59,592 respectively over the previous year. These two companies now own and operate 32,697 stations.

The agreement whereby the Continental Telephone and Telegraph Company was to acquire a controlling interest in the Rochester Telephone Company not having been carried out, the Consolidated Telephone Company, of Buffalo, has purchased a large interest in the Rochester Company. The Consolidated Company is the holding company for the Federal Telephone and Telegraph Company of Buffalo and controls several other independent telephone companies in Western New York.

A concession has recently been granted to a syndicate of American, French and English companies for the exclusive operation of telephones in Constantinople and the surrounding country, for thirty years. The construction may be done by the syndicate, but the operation must be conducted by a Turkish company, the syndicate being the stockholders. The government is to have the right to purchase the concession and plant, after ten years, upon a valuation placed thereon by appraisers, whose mode of selection is set forth in the contract.

The city council of Chicago has referred to a special committee the report on the business of the Chicago Telephone Company, which was made by Messrs D. C. and W. B. Jackson, and a summary of which was given in our June 1 issue. This committee has recommended that the report be gone over by other experts and checked up in connection with any data on hand, or which can be secured bearing on the case. Another expert has accordingly been engaged to go over the report and no action will be taken on the question of revising rates until the various items in the original analysis have been carefully checked up. Mr. B. E. Sunny, president of the Chicago Telephone Company, has recommended the abolition of the flat rate service and neighborhood exchanges, the increase of the charges for residence service from five to six cents and the abolishing of rebates. These changes, he believes, would put the service on a more satisfactory basis.

The Marconi Wireless Telegraph Company has commenced action in England against the United Wireless Telegraph Company and the British Radio Telegraph and Telephone Company for alleged infringement of some of its patents.

Telegraph and Telephone Age

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July 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Los Angeles Convention.

The twenty-ninth annual convention of the Association of Railway Telegraph Superintendents has passed into history and those members of the association who were fortunate enough to be able to attend have returned to their duties with new ideas and new zeal to increase, if possible, the efficiency of the systems over which they have charge. Enough matter of interest was brought out in the papers read and in the discussions which took place to furnish ample food for thought for the next year to those who were present as well as to those who have to depend upon the printed accounts of the affair for their knowledge of the information which was brought to light at this annual gathering. Many of the members of the association will be very busy during the next year in extending the telephone despatching service on their lines. To these the facts and experiences given in the convention on that subject will be of special value. Practically all of the superintendents are experiencing the same difficulty,

namely, that of securing a sufficient number of operators and station agents to keep the service up to the required standard. On this account the paper on "Education for Efficiency in Railroad Service," which tells how one of the great railroad systems in the country is meeting this difficulty, will undoubtedly form the basis of much work along similar lines in the future. Everyone who is concerned with the maintenance of a railroad telegraph system will agree that the deliberations of the association in the past have been of assistance to him in the performance of his duties. The convention just closed will be no exception to the rule, but will be remembered as one of the most important of the series.

System Necessary for Efficiency.

The higher officials of the telegraph companies frequently find in their trips of inspection that many of their managers, even in the larger cities, lack efficiency because they fail to systematize their work. This fault is not due to any lack of energy on the managers' part, for in the majority of such cases the manager is the hardest working person on the entire staff. The difficulty seems to lie rather in the fact that the managers burden themselves with a large amount of detail which could just as well be cared for by some of the subordinates in the office. Their time is so taken up in trying to wade through this mass of routine work that they do not have time to look after the more important things which would make their administrations more successful. If the work of the office was systematically divided among the various employes, each one being given certain tasks to perform the manager could so organize the force under his charge that his duties would be chiefly of a supervisory nature. The position of manager of a telegraph company in a large city office is one of great responsibility and one which requires high executive ability in order that the incumbent shall be entirely successful in the conduct of the affairs of the company which are intrusted to his charge. This is a qualification which many do not possess. There are some who may be said to have been born with a natural gift in this direction. There are more, however, in whom this asset has been developed by experience and perseverance. The greatest captains of industry are those who have the faculty of throwing the burden of the work upon their subordinates, leaving their own time free for developing plans for future increased work and supervision. As soon as a manager can be made to realize this fact, and to develop the organization of his force along such lines he is on the road to a better position. Outside interest, in many cases, seem to offer greater attractions to the young man than he can find by remaining in the employ of the commercial telegraph companies. Both of the great companies, however, are showing an inclination to make the service sufficiently attractive to retain

the interest of progressive young men and make the field one in which they can remain with profit throughout their lives. Before he can expect promotion, however, the employe must show that he is worthy. Executive positions, because hard to fill, command good salaries. The manager of a small office who systematizes his work so as to build up an efficient organization will always have an opportunity to show what he can do with larger things. In every issue of our paper we record changes in the official personnel of the different companies, the majority of which are in the nature of promotion. In choosing the men to fill these positions those who have the selection naturally look for the best man to be found for each place. Thus it is that the opportunity comes to the efficient manager. The one who has difficulty in keeping things moving when he has only two or three employes in his charge will hardly receive favorable consideration when a vacancy occurs in a larger office. If, however, he so arranges his work that the traffic is handled with despatch, all reports are sent in on time, all correspondence is answered promptly and he is still able, when called upon, to meet customers of the company, show them any desired courtesy and impress upon them the dignity and stability of the institution which he represents, then his superiors will, when the occasion arises, judge that he is capable of exercising authority and will give him the opportunity to prove their opinion. The way to the top of the ladder in the telegraph service is slow and tedious, but is probably as easy now as it ever was. If in going up the first rounds, however the climber learns to systematize his efforts the remainder of the way may be comparatively easy. If he does not learn this lesson, the ascent is impossible, and if he remains in the service he will always occupy a minor position.

A High Telegraph Official Urges Education Among Employes.

Mr. S. M. English, president and general manager of the Postal Telegraph-Cable Company of Texas, ascribes his success in the service to the fact that he has always been a student and has used all of the means at his command to increase his knowledge of the technical side of telegraphy. Mr. English always encourages the same spirit among his subordinates and in furtherance of this idea recently issued a circular letter to all employes of the company, which reads in part as follows:

I want to make one more personal appeal to you to learn more of the business you are in. Telegraph and Telephone Age is now running an educational column which is better for you than anything it has yet undertaken and you should take advantage of it even if you are "going out of the business" or think you are, as almost every man in the business has thought at one time or another. Subscribe for this paper and read the articles of instruction and you will learn something which will advance you. I know a lot of good fellows who felt as some of you do when I was studying every article published in the Age many years ago and trying to induce them to do so, but instead they ridiculed my efforts. I remember once while I

was explaining the advantages of the knowledge to be gained from Mavor and Davis' Quadruplex and Thom and Jones' book of diagrams, in an effort to induce an early morning Chief to buy them and learn why he did certain things, the Night Chief Operator "batted in" and said: "Don't waste your money, the more you read that stuff the less you will know," and proceeded to explain all that was necessary to know about quads. Both of these men were failures. One is now a Branch Office Manager and the other is working at the key. You must do something that others cannot do if you want to be pushed ahead.

While I was working in an undershirt and pair of overalls with the thermometer around 100 degrees, putting in a dynamo plant at New Orleans, I was engaged by the Texas Postal as Electrician. I am sorry to say only a very few of you understand the electrical end of the business and unless some who do not, learn more about the apparatus, I will be forced to go outside of our service for men who can handle the quads and repeaters. There is hardly a day that we are not short some of our facilities because of a lack of knowledge of the apparatus on the part of the man in charge of it. And you can understand the apparatus, if you will take the trouble to study it. It is not so complicated as it appears to be after you once understand the principles.

The articles now running in Telegraph and Telephone Age and the Postal Telegraph, together with two or three inexpensive books, will equip you for something better or to fill your present position more satisfactorily to yourself and to the Company. Won't you try? I want to help you.

The higher officials of all the telegraph companies will subscribe to what Mr. English says in regard to the difficulty of finding men in the service who are well enough acquainted with the construction and operation of the apparatus to be promoted to positions of responsibility. They also agree with Mr. English as to the value of Telegraph and Telephone Age as an aid to telegraphers in learning more about the business with which they are associated. Anyone who has the mental ability to become an efficient operator is capable of mastering without great difficulty any of the electrical problems connected with telegraphic operation and as soon as he does increase his knowledge in this direction he is putting himself in line for promotion. Mr. English has very aptly pointed out to his employes a way in which they can learn more of the technical side of the industry and, as he states, Telegraph and Telephone Age is published in the interest of telegraphers and is always ready to assist ambitious operators in their efforts for advancement.

International Telegraph Tournament.

The Italian Government has decided to hold in the summer of 1911 at Turin, in connection with the International Exposition of Labor and Manufactures an international competition of practical telegraphy. This competition, which has for its aim the awakening of a new interest among all telegraph employes and to encourage them to perfect themselves in the use of the apparatus is open to telegraphers in the service of the government administrations and the companies belonging to the International Telegraphic Union, as well as to the other administrations and private companies.

The competition will consist of a trial of sending and receiving by Morse apparatus, Hughes or Bandot, either individually or between representatives of the Administrations or private companies who take part.

The trials will be judged according to special rules by a jury in which the visiting administrations will be equitably represented.

The jury will have at its disposal as a reward for the winners prizes of money, medals and objects of art. Letters of invitation to take part in this tournament have been sent out to all of the administrations and private companies. A committee has been appointed to draw up a set of rules and this committee will be glad to receive suggestions from any of those interested. This competition is being planned with the object of strengthening the feeling of friendship which already exists between telegraphers of different nations. M. Ferdinand Geronimi, minister of posts, Rome, Italy, is in charge of the plans for the affair.

It would seem that this would be an excellent opportunity for the telegraph profession in this country to show its proficiency to the foreign brethren. At the Volta Centennial, which was held in Milan, Italy, in 1899, a large gathering of telegraph people took place and on that occasion telegraphers in the United States were represented by Mr. Walter C. Burton, of New York. Mr. Burton was kindly greeted and was the recipient of many favors at the hands of the other telegraph people present and in a series of articles which we published after this event he pointed out the good that was accomplished by that gathering. We have always encouraged telegraph tournaments in this country because we believe that they promote efficiency in the service and we will be very glad indeed to encourage the one to be conducted by the Italian government. We hope that the profession at large in this country will see to it that the United States is represented by at least one delegate in the proposed tournament. There are enough men of the standing in the profession of G. W. Conkling and F. M. McClintic, who are highly proficient in the use of the key from which number could be chosen one or more representatives who would reflect great credit on the operating force of this country if they were given the opportunity to participate in the proposed international event.

Administration Railway Bill.

The so-called Administration Railway Bill, entitled "An Act to Create a Commerce Court," which has been under consideration in Congress for some time has finally been passed and on June 18 was signed by the president. By the provisions of this measure, the telegraph and telephone companies are placed under the jurisdiction of the Interstate Commerce Commission. That part of the bill which applies directly to these interests reads as follows:

"The provisions of this act shall apply to * * * telegraph, telephone and cable companies (whether wire or wireless) engaged in sending messages from one State, Territory or District of the United States to any other State, Territory or District of the United States, or to any foreign country, who shall be considered and held to be common carriers within the meaning and purpose of this act * * * Provided, however, that the provisions of this act shall not apply to * * * the transmission of messages by telephone, telegraph or cable wholly within one State and not transmitted to or from a foreign country or to any State or Territory as aforesaid.

"All charges made for any service rendered or to be rendered in the transportation of passengers or property and for the transmission of messages by telegraph, telephone, or cable, as aforesaid, or in connection therewith, shall be just and reasonable, and every unjust or unreasonable charge for such service or any part thereof is prohibited and declared to be unlawful; Provided, that messages by telegraph, telephone or cable, subject to the provisions of this act, may be classified into day, night, repeated, unrepeated, letter, commercial, press, Government, and such other classes as are just and reasonable, and different rates may be charged for the different classes of messages: And provided further, that nothing in this act shall be construed to prevent telephone, telegraph and cable companies from entering into contracts with common carriers, for the exchange of services.

"No common carrier subject to the provisions of this act shall, after January first, nineteen hundred and seven, directly or indirectly, issue or give any interstate free ticket, free pass, or free transportation for passengers, except to its employees and their families, its officers, agents, surgeons, physicians, and attorneys at law, to ministers of religion * * * and provided further, that this provision shall not be construed to prohibit the privilege of passes or franks, or the exchange thereof with each other, for the officers, agents, employees, and their families of such telegraph, telephone and cable lines, and the officers, agents, employees and their families of other common carriers subject to the provisions of this act."

The portion of this measure relating to the telegraph and telephone companies which are now classed by the government as common carriers takes effect sixty days after the passage of the bill.

An effort is being made in Massachusetts to pass a bill prohibiting the employment of boys under sixteen in the night messenger service.

Ohio evidently is not ready for state control of public utilities as the several bills introduced in the Legislature of that State during the session recently closed, having that end in view, have all failed of passage.

The Beginning of Telegraph Train Despatching.*

To Charles Minot belongs the honor of having made the first practical application of the telegraph to railroading, either in this or any other country, by his adopting it in the early autumn of 1851, as near as the date can be now fixed, to the running of a train by telegraphic order, which led to a system that was adopted by railroads throughout the world, and remained the standard signal and reporting system of railroads until the automatic block system began to take its place, ten years or so ago. Up to the time of Minot's initial experiment with telegraph orders, trains on the railroad were run on what was called the "time interval system." The rule was that a ruling train had right of one hour against the opposing train of the same class. Trainmen were anxious to get through. As an instance of this, once Conductor Henry Ayres had lost his hour at Pond Eddy. He took the switch, and after waiting ten minutes, as was the rule, and the opposing train not being in sight or hearing, he started a brakeman with a red flag, and giving him twenty minutes' start, followed with his train. A little west of Shohola he caught the flagman, who had stopped on enough straight line to make it safe. The exhausted man was taken aboard the train and a fresh man started on with the flag, which operation was repeated until the train expected was met at Callicoon, thirty-four miles from Pond Eddy. Captain Ayres used to say that he had flagged the entire length of the Delaware Division more than once.

W. H. Stewart was running the westbound express train on the day when Superintendent Minot made his astounding innovation in railroading, he happened to be going over the road on that train. The train, under the rule then existing, was to wait for an eastbound express to pass it at Turner's, forty-seven miles from New York. That train had not arrived, and the westbound train would be unable to proceed until an hour had expired, unless the tardy eastbound train arrived at Turner's within that time. There was a telegraph office at Turner's, and Superintendent Minot telegraphed to the operator at Goshen, fourteen miles further on, and asked him whether the eastbound train had left the station. The reply was that the train had not yet arrived at Goshen, showing that it was much behind its time. Then, according to the narrative of the late W. H. Stewart, given to the author in 1896, Superintendent Minot telegraphed as follows, as nearly as Stewart could recollect:

To Agent and Operator at Goshen:

Hold the train for further orders.

Chas. Minot, Superintendent.

*Extract from Edward Harold Mott's History of the Erie Railroad entitled "Between the Ocean and the Lakes," published by John S. Collins, New York, in 1900, read by Mr. E. P. Griffith, superintendent of telegraph of the Erie Railroad, New York, at the convention of the Association of Railroad Telegraph Superintendents, Los Angeles, June 20-25.

He then wrote this order and handed it to Conductor Stewart:

To Conductor and Engineer Day Express:

Run to Goshen regardless of opposing train.

Chas. Minot, Superintendent.

"I took the order," said Mr. Stewart, relating the incident, "showed it to the engineer, Isaac Lewis, and told him to go ahead. The surprised engineer read the order, and, handing it back to me, exclaimed:

"Do you take me for a d—d fool? I won't run by that thing!"

"I reported to the Superintendent, who went forward and used his verbal authority on the engineer, but without effect. Minot then climbed on the engine and took charge of it himself. Engineer Lewis jumped off and got in the rear seat of the rear car. The Superintendent ran the train to Goshen. The eastbound train had not yet reached that station. He telegraphed to Middletown. The train had not arrived there. The westbound train was run on a similar order to Middletown, and from there to Port Jervis, where it entered the yard from the east as the other train came into it from the west."

An hour and more in time had been saved to the westbound train, and the question of running trains on the Erie by telegraph was at once and forever settled.

When the system of running trains on the Erie by telegraph was well established, a code of signals or signs for stations was adopted, such as "PO" for Port Jervis, "XN" for Lackawaxen, and so on. With some modifications this abbreviated nomenclature is in use to-day.

After reading this story of the birth of the system of telegraph train despatching, Mr. Griffith introduced the following resolution, which was passed by the association:

"Whereas, The fact has been established that Railroad Operation by telegraph was conceived by Charles Minot, general superintendent of the Erie Railroad, in the autumn of 1851, and the first telegraphic train order was issued from Turner, N. Y. station in that year, it is befitting the Association of Railway Telegraph Superintendents, and the Old Time Telegraphers' and Historical Association to recognize that great epoch in Railroad and Telegraph History. And, whereas, the story of the passing of the old Turner, N. Y., station on the Erie Railroad is now going the rounds of the press, awakening in the minds of the pioneer Railroad and Commercial Telegraphers, fond recollections of their early days. Therefore, be it

"Resolved, That the Association of Railway Telegraph Superintendents, and the Old Time Telegraphers' and Historical Association, the latter concurring at their next annual meeting in September, shall appoint a joint committee of five to raise a sufficient fund by popular subscription, to erect, and shall erect, a monument with suitable inscription commemorative of the event, on the site of the original Turner, N. Y., Erie Railroad station.

"And be it further resolved, That John B. Taltavall, Editor of Telegraph and Telephone Age, shall be a member of that joint committee, and is hereby authorized to receive and acknowledge subscriptions through the columns of his journal or otherwise."

The Late Charles Trippe.

BY MICHAEL FITZGERALD.

By the death of Mr. Charles Trippe the telegraphic world has lost one of its brightest ornaments, and in that branch of it to which his useful and honorable life was devoted, submarine cable telegraphy, his absence will be severely felt. The Age will undoubtedly deal with the principal events in the career of this estimable English gentleman, but it seems to me that, perhaps, a few words expressive of the respect and affection with which he was regarded by his old colleagues in the service may not be out of place.

When the writer was being initiated into the mysteries of cable working at the Valentia, Ireland, station of the Anglo-American Telegraph Company, Mr. Trippe had already achieved distinction in the service, having reached the responsible position of clerk-in-charge at Heart's Content, N. F. Those were the halcyon days of the operator's life, and the future had no terrors for them. The veriest prophet of evil never ventured to forecast the strenuous competition of the present day. The high tariff naturally restricted the business and three hundred messages a day was considered good work. The old mirror system was still in use, though Thomson's recorder was daily winning fresh victories over its time-honored rival, and the battle for supremacy was many a heated argument between those who fiercely denounced the recorder as "too slow," and those who vehemently declared that the mirror was doomed! As everybody knows, the mirror was eventually consigned to the scrapheap, and the recorder stands today without a peer—a living witness to the brilliant genius of the late Lord Kelvin. Mr. Trippe quickly adapted himself to the changed conditions and he became keenly interested in the development of the new instrument.

As time went on, the writer was promoted to the operator's desk and frequently had the pleasure of working with Mr. Trippe, who was always willing to take a turn at the wire in an emergency. I well remember his kindly comments on my working; now pointing out how my spacing might be improved, and again, having a generous word of commendation when an improvement was apparent.

Soon after this the Commercial Cable Company was started and the easy time were gone beyond recall. A star of the first magnitude blazed forth in the cable world, and that incomparable organizer of victory, George Gray Ward, came into his own. Backed by the lamented John W. Mackay, he was given a free hand and a wide field for the exercise of his superb talents, and he soon made cable history. Tariffs were reduced and a bitter war waged between the new company and the "pool." The volume of business was enormous and the call for

endurance and skill on the part of the operators was insistent.

During all this time Mr. Trippe was a tower of strength to his employers and his ceaseless vigilance in the performance of his arduous duties won for him the favorable recognition of Mr. J. H. Carson, the able chief executive of the Anglo. Mr. Carson is not so well known on this side of the Atlantic as is his rival, Mr. Ward, but his commanding position and influence in European cable circles is recognized by all who are interested in this great industrial enterprise which has done so much to preserve the peace of the world. Mr. Carson soon saw that something was out of joint on his machine and he completely revolutionized the plant, installed the latest mechanical devices for expediting the business, and ruthlessly obliterated the "caste" which made seniority of service the stepping-stone to advancement.

In his search for the best men to forward his plans, Mr. Trippe was not overlooked, and when a superintendent was wanted for the Anglo station at St. Pierre, Miquelon, he was selected by Mr. Carson for this important position. After a few years' splendid work at St. Pierre he was further honored by being chosen to be representative of his company in the United States, with headquarters in New York. Here the writer met him personally for the first time and it seemed strange to both of us that fate should so have planned this meeting far from the scenes where we first got to know each other on the wire.

Mr. Trippe's position in New York was one of great responsibility, and called forth all his diplomatic ability. He had energetic competitors on all sides. The Western Union was splendidly represented by M. H. Redding and P. J. Tierney, and, besides, it had the benefit of the valuable services as cable engineer of Mr. David Lynch. The Direct United States Cable Company was ably served by the lamented Messrs. James Brown and A. C. Frost. The French Cable Company was making great headway under the fine management of Mr. L. A. Lurienne, and the Commercial Cable Company, was, of course, reaching out for business in all directions. Truly, this hustling hive was a complete change from the comparatively serene atmosphere of an out-of-the-way cable station, but Mr. Trippe soon got accustomed to his environment and his unswerving integrity and gentlemanly demeanor made him a favorite with all.

I met him frequently during my stay in the city and we had many a pleasant chat about old times. It seemed to me, somehow, as if he often thought with regret on the promotion which had separated him from the old life of intimate association with the colleagues who shared his fortunes in the remote cable stations. He had the disposition of a student and the detachment of his former life was conducive to the gratification of his tastes in this direction. He was thoroughly versed in the science of electricity so far as it applied to submarine cable working. He was a master of every instrument at pres-

ent in use, and his knowledge of testing, the location of faults, and the thousand and one things that the superintendent of a cable station is supposed to know, was exhaustive.

Perhaps the greatest compliment which I ever heard paid to Mr. Trippe came from Patrick Bernard Delany. When I was at the Valentia station, Mr. Delany was trying some of his inventions on the Anglo cables, and, meanwhile, endearing himself to everybody who had the honor to be associated with him. The astonishing success of his apparatus in getting the best results in practical work was a matter of wonder to us at the time, and we could never quite understand why his system was not adopted by the company. Mr. Delany had, before this, been experimenting on the old St. Pierre-Brest cable, and while at St. Pierre he had the assistance of Mr. Trippe. I asked him how he liked Mr. Trippe. "Mr. Trippe," said the inventor, "is a fine man, a very fine man—a perfect gentleman."

A Record in Reading Tape.

BY J. W. LARISH.

Electrical Engineer of the Telepost Company.

In these pulsing days of extraordinary achievement, both above and below the earth, it is well, perhaps, to note and record at least one marvelous performance within our own ranks.

Telegraph tournaments have been held at which astonishing things were done in hand "sending."

Few cases are mentioned, however, where this prize-winning transmission has been "copied" legibly at its speed of 50 to 52 words per minute—which, by the way, can only be sustained for about five minutes, under the strain of forced effort—so that when I tell you of seeing recording telegraph tape transcribed into print, by hand, at 75 words a minute. I am prepared to hear not only your own voice in protest and incredulity, but that of the whole tape-reading craft, at home and abroad, because it is a record in telegraphy never before approached.

I doubt if even abroad, where tape systems are universal and long established, any transcriber could do more than half this at best, taking into account rolling up and managing the tape, even if the characters were as good as on the records from which the performances I mentioned are rendered.

Mr. B. H. Taylor, our electrician at Boston, is repeatedly transcribing new matter from constantly moving tape, without the error of a single letter, at 75 words per minute, from the current newspaper pages, and stands ready to demonstrate this to anybody, on call.

I had my attention attracted to this extraordinary feat last April, during the Portland, Maine, exposition, where we made an exhibit of which Mr. Taylor had charge.

During the ten days of the exposition Mr. Taylor was often asked as to the rate at which the tape (actually received over the wire from Boston at 1,000 words per minute) could be gotten ready for delivery in print. His announcements that he could typewrite it at 75 words a minute were frequently

challenged and as promptly verified before the critic's eyes, which it was known, were not always those of the layman.

I desire first of all, to see Mr. Taylor's talents and skill recorded in the pages of the craft's "clearing-house" as a matter of simple tribute to his exceptional qualities and modesty; and secondly that this astonishing performance may reach the eyes and ears of our brethren across the seas, where, at present, it will no doubt find greater interest than at home.

Naturally, to be sure, I must mention that it was primarily essential that Mr. Taylor should have perfectly clear, legible, correctly spaced tape characters for easy reading to do these things, which he surely had, though transmitted automatically over the regular working circuit from Boston to the Exposition Building in Portland, at full 1000 words per minute.

Of course, we are not all endowed with the talents for this sort of thing as is Mr. Taylor, who, by the way, is an old American Press Association operator, but his exploits do certainly tend to raise the average for tape-reading speed to high levels.

To paraphrase a well observed legal dictum, "Verum in uno, verum in multis."

Much might be said about how much speed of transcription may still further enlarge the claims in advantage of efficient automatic telegraph systems as against what may justly be termed the lingering hand methods.

Book Review

Major J. Orton Kerbey, the old time and military telegrapher, who is connected with the South American Correspondence Bureau in Washington has been engaged for some time past in writing a book entitled "An American Consul in Amazonia," in which he has described most entertainingly some of his experiences in South America while he was serving as United States consul in Brazil, and has given the first hand impressions which he obtained of that marvelous country during his extensive travels on foot, by canoe, on mule back and by steamer through all of the territory, from the source of the Amazon River to its mouth, a distance of 3,800 miles. One who has read the manuscript of the work says:

"The chapters on rubber, railway building, immigration, climate and scenery, ashore in Para, ethnology and religion, yellow fever, and a Sunday excursion with the '400,' read as if penned in the language of a delightful romance. There is not a chapter in the entire book of 500 pages with 100 illustrations that fails to interest and delight the reader."

Dr. David Homer Bates has read the new work and is assisting Major Kerbey in preparing the manuscript for publication.

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The Military Telegrapher in the Civil War.

PART XLII.

Mr. Louis H. Korty, who is at present living in retirement in Omaha, Neb., was a military telegrapher during the Civil War and afterward became prominent in railway telegraphic circles. In 1881 he was appointed assistant superintendent of telegraph of the Union Pacific Railway, and in 1887 succeeded to the superintendency which position he held until he retired in 1908. In writing to Colonel William R. Plum, historian of the United States Military Telegraph Corps in 1878, Mr. Korty gave the following account of his military experiences:

"I joined the United States Military Telegraph Corps during the fall of 1863. I served until after the close of the war in the Department of the Tennessee, Mississippi, and Gulf under Colonels W. G. Fuller and W. L. Gross, and later under General Thomas T. Eckert. I was operator and cipher clerk at the headquarters of Generals C. C. Washburne and N. J. T. Dana at Memphis. I took part in the campaign of General Canby against Mobile. After the close of hostilities, I took an active part in the re-establishment of telegraphic communication in Mississippi, Alabama and Louisiana and with the north. I administered the oath of allegiance to such of the Southern telegraphers as were not politically disqualified and who were willing to work for the government. I was chief operator of the joint military and commercial telegraph office at New Orleans from the spring of 1865 until the lines were turned over by the Government to the telegraph companies, after which I was ordered to Shreveport, Louisiana, as cipher operator at the headquarters of the northern division of Louisiana, where I remained until the final disbanding of the military telegraph corps in 1867 and wound up my career in the south by having the yellow fever in Texas in 1868, after which I came north.

"My connection with the telegraph corps during the war fortunately, or unfortunately, was principally of a peaceful and quiet nature, at points where the danger was not very great and I cannot therefore lay much claim to any mention in the history of the military telegraph, but I will, however, give a few facts as I can recall them with the aid of a brief diary and incidentally add something of an exploit of mine, which may be of interest.

"General Richard Taylor, commander of the Confederate forces in Alabama and Mississippi, surrendered to General Canby, at Citronelle, Alabama, on the Mobile and Ohio Railroad, on May 4, 1865. With the cessation of hostilities, however, the services of the telegraph corps had by no means ended. There was still an important task for them to perform, namely the restoration of telegraphic communication throughout the interior country and with the north, which had almost entirely disappeared on most of the routes.

Orders were immediately given for active operations. W. O'Neil's telegraph pack mule train which had previously rendered most efficient service, was brought out of its temporary quarters and sent into various directions with telegraph material for reconstruction purposes. Connection with the north over the Mobile and Ohio Railroad was completed on the evening of General Taylor's surrender. Colonels Fuller and Van Duzer, superintendents of military telegraph of the departments of the Gulf and Cumberland, respectively, sent operators to the principal points in their newly extended territory to assume charge, with instructions to retain in the service such of the Southern telegraphers as were willing to take the oath of allegiance as well as the oath prescribed for all Government telegraphers. In some instances telegraph construction parties met with no little resistance and opposition from straggling parties of Confederates who had not yet heard of Taylor's surrender, or who were not reconciled to such a fate.

"Samuel Cochran, assistant superintendent of military telegraphs, at Vicksburg, had begun rebuilding the line between Big Black River and Jackson, Mississippi, when he was taken sick. I was ordered to Vicksburg to take his place, but upon my arrival found him sufficiently recovered to resume his duties. The construction gang here consisted of a company of colored troops and were under the immediate charge of John F. Ludwig, an old member of the telegraph corps, who had just been liberated from a Confederate prison. The poles of the old line had almost entirely disappeared and the wire was strung on trees wherever it was practicable. The railroad track was also entirely obliterated by the ravages of the terrible events for which this locality had become so famous; where the armies of Grant and Sherman against those of Pemberton and Johnson had contended for supremacy in many hard fought battles, making the country as it were a vast burying ground. Now and then a chimney would mark the spot where once stood the mansion of some wealthy planter. Occasionally a ragged embankment, in many places washed to the level of the ground and now and then a telegraph pole faintly traced the route where once had been a great and prosperous railroad. The surrounding country was infested by guerillas and desperate characters from the Confederate army who had left their commands with their arms without waiting to be paroled, many of them encouraged to continued deeds of violence whenever opportunity offered, by the defiant proclamation of the Confederate General E. Kirby Smith, in command west of the Mississippi who proposed to keep on fighting as long as there was a Yankee left in the country.

"It was during this state of affairs that I was ordered to return from Vicksburg to Jackson to take charge there. I left Big Black River, the end of the railroad, on horseback in company

with a Captain Turner of a New York regiment. Before starting we discussed the propriety of only two travelling by night over a country of which so many stories were told about guerrillas and robbers, but there was no available escort at that time to accompany us. The officers in the camp at the river expressed doubt as to our courage to undertake the trip. This was the climax for us and off we started. The road before us had been sadly neglected during the past few years and was badly broken up. In many places it was crossed by deep ditches that compelled us to go some distance around over fields and through woods, altogether making our ride long and tedious. I soon found the Captain a very congenial travelling companion, full of stories of battles in which he had participated over the very ground we were then traversing. He pointed out to me the scene of the battle of Big Black River, the positions occupied and part taken by him, etc. At about midnight, we reached the celebrated Champion Hill battleground where, my companion informed me, he had been wounded. He described the terrible fight between Grant and Pemberton on this spot when the latter attempted by a strategic move in conjunction with Johnson, to annihilate Grant's army, but which resulted in Pemberton's being driven back into Vicksburg, thereafter being shut up in the beleaguered city tighter than ever before. The night was clear and mild, the bright full moon at this midnight hour gave the surroundings a weird and sublime effect. Bleached skeletons of horses scattered in every direction, numberless headboards of rude construction marking the irregular lines of graves of dead soldiers of both armies; wrecks of caissons, pieces of shells, etc., all clearly indicated that a terrible strife had taken place here. And I will admit that the sight, particularly at an hour 'when graveyards yawn,' was anything but pleasing to me and I was anxious to be off. My companion felt as I did. The recollections of the spot, brought back, under such circumstances and at that hour, caused him to shudder, brave as he was. We had just resumed our road leading through the thick woods when suddenly we were completely surrounded by eight or ten men coming out of the thicket with pistols drawn calling us to dismount. One of them had caught my horse by the bridle, another made a similar attempt at my companion's horse when the Captain opened on him with his revolver. This was the signal for a lively fire from our assailants. Before I could draw my revolver my horse which, fortunately for me, was very spirited and unmanageable, reared and broke from the grasp of the man who was holding it, and turning round dashed away with me at a terrific speed. In the meantime my friend with great odds against him engaged the guerrillas in a regular battle, emptying both revolvers at them, laying out at least two of them, and himself com-

ing out unscathed. I brought my horse to a stop with the utmost exertion, after he had run at least a mile, when I returned in the direction of the attack with a faint hope that the Captain had escaped injury. After a short time I heard him hailing me. As soon as we came together again we held a council of war as to the best way of proceeding on our journey, but hearing at this moment the neighing of a horse coming from the direction of the woods where we were attacked, we knew that the guerrillas were mounted and would probably pursue us. As they outnumbered us and knew the country better than we, we were completely at their mercy. Concluding therefore that discretion was the better part of valor we took an elevated position on the Champion Hill battleground, tied our horses, and threw up a barricade of a few fence rails and pieces of wood, confidently expecting to be besieged, and that we would be compelled to add to the fame of the historical spot by another battle, with chances against us far greater than they had been against Pemberton. The guerrillas seeing our purpose, that we were ready for a fight, and they having already fared badly at the hands of my brave friend, let us alone. We waited until sunrise and resumed our journey. That was the longest night I ever experienced in my life. The four hours spent behind our barricade seemed an age to both of us. We reached Clinton unmolested and breakfasted at the house of a professor, before the war the principal of a female seminary at that place. He related to us the circumstance of finding the bodies of two men murdered by guerrillas, two nights before, near where we had been attacked.

"One important service performed by the telegraph corps, was the clearing of torpedoes and other obstructions from Mobile Bay. Several of the members of the corps were assigned to this duty; they had a steamer at their disposal and were furnished with a plan, from the Confederates, of the location of the torpedoes. They sunk one hundred and two hundred-pound cans of powder with wires connected to a battery on board of the tug, and at the proper time exploded the powder near the torpedoes by means of the electric current from the battery. The bay and harbor were in this way cleared of obstructions of every kind placed there by the Confederates.

"Mobile was evacuated by the Confederates on the 11th of April, 1865, the army fleeing towards Montgomery. The city was surrendered the next day by the civil authorities to Admiral Thatcher. Among the telegraphers that took part in this campaign and were among the first to enter the city on the day of the surrender were I. A. Sherman, Z. P. Hotchkiss, S. L. Robinson, G. W. Baxter, George R. Penn, B. H. Upham, C. B. Smith, J. R. Frank, myself and others. We found the following southern operators awaiting our

arrival at the telegraph office: Edward Leloup, John Bohanna, Thomas Eastland and one or two others, who, tired of war, had quietly stayed behind when the army moved out. As operators were scarce all of these persons were immediately employed by the Government in the Mobile office."

The Wonderful Speed of a Russian Telegram.

The difficulties of sending a telegraph message from Russia are amusingly described by Antonio Scarfoglio in "Round the World in a Motor-Car." Upon asking the telegraph operator at Pogradichaya to receive his message, the official announced gravely that he could not accept a cipher message unless assured that the key was deposited in St. Petersburg. Signor Scarfoglio assured him that the message was not in cipher, but in Italian.

"Italian? Italian? First of all, what is Italian?" questioned the operator.

"Italian, my worthy sir, is a very well-known language which is spoken in Italy, a country which enjoys a constitutional monarchy, a liberal government, an army, navy, macaroni."

"Ah, yes, yes, macaroni. I remember the country of macaroni."

"So now you can transmit the message at once, so that it shall arrive at Torino at once."

"Did you say Torino?" he asks.

"Torino, Torino."

He began to look through a book, chanting "Torino, Torino, Torino. Here it is, Torino, in Texas, United States of America. Why did you want to talk about Italy?"

"But it is not Texas; it is Torino in Italy." Then I ventured, they make vermouth there."

"Ah, I understand now; but if you pronounce the names of towns so badly nobody can understand you. It is Turin; Turin, not Torino."

"What is the cost?"

"But why do you want to pay me? You must understand that your telegram cannot go."

"Why not?"

"If my dear sir," he resumed, "you had allowed me to speak, I should have told you from the first that I cannot telegraph in Latin characters for the simple reason that I do not understand them."

"But there is a tablet hung up here saying that the office accepts telegrams written in Latin characters."

"That is very true, but it only accepts them when the employe who is able to transmit them is present. Now he is not here."

"Where is this gentleman?"

"He is on holiday. A poor workman has a right to his repose. Russia, as you will admit, is a civilized and progressive country."

"I am profoundly convinced of it. But can't he be found and asked as a special favor?"

"The permission of the director is necessary."

"And where is the director?"

"In the country. To-day is St. Prosdemo, a great Russian feast; to-morrow is St. Nicodemus, another great feast. The day after to-morrow is St. Pancracius, and no office in Russia is open."

"So that?"

"So that you have some chance of finding him next week; on Monday or Friday, because the other days are feast-days."

"And my telegram will remain here?"

"Until Monday at least."

The Future of Electricity.

In the June number of Popular Electricity Thomas A. Edison discusses "The Tomorrows of Electricity and Invention," and declares that if he thought the possibilities of electrical development were exhausted he should not give it a moment's consideration. Were he to begin his life over now, even when it is assumed that all the great electrical inventions have been made, he would like nothing better than an opportunity to do original work where others have left off.

"The chances for new electrical inventions are much greater now than before the telegraph, the telephone, the electric light and the electric motor were invented; while each of these things is far from perfect. We shall have easily \$50,000,000,000 of money in electrical service in 1925, and five times as many persons will then be employed in electricity as now, most of them in branches for which we have not yet found even a name. I often pick up my laboratory note books, of which I have hundreds, full of hints and suggestions and peeps into nature, and realize how little we have actually done to set electricity at work, let alone determine its secret.

"Look at the simple chances of improvement in what devices are known today. They are endless. About one hundred million carbon filament lamps are made here every year, much the same in all essentials as a quarter of a century ago. We must break new ground. Lately the art has gone back to metallic filaments bringing down to one-third the amount of current needed for the same quantity of light. That is only a step. The next stage should be to one-sixth, and, as Steinmetz says, carbon is still in the game, for many of its qualities render it superior to metal. It is the same way with electric heating and cooking appliances, very ingenious even now, and better than any other means; but ten years hence they will be superseded and in the museums with bows and arrows and the muzzle-loaders. As for the electric motor, it will not be perfectly utilized until everything we now make with our hands, and every mechanical motion, can be effected by throwing a switch. I am ashamed at the number of things around my house and shops that are done by animals—human beings, I mean—and ought to be done by a motor without any sense of fatigue or pain. Hereafter a motor must do all the chores."

Protecting Telephone Lines from Lightning and Other Disturbances.*

BY M. E. LAUNBRANCH, CHICAGO.

The protection of telegraph lines from lightning and other disturbances is assuming more and more importance with the increasing use of high voltage power transmission; and as the telephone is extending into new fields.

Although the telephone is in a high state of development at the present day, there is still a great deal to be desired; and each time a new field is entered, new conditions arise, so that the telephone engineers are kept constantly busy meeting such conditions and developing new schemes for improvement of service. The rapid development of other branches of electrical transmission such as power transmission lines, lighting circuits and trolley roads, in all parts of the country, has multiplied the troubles of the telephone circuit; which, not many years back, held undisputed sway throughout the rural districts, and literally possessed the earth and compelled it to do part of its work, as ground circuits were most common then. These ground circuits are rapidly being driven out of existence, by these other circuits of high potential taking possession of the territory.

In addition to these we have the ever present atmospheric conditions to contend with, such as lightning and other static disturbances. All high tension lines are circuits for the transmission of electrical currents with inanimate machines to transmit and receive the power while the telephone line is a circuit for the transmission of human intelligence and a human being is the generating and receiving machine.

In the first group of circuits we must protect property from injury or destruction caused by the atmospheric disturbances or disturbances created within themselves. But on a telephone line we must provide protection not only against disturbances, injury or destruction of property, but against injury and annoyance to the user.

As stated in our subject, we shall confine ourselves to the protection of telephone lines, and more especially to lines in railway service. Let us first take disturbances from lightning. These are of two kinds, direct, and indirect or induced. Fortunately the most destructive is the least experienced; namely, the direct flash. And this is certainly very fortunate when we realize that no very effective protection has ever been designed to guard against its destructive effects, such as destroying entire cable terminals, melting heavy copper leads and instruments. By far the greatest amount of lightning disturbance is caused by induced charges, and these range from those that burn out the coils, transmitters and

receivers, to the annoyance experienced by a despatcher getting a crack in the ear from the static charge passing from one wire to the other through his receiver, or the surging and snapping one hears on long lines during electric storms, and even in dry snow storms.

PROTECTION FROM DIRECT FLASH.

As stated previously, no real successful protection against direct lightning flashes has been designed for telephone lines, or at least none which would be considered commercially economical considering the small per cent. of loss due to such causes. A protector for such a purpose must have large carrying capacity and low resistance to lightning discharges. Such protectors have been designed for use on power transmission lines and are of two types, electrolytic, and multiple air-gap combined with resistance. Such arresters are not only for the protection of lines from lightning, but from excessively high potentials created within themselves.

It is a question whether protection can be provided to guard against such disturbances, when we consider the enormous energy in a discharge which has pierced through an air-gap often times over a half mile in length, so that the remaining distance after it hits the line amounts to very little. It will often not even go down the ground-lead, but will melt the wire it first hits and then shoot off through the air and hit some adjacent object, no matter how good a ground you may have, although a ground should always be of the best. Of course, these direct flashes vary in intensity and every possible means should be provided to take care of them; and there is no doubt that a despatcher's line or message wire is far better protected against such disturbance than the ordinary single station telephone line, due to their being equipped with arresters at every station which act like a long drawn-out picket fence of grounds which do a great deal towards dissipating the charge by assisting in preventing its concentration toward one point.

As stated before, destruction from a direct flash is very rare, and even when a line is struck, the energy of the flash is so great that it does not always follow the turns and twists of the wire entering a building. This is the reason one so seldom hears of a person being injured by lightning while using a telephone, which speaks well for the present day protection; and this is especially true of the despatcher's line, as the writer has heard of only one burnout in two years on any such circuits, and no one was injured in the slightest degree at that time.

PROTECTION FROM INDUCED CHARGE.

It is oftentimes hard to distinguish between a direct flash and an induced discharge from the damage done, as an induced discharge is sometimes so intense that it causes as much destruction as a direct flash—at least, its practical results are just as serious as far as putting the line

*A paper read at the convention of the Association of Railway Telegraph Superintendents at Los Angeles, June 20-25, 1910.

out of service, and also, as to its being dangerous. As stated before, that although this trouble, due to induced discharge, constitutes by far the greatest per cent. of all the disturbance experienced on telephone lines, only a small portion of this is dangerous to persons; the greater portion being such as to cause annoyance to the service. The majority of these troubles may be enumerated as follows: burned out coils in relays, bells, and receivers; punctured condensers; conductors in cables destroyed; insulation in cables reduced by charring of insulating material; blowing holes through sheaths of cables, thus letting in water and putting cables out of business.

The so-called burning out of coils often consists of discharge taking place between different layers of the winding, and either short circuiting the coil or fusing of the wire, as it is often very fine; and thus opening the coil. Very often, however, the energy of the discharge is so great that the coil is entirely destroyed in dissipating the heat. In puncturing condensers it often occurs that after the discharge takes place, enough current follows to burn out the cross between the plates, leaving it as good as ever, so that the trouble-man is mystified when he sees evidence of lightning having passed through the condenser and still finds it O. K.

I have gone somewhat into detail in the foregoing, so that we may have clearly before us just what we must protect against.

PROTECTION OF APPARATUS.

To protect our apparatus it is very evident that we must provide a path for the static charge, of a lower resistance than that found between windings of fine wire, with thin insulation on the coils and between plates of condensers, as these are the weakest spots that must be protected. The first attempt at lightning protection to telephones was the toothed plates mounted closely to the ground plate, similar to that used in telegraph service. This served the purpose to some extent, but was not as efficient as protectors of later design. The protector now most used consists of carbon blocks separated by very thin sheets of mica. Although these protectors are of various designs, the principle is the same; namely, the flashing of the discharge between the carbon blocks across the intervening air-gap. Some such arresters are provided with a piece of fusible metal set into the center of one of the carbon blocks so that in case a discharge is followed by a volume of current the carbon becomes heated enough to melt the metal, which in turn forms a solid conducting path to ground, thus putting a dead ground on the line and blowing the fuse. This type of arrester has proved very efficient on the lines of telephone companies, and is used almost exclusively in exchange service.

As the telephone commenced to be used more extensively in railway service, new conditions arose which gave trouble and had to be met. One

trouble with the regular carbon mica arrester is that it does not always clear itself after each discharge. The consequence is that after a discharge there is generally left a dead ground on the line, or one of high resistance which is often enough to cause a noise. This is not of so much consequence on the ordinary exchange line where there are only few arresters, which are so located that the carbons are easily removed and cleaned.

On railway telephone lines another condition is met with; namely, that instead of from two to a possible ten telephones being on the line, there are from twenty to even a possible sixty, with an arrester at each station. Under such circumstances it becomes necessary to have an arrester which will remain clear after each discharge, as here it is not only a question of protection, but that the service shall continue uninterrupted, as the business on these lines is of such vital importance compared with what might be going over a farmer's line which can stand having poor service for a possible half day, due to some protector being grounded.

About seven years ago, in making a study of telephone requirements on trolley roads, this question of high resistance grounds was one of the first difficulties we had to deal with. It was found that the regular carbon-mica arrester, although it might not always become heavily grounded, would still give a high resistance ground due to fine particles of carbon lodging on the edge of the mica. These high resistance grounds would not be noticeable where there were only two or three instruments on the line; but when a greater number were connected these grounds having multiplied, they produced heavy noises on the line, this also being intensified because of the fact that these lines run parallel with high tension circuits, often on the same pole. To do away with this trouble a great deal of experimenting was done to find a substitute for the carbon block, by trying different kinds of metal such as aluminum, zinc, brass and copper. Sand blasting the surface to produce points was tried. The outcome of these experiments was the present copper block and mica arrester, which is at present quite extensively used. This arrester although it has cleared away a great deal of the trouble due to carbon dust, still has a path on the ragged edge of the mica for the accumulation of dirt, and possible carbon dust from smoke. It also does not fully take care of the discharge from one wire of the circuit to the other, which more frequently finds escape through the despatcher's receiver than across the air-gap of the arrester. To do away with the trouble caused by the accumulation of dust on the edge of the mica, and also, to take care of heavy flashes, a number of arresters have been designed in the last few years. As an example of this type might be mentioned the O'Connell which is quite extensively used on train des-

patching lines. This consists of large carbon blocks widely separated by insulation and set in V position in relation to each other, so that at the point of the V the edges nearly meet, this being the point of discharge. This arrester has proved quite efficient as it not only clears itself quite readily on a small discharge, but it has a capacity to carry heavy discharges and of caring for heavy flashes by blowing them out by means of its V-shaped air-gap. There are also other types of arresters which are designed to carry heavy discharges of different designs.

Of two later arresters put on the market one uses a partial vacuum for an air-gap between two carbon plates known as the "Vac-M"; the other is a departure from the air-gap principle entirely, and might be termed a direct contact arrester and consists of carbon blocks being separated by means of a composition block instead of an intervening air-gap, and it is known as the Brach arrester. As these two arresters are of quite recent origin we are not able to give any extensive data as to their efficiency under all conditions on the telephone lines. It might be stated, however, that these two seem to be lightning arresters pure and simple, and will not protect against power circuits of low potentials. However, they have the advantage of taking care of lightning discharges repeatedly, without leaving any ground on the line.

In the "Vac-M" the discharge takes place in the form of a brush discharge between two carbon plates across a partial vacuum. In the Brach arrester, the discharge takes place between two carbon blocks through the intervening static conducting composition block. It would seem that an arrester of this type gives promise of quite an improvement for taking care of the greater percentage of troubles and annoyances on railway telephone lines. The composition acts as a nearly perfect conductor for highly oscillatory current such as lightning and static charges, while it is of high ohmic resistance for direct currents.

This composition arrester has been in service on block systems for two years and has given very satisfactory service. A number have recently been put in service on telephone lines and we see no reason why they should not clear away considerable of the trouble not being cared for by the present air-gap arresters; namely, the annoyance of minute static discharges on railway telephone lines, and toll lines, and at the same time keeping the line clear of grounds.

At this point, I again wish to call attention to the fact that a train despatcher's and message service lines on railroads are far better protected than the regular long lines of telephone companies, on account of their having a number of arresters distributed all along the line; and I believe I am making a conservative statement when I say that injuries to apparatus on these lines have been very rare.

If an arrester can be produced which will care

for static discharges without permanently grounding, and of high enough ohmic resistance to prevent leakage, there is no reason why this system of protection, namely, distributing arresters along the line, should not be adopted on regular long distance lines.

PROTECTION FROM HIGH TENSION CIRCUITS.

Railway telephone lines being run on the railroad's private right of way are probably more free from the dangers of high tension crossings than the lines of telephone companies; still with the ever increasing growth of high tension circuits the protection against these sources of danger is becoming more and more necessary in the more populous districts. The chief step to be taken in connection with protecting these lines is, of course, the high tension crossing which has already been thoroughly covered by the association specifications for these crossings. This, however, does not remove the necessity for providing protection on the lines themselves, where crossing from such circuits are made possible by their presence. The methods in use for such protection are the lightning arrester and fuses.

The same lightning arrester discussed under protection from lightning, serves this purpose quite well; namely, the carbon arrester, with small enough air-gaps to permit the flashing across of potentials, say 350 volts and over, and to fully protect the apparatus. In such cases a fuse should be provided which will open when the current flows which follows the discharge.

As the standard commercial fuse will not always take care of the opening of a circuit where crossed with a very high tension wire, other methods have been employed to protect the line; namely, where the dangers of such possible crosses occur, a section of the line is so constructed that in case it is crossed by the high tension wire, that section will disconnect itself and drop out, thus making a break long enough to extinguish the arc.

SUMMARY.

Taking the whole subject of arresters we have the following conditions; the carbon air-gap arrester is necessary to protect lines from crossing with other circuits of 350 volts and over, and the heavier lightning discharges followed by current. An arrester of efficient static carrying capacity is desirable to take care of the larger percentage of troubles and annoyances due to static discharges. It would, therefore, seem that an arrester which would take care practically, of all the troubles on railroad telephone lines should consist of large carbon blocks with a small air-gap at one point the blocks to be insulated from each other by means of a highly efficient static carrying material; such material to be of high ohmic resistance, to prevent leakage to such an extent that it will not produce noise on the line; or a combination of two types of arresters could be used; namely, the static arrester connected

direct to the line without fuses and the carbon arrester connected through fuses to protect the instruments.

LOCATION OF PROTECTORS.

The most desirable location of protectors is, no doubt, outside of the buildings, although the greater number of them are located on the inside, and apparently without very much risk, as the number of cases of disturbances from lightning and high tension circuits which would cause danger to buildings are very few. However, the best place to locate an arrester, especially for protection against lightning, is on the pole. A very efficient way of connecting such an arrester is to mount it on the cross-arms between the pins of the wires to be protected, connecting the carbon block directly to the line wire; and at this same point connecting the drop wire which is to enter the building. This drop wire, immediately after leaving the connection on the lightning arrester or line wire, should be wrapped several times, either around the pin below the insulator of the wire to which it belongs or around the cross-arm before it is extended into the building. This you will observe gives you a highly efficient choke coil that in case of lightning discharges, forces the current to ground through the lightning arrester instead of permitting it to enter the building. If a fuse is desired, one side of this should be connected directly to the line wire, the other side can act as the terminal for connecting the one side of the arrester and the drop wire.

The objection to having a fuse located on a pole is its inaccessibility. It is, therefore, recommended that for railway service the fuses be omitted on the pole arrester, but that it be installed ahead of the instrument in the building. Another advantage of having arresters mounted on the pole is that it permits a most direct and straight lead, as this is most desirable to take care of lightning discharges and prevents side flashing to quite an extent.

For ground leads iron wire is just as good as copper. Another objection to a fuse on a pole arrester is that these arresters are primarily intended to take care of the greater per cent. of static discharges which are mostly of such a character that they do no serious damage, only cause annoyance, and still are often severe enough to blow a fuse, which proves a source of great trouble and is of no practical service.

PROTECTING CABLES.

In the protection of cables, lines before entering the cables should be provided with fuses to prevent excess current getting in and destroying the conductors, or charring the insulating material, which would reduce the insulation; where cables leave terminal boxes a loop or goose-neck should be formed, as it has been found that where lightning succeeds in entering a cable at a terminal box and there has been such a loop or goose-neck,

the charge has, nearly without exception, discharged itself out through the sheathing at this loop or goose-neck, leaving a hole very much as though a bullet had been shot from the inside. It is better to have this occur at this point, where the cable can be easily repaired or boiled out in case of water having entered, than to have it penetrate further in. Such blow-outs are generally caused by heavy discharges which destroy the fuses and get beyond them.

In a study made several years ago, on damage done by lightning on cables of one of the telephone companies, it was found that this was a fact nearly without exception. In one case where the cable came straight down the pole out of the terminal head and went under ground, it was found that the discharge through the sheathing had taken place where it made the turn in the man-hole and entered the conduit, making it necessary to pull out the cable to make repairs.

OTHER DISTURBANCES.

As we have made lightning protection the principal feature of this paper, we will just briefly mention other disturbances. Of course, such other disturbances will chiefly be induction due to paralleling circuits. Transposing of lines take care of the ordinary disturbances due to adjacent telephone and telegraph disturbances. Such transposition will, of course, depend upon the paralleling circuits to be contended with. The most extreme cases to handle are paralleling high tension circuits, and especially if these high tension circuits are very close and have a large carrying capacity. We have met with cases where the induced effect from such circuits on a telephone line have been such that it has produced a current to ground direct from the telephone wire, of as high as three and four amperes; and in taking a volt meter reading to ground it has amounted to 200 volts, and in one case in attempting to take a volt meter reading the meter was burned out.

This will be appreciated when it is realized that a telephone wire being adjacent to a high tension A. C. transmission line is simply a good conductor directly in the magnetic field. The consequence is that the telephone wire will not only have a high static charge but will also be a conductor of electro magnetic current, being in reality one coil in a transformer. A very efficient way of caring for this trouble has been the drainage coil. This consists of a well balanced retardation coil bridged across the line, the center being connected to ground. These coils are connected at intervals along the line, depending upon the amount of induced current it is necessary for them to carry off. Of course, the wire in these coils must have enough carrying capacity to take care of the current to prevent burning them out. This coil also keeps down the static charges.

Education for Efficiency in Railroad Service.*

BY D. C. BUELL, OMAHA, NEB.

Chief of Educational Bureau of Information, Union Pacific Railway.

Never before in the history of our country has greater attention been paid to industrial education than during the past ten years.

Railroad managers, especially, have realized the need of educational work throughout their entire organization, and have, from time to time, attempted to accomplish something along this line. The attempts thus far made have been confined principally to the education of special classes of men employed in the shops. In some cases co-operative arrangements have been made with universities, business colleges, Y. M. C. A. schools or correspondence schools to secure their assistance in the education of special classes of employees.

It remained, however, for the Union Pacific Railroad Company to blaze the trail of real railroad educational work by establishing the first comprehensive educational plan for an entire railroad organization, viz: its Educational Bureau of Information.

I. Shirley Eaton, in a recent monograph published by the United States Bureau of Education, and after an exhaustive study of present railroad educational plans, draws seven conclusions which it would seem pertinent to quote, regarding education for efficiency in railroad service:

"(1) Railroad financial managements should incorporate an educational scheme as a definite part of their policy on the ground of business prudence. Such policies should be inaugurated for periods of not less than five years, preferably ten, otherwise the money appropriated will be largely wasted.

"(2) Railroads should extend the principles of definite apprenticeship to every department of service. Between these grades should be more grades of apprentices in order to take account of differences in capacity and work done elsewhere, either in properly accredited schools or by experience, and leading to different grades of service. Between these grades should be free movement, so that no individual should be arbitrarily designated to any class from which by his own effort he cannot advance (or by his own default automatically drop out). To assure this, the tenure in any apprenticeship status should be periodically tested.

"(3) There should be formal provisions for movement among departments under proper conditions, and the comity of railroads should be so far extended as to formally provide for some interchange of officials under special restrictions.

"(4) In executing the policy of education announced by the directors, there should be a superintendent of education reporting directly to a higher official, such superintendent to be thor-

oughly informed of the educational policy of the railroad and the broad considerations on which it rests. His department should systematically recruit the employes throughout the service and certify, on request, to their records and general efficiency in the early stages of promotion.

"(5) Efficiency should be recognized by an efficiency wage, stated distinctly apart from the seniority wage.

"(6) Employes should be encouraged to take outside courses of instruction or experience without forfeiting their tenure, and, so far as possible the educational department should systematically turn to account every outside educational agency, by suggesting courses, uniting in co-operative courses, and recognizing the work done in those courses, to the end that theory and practice be joined.

"(7) The educational opportunities of the service should be utilized to the utmost by encouragement of perfect freedom of study and criticism, and interchange of ideas concerning accidents, bad work, and all the details of practice. Annual or semi-annual meetings of employes by classes of work, and the preparation and circularization of papers and discussions should be a feature."

It will be noted in the following description of the Educational Bureau of the Union Pacific, which was organized some months before the publication of this government monograph, that the plan of the Bureau conforms to all of these conclusions, except the second and the fifth, the practicability of which two are considered doubtful by many of our leading railroad officials.

The Educational Bureau of the Union Pacific had its origin in the idea of Mr. Harriman, that with the amount of mileage and number of employes of the affiliated lines it never should be necessary to go outside of the organization for men to fill vacancies to which employes might be promoted if qualified. Consequently he asked the officials of the different companies comprising the affiliated lines to work out some educational plan, whereby there would always be employes in the service ready for promotion when vacancies occurred.

There were no precedents for guidance in establishing this Bureau. The industrial education of particular classes of employes was being carried on by some firms. A number of railroad companies, the Union Pacific included, had classes in arithmetic and mechanical drawing for shop apprentices, and in some cases special apprentice systems. The Southern Pacific had a course of training in railroad operation which had been in effect for four years. Their plan was to have a special class of from five to ten men, preferably college-bred, and not necessarily employes. These men were put through a special course of about four years' duration during which time they were paid from eighty to one hundred dollars per month. The course took up station

*Paper read at the convention of the Association of Railway Telegraph Superintendents, Los Angeles, June 20-25.

work, track work, storehouse work, train service, yard service, despatching, and trainmaster's work. At the end of the four years students were supposed to be qualified to take official positions.

The Union Pacific had contracts with certain telegraph schools to prepare students for the position of station helper. Railway wires had been cut into these schools and station forms were furnished. None of these plans, however, was broad enough to cover what was wanted, although it was decided that the education of station helpers, which had proved highly successful, was to be made a feature of the new Bureau.

After a period of careful study on the part of Mr. Mohler, vice-president of the Union Pacific, Mr. Park, then general superintendent of the Union Pacific, but now vice-president of the Illinois Central, assisted by the heads of various departments, and the writer, the Bureau was organized on September 1, 1909. In formulating the plans, two cardinal principles were kept constantly in mind; first, the Bureau was to be for employes of all departments, each employe being equally entitled to all benefits as far as his position and qualifications warranted, all instruction was to be free, and in no way compulsory—its aim being to assist those who desired to benefit by it. Second, the Bureau was to be kept entirely separate from the general organization. It was to assist employes, but was to have no voice as to the advancement of any of the students. If a student desired to advance, it would depend the same as heretofore, upon his immediate superior in the department to which he was attached. If he desired to advance in some other department, it would depend upon the recommendation and approval of those who had charge of the department concerned.

It can be readily seen from this that the idea was to eliminate favoritism and "pull" and let each man know that the opportunity was offered to him to prepare himself for better things, without regard to his station in life.

It was not the object of the Bureau to make officials, but to make more efficient employes from whom would naturally come those who were qualified to become officials.

The plans of the Bureau as announced, set forth the three principal objects which it was to accomplish; first, to assist employes to assume greater responsibilities; second, to increase the knowledge and efficiency of employes; third, to prepare prospective employes for the service.

It was further announced that the privilege of using this Bureau was open to all departments and employes free of any charge, the Company maintaining the Bureau for the benefit of the entire service.

The Bureau as organized, is controlled by a Board of Supervisors consisting of five of the general officers.

The Bureau is directly in charge of the writer, who reports to the Vice-President and General Manager.

An Advisory Board acts with the Chief of the Bureau in handling all matters relating to the various departments, holding meetings each week, and enjoying the active co-operation of the Vice-President and General Manager and the General Superintendent—the latter representing the Board of Supervisors.

The Advisory Board plans the courses of reading and study; passes on applications for courses, and assigns the work each student is to take up; approves questions answered by individual members of the Board; advises the Chief of the Bureau on such matters as may be brought before it; and plans the policy to be pursued in handling new matters that arise from week to week.

The Board is made up of a representative official from each of the various departments, such representatives being selected on account of their special fitness for the work.

The scope of the work now being carried out by the Bureau will naturally have to be considered under three primary objects which it is desired to accomplish.

ASSISTING EMPLOYES TO ASSUME GREATER RESPONSIBILITIES.

Courses of reading and study, especially prepared under the direction of the Advisory Board are being issued to cover as much of the "unwritten law" of railroading as is possible, and to include such existing instruction and written matter as will assist an employe to assume greater responsibility in the line of his work. Regular courses are offered on the following subjects: Telegraphy, telephony, maintenance of automatic block signals, interlocking signaling, railway mechanical engineering, track work in both English and Japanese, station accounting, general accounting, railway operation, freight passenger traffic, electricity in its various branches, locomotive operation, air-brakes, shop practice, car building, gasoline motor car construction and operation, railway civil engineering, refrigeration, the analysis of statistics, and mechanical drawing.

These courses are all conducted somewhat on the method of existing correspondence schools. Any employe is eligible to take up one or more of these courses, and while employes are expected to take up a course that applies to their actual work, nevertheless, they are allowed, under certain conditions, to take up subjects in which they are most interested. Certain reasonable rules apply to the assignment of courses so as to make the work of such a nature as will benefit both the student and the company.

It is not the intention to teach elementary or rudimentary subjects, such as arithmetic, spelling, grammar, etc., except in certain particular cases, like shop classes for apprentices, or where

an employe is located at such a point that there is no other way for him to get this training, and the training of this man in the particular subject would be of benefit to the company.

All students are required to familiarize themselves with preliminary papers covering the history and geography of the road, before taking up definite courses.

Special papers are issued at frequent intervals to various classes of employes, whether students of the Bureau or not. These papers deal with live subjects of general interest.

It was realized, when first planning the work of the Bureau, that to meet these requirements, practically all instructional matter would have to be prepared and published by the Bureau, there being practically no books issued that could be used for work of this kind. This was due to the fact that all instructional matter put out by the Bureau deals specifically with Union Pacific methods and standards; is approved by the heads of the departments interested; and can be accepted by the student as authoritative information, applicable to his daily work. The lessons are divided into small units, and a set of questions accompanies each lesson. Written answers to these questions must be submitted, and must show a satisfactory understanding of the work before additional lessons will be furnished.

The lesson papers are prepared in outline by officials, or other employes of the road, who are selected for this work as a result of some special fitness they possess to handle the subjects which are assigned to them. Material from which to prepare the Station Course, for instance, was in part collected as follows:

Outline of the subjects it was desired to cover in this course was made to certain station agents best qualified to write upon these subjects. These agents prepared papers on the subjects assigned to them, following which all who had submitted papers were called together for conference at the Bureau Headquarters. The papers were discussed and compared, and from the material submitted, selections and eliminations were made until the nucleus for each of the several units of the course was established. From this, as a starting point, the subject matter is written up by the editorial department of the Bureau to conform with a standard method of presentation.

Complete records are kept of the student work done by employes; and the names of those making good progress, together with their records, are furnished the officials interested.

A summary of the first seven months' work of the Bureau as regards the results accomplished in this first object just described, will undoubtedly be of interest. It must be borne in mind, in this connection, that the proposition was a new one and the texts, in some instances, could not be put out as rapidly as students were prepared to receive them. It should also be remembered that—in view of the fact that the Bureau was not

in shape to handle an unlimited number of students,—no attempt was made to urge employes to take advantage of the opportunity; all men receiving instruction have voluntarily applied for the courses which they have taken up. From September 1, 1909, to March 31, 1910, inclusive, 937 employes enrolled for courses. In addition to this number, 15 relatives of employes were allowed to take up studies of various kinds, and 46 "outsiders," who were considered promising material for prospective employes, were given studies along the line of work they desired to take up when they entered the service of the company, making a grand total of 998 receiving instruction up to March 31st. A total of 1422 lesson papers were sent in and corrected during this same period. The total enrollment of the Bureau at this writing is 1200, the lesson papers are being sent in and corrected at the rate of about 500 per month. Those enrolled are distributed among the various departments, and all classes of employes are received, from laborers up to officials of the rank of assistant superintendents. The most popular courses are those in signal work, railway mechanical engineering, track work, station work, traffic, accounting, railroad operation and railway civil engineering. Twenty-eight regular courses are in the process of preparation, and more may suggest themselves as the work progresses.

In connection with this part of the Bureau work, men selected for advancement to minor official positions, are afforded an opportunity before their final appointment is made, of acquiring a knowledge of the practical workings of departments with which they have not been intimately connected. This is accomplished by securing such employes a temporary connection with the various departments, under the direction of the heads of such departments, and at a salary fixed by the Board of Supervisors.

(To be continued.)

* The Erie Railroad Employes Magazine relates the following joke which passed between an agent of that road and Jay Gould while the latter was president of the Erie:

"One day a man with flowing beard approached the window of the ticket office. Train No. 1 was standing at the station, having just pulled in. Assuming that he wished to buy a ticket the agent queried, 'What place?' The reply was 'Nowhere.' 'You are on the wrong road, we don't run there,' responded the agent. 'You are right,' said the man. It was Jay Gould, whose private car was attached to the express, but the agent knew nothing of this until after the train had passed on."

"Pocket Edition of Diagrams," etc., the latest revised edition, 334 pages and 160 illustrations, published by Telegraph & Telephone Age, contains just the information every telegrapher requires.

Wireless Communication as Applied to Railroad Lines.*

BY DR. LEE DE FOREST.

A subject of this type must necessarily deal largely in futures, yet the demonstrated possibilities of the radio telegraph and telephone and the strict requirements of the railway service are today so well known by the experts in each separate field, that, by conferring and co-operatively working together, it is reasonable to suppose something tangible, and of real value to both may rapidly result. The possibility of telegraphing wirelessly to moving trains over considerable distances by means of the old fashioned spark telegraph, was, I believe first demonstrated in 1905 over the Chicago and Alton Railroad out of Chicago and St. Louis.

Thanks to the enlightened interest which the officials of that road took in my proposals, I was allowed the privilege of experimenting on the fast daylight express between St. Louis and Chicago. Two horizontal antenna wires were first run on insulators along the top of the train and connected to a receiving instrument installed in the parlor compartment of that coach. Earth connection was made to the trucks, the fifteen kilowatt station at East St. Louis, about two miles from the track side and the ten kilowatt station at Chicago, a quarter mile from the rails were used as transmitters. No attempt was made at that time to transmit messages from the train. But unfavorably situated as both these stations were, so far from the tracks, messages were clearly received on the flying train when 30 to 35 miles from these stations.

Subsequent experiments at New Haven, Conn., and Toronto, Canada, demonstrated the correctness of my view, that the track rail system, including the mass of telegraph or telephone wires along the right of way served not only as a conducting zone or wave chute along which the electric waves preferred to travel; but also acted as a net to catch waves coming transversely and obliquely towards the right of way, and then distributing in both directions along the track a surprisingly large amount of electric energy.

On account of this directive action of the telegraph wires it is easy to pick up strong wireless telegraph signals by a wave detector connected to a short horizontal wire stretched parallel and near to the telegraph wires, and at a surprisingly large distance from the wireless transmitting station.

Now, given this phenomena, it is easy to understand how a track side wireless station, using a horizontal antenna wire say 100 feet long fastened to two or three telegraph poles, can communicate with another trackside station similarly arranged, and distant twenty or even more miles from the first.

Obviously one or both of these stations can be located on board a train, and in such case the hori-

zontal antenna wire can, as I have demonstrated, be run inside the cars, of heavily insulated wire, parallel to the bell cord. This is, of course, providing that the cars are of wood and not of steel. In the latter case wires would need be supported on insulators a few inches above or at one side of the roof of the cars.

By this arrangement it would be a comparatively simple matter to telegraph regularly to and from express trains, over a distance of say forty miles (twenty miles on each side of the track side station). However, the commercial applications of such a wireless telegraph service would be generally confined to a few limited trains, where for the benefit of traveling business men, a news or stock report service could be made a feature. The expense of carrying a telegraph operator on board more than the cost of the equipment entailed, would greatly limit such application.

With the radio (or wireless telephone), however, the case becomes very different, so different in fact that it is my firm belief that ere many years the telephoning to moving trains, and especially to locomotives, will become a very common, or well nigh universal adjunct to our elaborate railroad safety appliances.

For such a purpose long distance of communication will be quite unnecessary, in fact, undesirable. Consider a railroad system equipped with the block system, with signal stations or towers at mile intervals; a small wireless telephone transmitter capable of half mile communication and utilizing the inductive or "wave-chute" action of the existing telegraph wires would cost little to install, little to operate, and be so simple as to add practically nothing to the training of the signal operator. A horizontal antenna wire would be extended to the first or second telegraph pole stretched three feet below the lowest telegraph wire, the earth connections would be direct to the track rails. On the locomotive or over the locomotive and the first coach will extend an insulated wire as easily coupled up when making up the train as is the air brake at present. In the cab a small box is fastened containing a tuning coil and a simple crystal wave detector; connected to this is a single head telephone receiver with head band attached, or a telephone receiver with rubber air pad is fastened to a short arm, at a point where the engineer can easily rest his ear against it. The body of the locomotive, of course, supplies the earth connection.

This system would enable the signal man to talk direct to the engineer for a period of one to four minutes, and add immensely to the probability that he will perceive the proper signal, or enable him to receive orders or information which the semaphore cannot possibly communicate. The engineer could not, of course, reply, except to O. K. by whistle.

It would appear that by this appliance it will be generally quite unnecessary for a train to stop merely to receive despatcher's orders. What value this saving of time of hundreds of trains would

*Paper read at Los Angeles Convention.

aggregate to the railroads in a year. I have no means of estimating. Surely it would total very large figures.

Arrangements have already been made with the New York Central for carrying out a series of experiments in telephoning thus to moving trains, from a track side station at Spuyten Duyvil, on the Hudson; and I expect soon to be able to publish some very interesting results.

A short range wireless telephone transmitter for such service as I have just described is operated from a few cells of Edison-Leland battery, and the entire transmitting outfit will occupy less than three cubic feet of space.

Now consider the application of such wireless telephone instruments to freight train service, on roads like the Santa Fe, for example, without block signal stations at short intervals.

It frequently happens that a train awaits on a siding for long periods the passing of another which has been delayed by accident or other cause and with no means whereby the train crew can be notified to proceed. A portable telephone set installed in the caboose could be quickly brought into action to call up the nearest despatch station.

To facilitate this work a length of flexible antenna wire can be very quickly spiked up on two or three telegraph poles as high as a man can reach, parallel to the telegraph wires or directly connected to a wire through a small condenser, the capacity of which is too small to allow any detrimental grounding of the wires. This "emergency antenna" can be strung up and taken down again in two minutes' time. Such means for getting quick communication with stalled freights will mean an immense saving in costly delays to freight and to all trains affected by the tie up, to say nothing of loss in wages to idle train crews, this latter item where the 16 hour law is operative.

I believe that the railroads will soon see this method demonstrated, and be quick to admit the economy to them of equipping every caboose or a car on every accommodation train with such portable wireless telephone transmitting and receiving sets, whether or not the locomotive carry the receiving apparatus, which I have already described.

Ideas as to the possibilities of our land, wireless telegraph for commercial purposes have been generally founded on the all too plainly demonstrated failures and short comings of the spark systems. Such service is limited to relatively short distances over land by daylight, on account of the sad inefficiency of the spark wireless transmitter. The best of the spark systems can radiate generally less than ten or twelve per cent. of the energy taken from the dynamo, then the trains of electric waves which the spark transmitter sends out are "strongly damped" as we say—i. e., rapidly tail down to zero. Sharp tuning at the receiving station to cut out interference from other stations or from atmospheric causes is really quite impossible when

one has to work with these strongly-damped waves from a spark transmitter.

Hence, in addition to the short ranges necessitated, the spark system is not, and cannot be made reliable and "interference-proof." Such means, therefore, as supplementing the wire service of a railroad at times of emergency as when long stretches of wire are mowed down by sleet and wind storms is quite impracticable because so altogether unreliable.

During the last year, however, a new epoch in wireless telegraphy has been entered, marked by the Radio Telephone Company's new sparkless, wireless telegraph system, this "Radio-tone" transmitter (as it is called) is sparkless and noiseless, in place of the noisy, crude and inefficient old spark gap, it employs a silent discharge from the antenna wires and emits trains of waves which are very little damped, i. e., which tail down to zero very slowly.

Moreover, we can now radiate fifty to seventy-five per cent. of the energy derived from the alternating current dynamo instead of the ten to twelve per cent. of the spark system. This means that ranges two or four times greater than those given by the old spark method are possible and that wireless interference from natural or artificial sources can be completely and successfully eliminated.

As proof of my statement note the work daily carried on between our New York and Philadelphia and Washington stations where, in each case, a spark station of the United Wireless Company is operating within one to nine city blocks from our own, yet an hourly commercial wireless service is continually maintained by our Company.

I have here a photograph taken last week in San Francisco of a two kilowatt installation of the sparkless radio tone system on board the United States Army transport "Buford." The first day this apparatus was put in operation the "Buford," lying at her wharf in San Francisco, communicated in bright daylight with a Naval Station at Point Aguillos, nearly 300 miles south, a new daylight record on the coast.

A number of other army transports are now being equipped with this system, replacing the spark apparatus.

The art has now actually reached the stage where we can begin to handle overland business in competition with wire lines.

Therefore, the sparkless, wireless telegraph possesses immediate interest to railroad telegraphers as ready means for communicating over long distances between division headquarters, especially at times of emergency when storms and washouts have cut wide gaps in the wire system.

I foresee this use of the wireless telegraph coupled with short range telephone safety signaling and emergency service as occupying a very extensive field of usefulness to railroads and the traveling public.

Annual Convention of Railway Telegraph Superintendents

The twenty-ninth annual convention of the Association of Railway Telegraph Superintendents assembled in the convention hall of the Hotel Alexandria, Los Angeles, Cal., June 20-25. It proved to be one of the most important meetings in the history of the association, and was largely attended by railway telegraph officials and associate members from all parts of the United States, Canada and Mexico. Nearly all of the leading railroads of the country were represented and important topics pertaining to railroad operation were discussed at each one of the sessions.

Monday, June 20, at 1.30 p. m., Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad, and first vice-president of the association, called the meeting to order. After greeting those assembled and welcoming the visitors to the city, he read letters of regret from a number of the members who, on account of pressure of business and other reasons could not be present.

Mr. Joseph Scott, president of the Los Angeles Chamber of Commerce then extended the freedom of the city to the visitors. The response to the welcome was made by Mr. E. P. Griffith of New York, superintendent of telegraph of the Erie Railroad.

Mr. F. H. Van Etten, superintendent of telegraph of the Southern Indiana Railroad, Chicago, in the absence of Secretary P. W. Drew, was elected secretary pro tem, and Mr. William Bennett, superintendent of telegraph of the Chicago and Northwestern Railway, Chicago, was elected treasurer.

Courtesies to the members of the convention were extended by the Pacific Telephone and Telegraph Company, Western Union Telegraph Company, Postal Telegraph-Cable Company, Home Telephone and Telegraph Company, United States Long Distance Telephone and Telegraph Company, Southern Pacific Railroad Company, United Wireless Telegraph Company and the Canadian Pacific Railroad Company's Telegraph.

Mr. I. T. Dyer then read the programme of entertainment.

The report of the secretary and treasurer, Mr. P. W. Drew, was read, and the affairs of the association were shown to be in a very satisfactory condition.

On account of the resignation of Mr. J. L. Davis, president of the association, some two months ago when he severed his relations with the railroad telegraph service, George A. Cellar, superintendent of telegraph of Pennsylvania Lines west of Pittsburg, of Pittsburg, and John B. Sheldon, superintendent of telegraph of the Union Pacific Railroad, of Omaha, were added to the executive committee.

There being nothing new to report on the subject of telephone train despatching and wireless telegraphy that has not already appeared in print,

the papers promised by E. E. Dildine and William Mavor, Jr., were omitted by the committee on topics.

Secretary Van Etten announced that at the present time there were 116 active and 63 associate members of the association, making a total of 179.

A report was presented by Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railroad, St. Louis, covering the work of the western division of the association during the previous year.

Mr. W. F. Williams, of Portsmouth, Va., was then called upon to read his paper on "Composite Telephone Blocking."

A paper written by Mr. S. P. Ryner on "Automatic Block and Highway Crossing Signaling," was then read by Mr. William Bennett.

The following new members were elected: F. S. Worth, chief despatcher, Lehigh and Hudson River Railway, Warwick, N. Y.; H. C. Chace, assistant superintendent of telegraph, Atchison, Topeka and Santa Fe Railway, Los Angeles, Cal.; J. H. Lindsey, superintendent of telegraph of the Northern Railway, Costa Rica, Central America; J. Wilson, superintendent Canadian Pacific Railway's telegraph, Vancouver, B. C.; E. D. Hubbard, general foreman, Grand Trunk Railway, Battle Creek, Mich.; J. F. Caskey, superintendent of telegraph, Lehigh Valley Railroad, So. Bethlehem, Pa.; E. W. Mason, superintendent of telegraph, Western Pacific Railway, San Francisco, Cal.; C. T. Day, assistant superintendent of telegraph, Southern Pacific Railway Lines in Mexico, Sonora, Mex.; G. H. Leverett, telegraph and telephone engineer, Chicago, Milwaukee and Puget Sound Railway, Seattle, Wash.; J. C. Johnson, superintendent of telegraph, Pennsylvania Railroad, Philadelphia, Pa.; G. J. Bayliss, general foreman, Southern Pacific Railway, San Francisco, Cal.; Wm. Knowd, telegraph manager, Gulf, Colorado and Santa Fe Railroad, Galveston, Tex.; Geo. N. MacDonald, signal engineer, Virginian Railway, Norfolk, Va.; J. W. Murphy, superintendent of telegraph, Mobile and Ohio Railroad, Jackson, Tenn.; T. M. A. Haston, superintendent of telegraph, Toledo, St. Louis and Western Railroad, Bloomington, Ill.; A. T. Hollenbeck, superintendent of telegraph Chicago Great Western Railroad, Chicago, Ill.; J. T. Nolan, chief operator, Washington Terminal Company, Washington, D. C.; H. L. Husted, division operator, West Jersey and Seashore Railway, Camden, N. J.; F. S. Fender, assistant superintendent of telegraph, Southern Pacific Railroad, San Francisco, Cal.; W. F. Taylor, division operator, Pennsylvania Railroad, Altoona, Pa.; J. H. Ditch, telegraph inspector, Pennsylvania Railroad, Altoona, Pa.; E. C. Keenan, superintendent of telegraph, Lake Shore and Michigan Southern Railroad, Toledo, O.; J. H. Mahon, superintendent of Canadian Pacific Railway's Telegraph, St. John, N. B.; E. W.

Mersereau, superintendent of construction, Canadian Pacific Railway's Telegraph, St. John, N. B.; W. H. Hall, superintendent of telegraph, Missouri, Kansas and Texas Railway, Denison, Tex.; P. Robinson, chief train despatcher, Algoma Central and Hudson Bay Railway, Sault Ste. Marie, Mich.

The following associate members were elected: G. W. Swan, representative, John A. Roeblings Son's Company, New York; G. M. Marshall, engineer, National Carbon Company, Cleveland, Ohio; C. H. Fuller, commercial superintendent, American Telephone and Telegraph Company, New York; G. W. Peck, commercial department, American Telephone and Telegraph Company, New York; F. R. Chambers, Jr., vice-president, Duplex Metals Company, New York; W. M. Page, manager, Duplex Metals Company, New York; H. D. Currier, engineer, Duplex Metals Company, New York; R. A. Peterson, vice-president, Watson Insulated Wire Company, Chicago, Ill.; P. J. Eubanks, sales manager, Sandwich Electric Company, Sandwich, Ill.; J. H. Kinnard, Bell Telephone Company, Philadelphia, Pa.; A. F. Ormsbee, special agent, New York Telephone Company, Brooklyn, N. Y.; Wm. Prescott Hunt, vice-president and secretary, Buda Company, Chicago; E. K. Dyer, salesman, Western Electric Company, San Francisco, Cal.; R. W. Gillette, electrician, Western Union Telegraph Company, San Francisco, Cal.; C. N. Sigison, United States Electric Company, New York.

The following honorary members were elected: J. B. Fisher, ex-superintendent of telegraph, Pennsylvania Railroad; G. H. Groce, ex-superintendent of telegraph, Illinois Central Ry.; S. K. Bullard, ex-superintendent of telegraph, Missouri, Kansas and Texas Ry.; William Kline, ex-superintendent of telegraph, Lake Shore and Michigan Southern Railway; John L. Davis, ex-superintendent of telegraph, Chicago and Eastern Illinois Railway; E. E. Torrey, ex-superintendent of telegraph, Mobile and Ohio Railroad; W. T. Gentry, president, Southern Bell Telephone and Telegraph Company; E. J. Hall, chairman, executive committee, Western Union Telegraph Company; E. C. Bradley, vice-president and general manager, Pacific Telephone and Telegraph Company.

The second day's meeting was called to order at 9 a. m. Tuesday.

Mr. E. P. Griffith, chairman of the committee from the eastern division of the Association of Railway Telegraph Superintendents which was appointed at the meeting held in Washington, March 25, to formulate a system for delivering messages to passengers on trains, whereby a receipt can be obtained and returned to the telegraph company then read the report of that committee. Other members of the committee were Mr. J. C. Johnson and Mr. C. M. Lewis. The report was as follows:

"Your committee, appointed by the Chairman of the eastern division of the Association of Railway Telegraph Superintendents, to confer with the telegraph companies' officials for the purpose of

establishing an adequate and uniform system for the delivery of commercial telegrams to passengers on trains, met in conference with Mr. A. G. Saylor, general superintendent, Western Union Telegraph Company, and Mr. M. M. Davis, electrical engineer of the Postal Telegraph-Cable Company, in New York City, on May 24 last, and discussed the various phases of the subject. It was shown by the reports of the commercial telegraph companies that the methods of making deliveries to passengers on trains, varied considerably, and a large percentage of the telegrams of that character failed of delivery, such failures causing the addressee, as well as the sender, to criticize both the railroads and the telegraph companies.

"The railroads generally are alert to adopt any safeguards suggestive of the protection, comfort and contentment of their patrons. They endeavor to give the traveler ease of mind and all the comforts of home. The commercial telegraph companies are equally anxious to perform a perfect service and thereby please their patrons.

"Your committee, in their search for information on the subject, are indebted to Mr. G. A. Cellar, superintendent of telegraph, Pennsylvania Lines west of Pittsburg, and Mr. J. C. Johnson, superintendent of telegraph, Pennsylvania Lines east of Pittsburg, for copies of a general order issued by the Pennsylvania Lines in 1905, entitled 'Handling of commercial telegrams addressed to passengers on trains,' which instructs their agents, conductors and employes generally to co-operate with the commercial companies in their efforts to make deliveries. The action taken by the Pennsylvania Lines in 1905, has, no doubt, enabled the telegraph companies to effect a larger percentage of deliveries on that line than on any other road, and if all the railroads will do no more than adopt the Pennsylvania Lines' General Order of 1905, great progress will be made in the right direction.

"It has been suggested to your committee, however, that this association may be able to go further in the matter, by recommending to the General Managers' Association and the General Passenger Agents' Association, that a general order be issued by the railroad companies, instructing their agents and other station employes to aid the telegraph company's messenger to reach direct the conductor of the train and instruct the conductors to receipt, on the telegraph company's regular delivery receipt forms, for the messages addressed to his train, or in his care, and in case the conductor is unable to find the addressee on his train, he shall note on the telegraph company's envelope 'Unable to find addressee on train No. —, between Poland and Podunk, James Smith, Conductor, 11.10 a. m., June 22.' He shall then place the telegram in a railroad envelope, address it to the agent of the station where the message was delivered to him, and send it back by train mail. The station agent receiving such undelivered tele-

gram shall immediately notify the telegraph company, over whose lines the message was handled, as indicated by the envelope, to call at his office for undelivered telegram, addressed to James Smith, care of Conductor, Train 10. Should there be a second section of any train, the conductor of the first section, failing to find the addressee, shall endorse on the envelope, 'Cannot find on first section Train 10, try second section,' and put the message off at his next scheduled stop. The agents at all stations shall comply with the endorsements on such telegrams, the same method should apply should there be a third or fourth section, the conductor of the last section, failing to locate the addressee, shall return the message in a railroad envelope, addressed to the agent at the station where the message was handed to the conductor of the first section. The telegraph company shall issue a general order to all managers to procure full address from the sender: for example—'To John Jones, en route Washington to St. Louis, B. & O. R.R., Train No. 10, care Conductor, Parkersburg, W. Va.' The telegraph company's receiving office shall place full address on the envelope as a guide to the railroad conductors in returning undelivered messages to the proper station.

"It has been suggested by the commercial companies that all telegrams for passengers on trains should be addressed in care of the railroad company's station agent, who should receipt for and deliver the same to the conductor of the train mentioned in the address. Your committee is of the opinion that such an agreement might lead the agent to believe that the addressee would call at his office for the telegram, and a complete failure result. It is therefore the conclusion of your committee, so far as the address on such messages is concerned, that they should be addressed in care of the conductor of the train, and the telegraph companies should make the delivery to the conductor. The old method of having the telegraph company's messenger page the trains, while stopping at a station, is, in the opinion of your committee, unreliable. At stations, where a stop of five minutes or more is scheduled, the passengers, as a rule, take advantage of the stop to exercise themselves on the platform, while the messenger is passing through the train.

"The Pennsylvania Lines' general order, already referred to, says: 'The messenger should also, for the purpose of delivering such telegram, be permitted to pass through the train, if the stop thereof be of sufficient duration to enable him to do so and leave the train with safety.'

"A direct delivery to the conductor of the train eliminates the danger to the messenger, releases the railroad company from liability of injury to such messenger, and finds all the passengers in their proper seats, when the conductor passes through the train after leaving the station. Your committee recommends that the Association of Railway Telegraph Superintendents, now in an-

nual convention, appoint a committee to communicate with the General Passenger Agents' Association, forwarding to them a copy of this report, and requesting their endorsement of our efforts in this direction, and if their endorsement shall be favorable, the same committee shall take the matter up with the General Managers' Association, with a view to the promulgation of a general order through the railroad operating departments, on the lines indicated in this report, and if the General Managers' Association shall acquiesce in the matter, the committee shall then notify the commercial telegraph companies and request them to instruct their managers accordingly."

The following communication on this subject from A. G. Saylor, general superintendent of the Western Union Telegraph Company, New York was then read:

"Referring to the copy of the report of the Committee of the Association of Railway Telegraph Superintendents in connection with the delivery of telegrams to passengers on trains I am advised that the report as drafted covers the matter admirably and is entirely satisfactory to the Western Union Telegraph Company, except that it is pointed out that the proposed regulations make no provision for marking on the message envelopes the names of stations at which messages are received and delivered, to check the recollection of the conductor in returning the same if undelivered, or as a guide to conductors of following sections to whom the message may be handed for disposal if delivery is not effected by the conductor of the first section. This is a matter which we can cover in our own instructions on the subject in case the proposed regulation is adopted at the meeting and followed by the railroad companies. However, it is suggested that it might be well to include this additional detail in the committee's report if it is acceptable to them."

In the discussion which followed, Mr. F. H. Lamb, superintendent of the Western Union Telegraph Company, Los Angeles, said that the report covered the ground satisfactorily, but suggested that the announcement by trainmen of addressee's name be made more audibly.

Mr. M. M. Davis, electrical engineer of the Postal Telegraph-Cable Company, New York, suggested that the conductor be made responsible for the delivery of messages addressed to parties on trains and offered on behalf of his Company to co-operate in efforts to make proper delivery of such messages.

Others taking part in the discussion were Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway, Montreal; Mr. J. B. Sheldon, superintendent of telegraph of the Union Pacific Railway, Omaha, Neb.; Mr. William Bennett, superintendent of telegraph of the Chicago and North Western Railway, Chicago; Mr. H. C. Chace, assistant superintendent of telegraph of the Santa Fe System, Los Angeles; Mr. F. S. Rawlins, superintendent of telegraph of the Southern Pacific, San Francisco.

After the subject had been thoroughly gone over, a committee of five was appointed to consider the subject and formulate a plan within the next ninety days, which would insure proper delivery and notice of non delivery of messages. This committee consists of Messrs. E. P. Griffith, C. M. Lewis, W. J. Camp, William Bennett and J. C. Johnson.

The meeting then adjourned for one hour for the inspection of the exhibits. Upon reconvening, Mr. M. E. Launbranch read his paper upon "Protecting Telephone Lines from Lightning and Other Disturbances." Mr. Launbranch's paper is found in full elsewhere in this issue. In the discussion which followed, Mr. M. M. Davis described the standard protection in use by the Postal Company. This consists of carbon arresters with heavy fuses between the line and the arresters and light fuses between the arresters and instruments. This system is quite effective for all ordinary disturbances, but does not protect the relays from high tension induction of long duration and insufficient current to blow the lighter fuse or from a direct cross with a high tension line that forms a heavy arc at the arrester and in the cartridge type fuse. In his opinion the proper place for arresters is on the poles. Others taking part in the discussion were Messrs. J. B. Sheldon, B. F. Frobes, William Bennett, R. W. Gillette and F. S. Rawlins.

Wednesday morning the meeting was called to order at 9.45 a. m. Mr. William Bennett read an interesting paper on "Education for Efficiency in Railroad Service." written by Mr. D. C. Buell. Part of Mr. Buell's paper appears elsewhere in this issue.

Mr. F. D. Mackay, manager of the Southern Pacific General Telegraph School of shorthand and telegraph operating, was called upon for a few remarks. He stated that while the school received the co-operation of the Southern Pacific Railroad Company, it is not actually conducted by that company. Out of 347 examinations for efficiency in accept positions since the school was established, 300 were accepted and 47 rejected. 100 graduates of the telegraph department have been employed by the Southern Pacific Company.

A committee on resolutions was appointed to send expressions of regret to members who could not be present. This consisted of J. J. Ghegan, J. B. Sheldon and W. J. Camp.

A committee was appointed to extend thanks to the various telegraph, telephone and railroad companies for courtesies extended. This committee was composed of E. P. Griffith, J. M. Walker and W. F. Williams.

An auditing committee was then appointed consisting of B. F. Frobes and E. W. Mason.

Some discussion on high tension crossings was then listened to, and the plan adopted at the last session of the Association was accepted.

An instructive paper on "Wireless Telegraphy as applied to Railroad Lines" was then read by Dr.

Lee DeForest. This paper is printed in full elsewhere in this issue.

In the discussion on this paper Mr. Camp inquired whether it would be possible for two passenger trains travelling in opposite directions to carry on telephone communication over distances of say two miles. Dr. DeForest replied that it would, and that if limited passenger trains were equipped with a dynamo in place of batteries, a much longer distance would be possible.

Mr. Dyer inquired what experiments had been already carried on in telegraphing to moving trains. The first experiments with the wireless telegraph were made on the Chicago and Alton in 1905. Last year the Frederic Thompson theatrical special "Via Wireless" train from New York to Chicago was equipped with a telegraph transmitter and several trackside wireless stations installed for the purpose of keeping in touch with this train throughout its journey. These tests, it is understood, were very successful.

In reply to inquiries as to how the proposed wireless service would effect the existing telephone and telegraph instruments, Dr. DeForest said it would be possible to hear in the telephone receiver the wireless signals of the telegraph and possibly the telephone, but only faintly and not to interfere at all with the present service.

The wireless waves acted strongly only on special detectors, like the crystal silicon, the "audion" and others similar to these, if necessary, choke coils without iron cores, can be inserted in the telephone wires outside of the stations to effectually prevent the electric waves from entering the wire telephone and telegraph instruments, the wireless signals can be thus taken off from the lines through very small condensers into the wireless instruments intended for their reception.

On Thursday evening, after a delightful trip over the kite shaped track of the Santa Fe System, which consumed the entire day, the meeting was called to order at 7.30 p. m., and the subject of high tension crossings was discussed.

In the absence of Mr. G. A. Cellar, chairman of the committee, Mr. William Bennett outlined the position of the association in their plan of specifications for a safe crossing.

Among those taking part in the discussion which followed were, Messrs. W. J. Camp, J. W. Gillyson, Minor M. Davis, Dr. Lee De Forest, G. H. Groce and others. Mr. F. H. Van Etten suggested that the specifications prepared by the committee be put into effect and other associations be asked to take similar action. The discussion of this subject consumed considerable time, the convention not adjourning until a late hour.

At Friday's session the committee appointed to draw up resolutions thanking the various telephone, telegraph, railroad and other interests for courtesies extended made its report, which was unanimously adopted.

A committee was then appointed to handle miscellaneous matters for the association and the following were named: W. F. Williams, of Portsmouth,

Va., S. A. D. Forristall, of Boston, Mass., S. L. Van Akin, of Syracuse, N. Y., W. W. Ryder, of Chicago and J. M. Walker of Denver. The following subjects were referred to this committee: Western Union Telegraph Company numbering of telephone wires; the establishment of a working agreement between the American Railway Association and the Association of Railway Telegraph Superintendents.

A paper was then read by Mr. E. P. Griffith, of New York, relative to the establishment of a monument at Turners, New York, to commemorate the birth of the telegraphic train orders.

A committee of five was appointed to handle the matter, namely: E. P. Griffith, of New York, Charles Selden, of Baltimore, W. J. Camp, of Montreal, E. A. Chenery, of St. Louis and J. B. Taltavall, of New York.

Boston, Mass., was selected as the next place of meeting the date to be June 19-23, 1911, and the following officers were elected President, I. T. Dyer, of Los Angeles, Cal.; first vice-president, John B. Sheldon, of Omaha, Neb.; second vice-president, Wm. Bennett, of Chicago; secretary and treasurer, P. W. Drew, of Chicago.

Among those present were:

Altoona, Pa.: J. H. Ditch.

Battle Creek, Mich.: E. D. Hubbard.

Chicago, Ill.: Wm. Bennett, wife and daughter C. H. Bull, Albert Douglass, E. Parsons, M. E. Launbranch, Mrs. W. W. Ryder and sons Earl and Perry, F. H. Van Etten and F. T. Wilbur and wife.

Denver, Col.: J. F. Dostal, C. A. Parker and John M. Walker.

Lamar, Colo.: R. A. Beck.

Houston, Tex.: A. S. Foote.

Kansas City, Mo.: Val. B. Mintun.

Los Angeles, Cal.: H. C. Chace and wife, Mr. Eccles and wife, J. W. Gilkyson, H. B. George, I. T. Dyer and wife, E. Kendrick and wife, C. L. Lewis and wife, J. E. MacDonald, L. C. McIntosh and wife, R. H. Miller, F. E. Redline and wife, A. E. Roome, L. G. Sloane, B. M. Stanley, V. V. Stevenson and wife and C. J. Steinel and wife.

Montreal, Que.: W. J. Camp.

New York: Wm. H. Baker, M. M. Davis and wife, Dr. Lee DeForest, Richard A. Fanto, J. J. Ghagan, E. P. Griffith, wife and son, E. Kleinschmidt and wife, George W. Peck, G. M. Seeley, and Chas. M. Sigison.

Omaha, Neb.: J. B. Sheldon, wife and son.

Pittsburg, Pa.: L. A. Lee, wife and daughter.

Portland, Ore.: E. A. Klippel and wife.

Portsmouth, Va.: W. F. Williams, wife and two daughters.

Redlands, Cal.: S. K. Bullard.

Roanoke, Va.: W. C. Walstrum, Miss Margaret Walstrum.

Rochester, N. Y.: M. F. Geer and G. H. Groce.

San Francisco, Cal.: W. F. Birt, E. K. Dyer and wife, W. S. Fender, R. W. Gillette, S. B. Gregory, E. W. Mason, E. Miller, F. S. Rawlins and wife and A. B. Saurman.

Salt Lake City, Ut.: B. F. Frobes.

St. Louis, Mo.: Mrs. E. A. Chenery, and Alan MacEwen.

Seattle, Wash.: Mrs. Henry Alexander.

Sonora, Mex.: C. T. Day.

Tucson, Ariz.: B. M. Stanley.

Toronto, Ont.: W. Marshall and wife.

ENTERTAINMENT OF VISITORS.

The entertainment committee of the Association is to be congratulated upon the success of this feature of the convention. The program was so arranged that although the time which the visitors had to devote to sight-seeing was very limited, what time they had for this purpose was occupied to the best advantage. On Monday afternoon, the visiting ladies were met by a local ladies reception committee and taken for an automobile ride around Los Angeles and near-by suburban points. Tuesday afternoon, the visitors, through the courtesy of the Los Angeles Pacific Railway, enjoyed a trip over the Balloon Route to Santa Monica, Ocean Park, Venice, Redondo, and other points of interest. Dinner was served at Bristol Pier, Ocean Park, and the party did not return to Los Angeles until late in the evening. Wednesday afternoon a special train on the Pacific Electric Railway conveyed the members of the association, their friends and guests to Mt. Lowe. A banquet was enjoyed at the tavern and after dinner the party went for a moonlight ride and a visit to the observatory. Numerous speeches were made at the banquet, among those who favored the diners were Messrs. J. J. Ghagan, R. W. Gillette, E. P. Griffith, John M. Walker, A. E. Roome, F. H. Van Etten and C. L. Lewis. Thursday was devoted to a trip over the kite shaped track of the Santa Fe Railway, a special train being provided for the purpose by the management of that system. Luncheon was served at the famous Glenwood Mission Inn, Riverside, and the return to Los Angeles was made in time for dinner. On Saturday, the business of the convention having been brought to a conclusion, the visitors, early in the morning, boarded a special train on the San Pedro, Los Angeles and Salt Lake Railway and were taken to San Pedro, where the steamer Cabrillo was chartered for a trip to Avalon, Catalina Island. Dinner was served at that place and the day was spent in bathing, fishing and other outdoor sports. All of those present at the convention agreed that taken altogether, the entertainment provided for them could not have been improved upon in any respect.

EXHIBITS AND REPRESENTATIVES AT THE CONVENTION.

Numerous interesting exhibits of up to date electrical apparatus were displayed in the large and commodious rooms provided for the purpose.

Mr. J. J. Ghagan, president of the J. H. Bunnell and Company, New York, represented the interests of that corporation.

The National Dictograph Company of New York had an interesting exhibit in charge of Mr. Richard A. Fanto, manager of the company.

The Kellogg Switchboard and Supply Company of Chicago, Ill., had an interesting exhibit of their equipment for use in connection with telephone train despatching, including their selective system. They were represented by H. C. Goldnick and C. F. Hartung.

The National Carbon Company of Cleveland, Ohio, were represented by an exhibit in charge of Mr. F. H. Murray, Pacific Coast representative.

The National Telephone Selector Company of New York had an exhibit in charge of G. M. Seeley and E. Kleinschmidt. The selector which they displayed is an alternating current device.

The Buda Company of New York, Chicago and St. Louis exhibited an excellent motor car which received much favorable comment from those required to use cars for line inspection. Mr. C. H. Bull, of Chicago, was in charge of the exhibit.

The Western Electric Company displayed numerous and interesting electrical devices, among them the new Western Electric selector which received many favorable comments from the visitors. Mr. E. K. Dyer, Pacific Coast salesman of San Francisco and H. G. George, Los Angeles representative, were in charge of the exhibit.

The Railway Safety Signal Company had an elaborate exhibit consisting of miniature locomotives and rails equipped with effective signaling devices for prevention of accidents caused by mistaken or neglected train orders, front or rear end collisions, open or partially open switches, side wipe from cars on sidings, destroyed or defective bridges, broken rails and land slides.

The Standard Underground Cable Company of Pittsburg, Pa., had an elaborate display of underground, aerial and inside wires and cables for fire alarm and police telegraph systems, sub-marine telegraph and telephone cable and steel core copper sheath line wire. Messrs A. B. Saurman and C. G. Pyle were in charge of the exhibit.

The exhibit of the United States Electric Company of New York was in charge of M. E. Launbranch of Chicago and Chas. M. Sigison of New York. They displayed a full line of their Gill Selectors showing how they may be used in connection with semaphore signaling as well as in telephone despatching.

The Western Engineering Specialties Company of Denver, Colo., exhibited a device for the protection of telephone lines or other circuits at transmission line crossings protecting the lower circuits from being subjected to the high potentials in case the transmission lines should break. It eliminated the basket form of protector which is often an additional source of danger, especially where the baskets are made of metal. Mr. J. F. Dostal was in charge of the exhibit.

The exhibit of the General Railway Signal Company of Rochester, N. Y., was in charge of G. H. Groce, E. Parsons and M. F. Geer. The system which they displayed can be arranged for calling the dispatcher's office only or for calling between stations in either of which cases the instruments are bridged on the line and calls made without the use

of local battery. Alternating current or direct current ringers may be used in either case.

The Intensifier Company was represented by Mr. R. A. Beck, of the Atchison, Topeka and Santa Fe Railway, Lamar, Col., and Mr. C. A. Parker, superintendent of telegraph of the Denver, North Western and Pacific Railroad, Denver, who showed the operation of the telegraphic intensifier. The use of these intensifiers makes it practicable for the operator to copy with a typewriter direct from the standard relay without the resonator, local sounder or battery, using this instrument and the stroke of the armature of the relay to produce the sound. No change is made in the relay. The main line is not affected in any way by its use. Mr. Beck is the inventor of this device.

NOTES OF THE CONVENTION.

At the dinner, Tuesday evening, at Ocean Park, Mrs. W. W. Ryder in behalf of the association presented the daughter of Mr. I. T. Dyer with a beautiful gold watch, the occasion being her eighteenth birthday.

Mr. L. C. McIntosh, of the Southern Pacific Railroad, Los Angeles, an old and esteemed friend of Telegraph and Telephone Age, looked after our interests at the convention in a most satisfactory manner.

It was the general consensus of opinion of those present at the convention that more actual work was accomplished and more entertainment enjoyed at this meeting than at any which has been held since the association was organized.

Canadian Notes.

All telegraphers in the employ of the Canadian Pacific Railway have been granted an increase in pay of \$5 per month.

The associated boards of trade of Western Canada, at their annual convention, held recently at Brandon, Manitoba, passed resolutions endorsing the Winnipeg Board of Trade and Grain Exchange's application to the Railway Commission for a reduction in commercial telegraph rates from Eastern Canada.

Mr. J. T. Phelan, superintendent of the Yukon system of the Canadian Government telegraphs, is supervising the construction of about two hundred miles of new line which is being built in northern British Columbia, through a wild and practically unknown territory between Fifth Cabin and Stewart.

On account of the great expansion of the Canadian Pacific Railway's telegraph in western Canada a re-arrangement of the divisions has been made that territory being arranged into four divisions corresponding to the four provinces of Manitoba, Saskatchewan, Alberta and British Columbia. A new division with headquarters at Moose Jaw, Sask., has thus been established and Mr. R. N. Young, assistant superintendent at Winnipeg, has been appointed to the superintendency at that point. Mr. J. Fletcher has been appointed superintendent for the British Columbia division, with headquarters at Vancouver, vice Mr. James Wilson, retired. These changes are effective July 1.

The final hearing by the Canadian Railway Commission of the case between the Western Associated Press and the Canadian Pacific Railway Company's Telegraph was commenced at Ottawa, on June 8. Press representatives were in attendance from newspapers at Vancouver in the west and Halifax in the east, besides various other cities between these points. The great North Western Telegraph Company was represented by Mr. I. McMichael, general manager, and Mr. G. D. Perry, general auditor. The Canadian Pacific Railway Company's Telegraph was represented by Mr. James Kent, manager of telegraphs, W. J. Camp, electrical engineer, and E. W. Beattie, general solicitor of the company. On the opening of the case, Mr. Beattie addressed the Board, and was followed by Mr. Camp, the two speaking for about an hour and a half, when the Chief Commissioner, Judge Mabey, suggested that the Board adjourn, in order that the two sides might hold informal meeting and endeavor to get a little nearer a solution. This was agreed to by all parties, and meetings were held almost continually, from Wednesday evening until Friday, when the agreement was reached about noon.

This agreement proved very satisfactory to all the representatives of the press, who will continue to have, in spite of the increase, what is probably the lowest press rate in the world for the distribution of general press association news. At the same time, the companies are satisfied, in view of the fact that the increased rates given will prevent, in the future, the actual loss on the carriage of this news service which they have suffered in the past.

Census Report on Telephones.

The Census Bureau report on the census of the telephone industry taken in 1907 which is now being printed shows that in the five years from 1902 to 1907 the use of the telephone in the United States more than doubled, or, to be exact, increased 124 per cent., for only five billion conversations were reported in 1902 as against eleven billion in 1907. The miles of telephone wire in use in 1907 were 12,999,369, or over two and a half times the 4,900,451 miles strung in 1902.

The capital stock and funded debt of the telephone companies outstanding in 1902 was \$348,031,058, while five years later it was \$814,616,004, an increase of 134 per cent. During the same period the earnings of the companies increased from \$86,825,536 to \$184,461,747. The increase in revenue was therefore 112.5 per cent. But the increase in operating expenses and fixed charges during the five year period was but 108.4 per cent.; from \$61,652,823 in 1902 to \$128,456,196 in 1907.

Of a total wire mileage of 14,570,142 in use for telephone and telegraph purposes in 1907, only eleven per cent. belonged to the telegraph. In 1880 the telegraph companies reported 291,213 miles of wire compared with 34,305 miles reported for the telephone companies.

Between 1902 and 1907 there was an addition of 8,098,918 miles of wire for the use of the telephone systems of the country, as compared with an increase of 259,611 in the mileage of owned and leased wire for the use of commercial telegraph systems.

The report divides the telephone business of the country into two classes, Bell and Independent. Of a total number of 22,971 systems and lines in 1907, only 175 belonged to the Bell system. The latter system, however, had 3,132,063 stations or telephones, which was 51.2 per cent. of the total, and the non-Bell operated 2,986,515, or 48.8 per cent. In addition to the stations belonging to the Bell, independent companies comprising 13.7 per cent. of the total number of telephones in the country, had connection with their lines, thus making the whole number of telephones connected to their system equal to 64.9 per cent. of the total for the country.

The telephone companies had 144,169 employees in 1907 and the pay roll amounted to over sixty-eight million dollars.

The Telephone Industry of the World.

Under this heading the Electrical Review and Western Electrician has presented some very interesting figures showing the extent to which the telephone is used in various countries. These show that on January 1, 1910, there were 10,269,000 stations in service and 24,075,000 miles of wire. Two-thirds of the telephones and wire mileage are in the United States. There are 7,083,900 stations in the United States, 239,200 in Canada and 2,627,200 in Europe. Of the European countries, Germany heads the list with 910,900. Great Britain has 615,900, and France has 211,600. In reference to the number of telephones in proportion to the population, the United States leads with 7.6 stations per hundred inhabitants, Canada is second, with 3.7, Denmark has 3.3, Sweden 3.1, New Zealand, 2.6, Norway, 2.3, Switzerland, 2.0, New South Wales, 1.6, Germany, 1.5 and Great Britain, 1.3.

New York State, with 745,900 stations, has more telephones than any foreign country except Germany. In January, 1909, there were nearly as many telephones in Greater New York as there were in London, Paris and Berlin combined. Los Angeles, Cal., has the largest number of telephone subscribers per inhabitant of any city in the world, having 25.4 telephones per hundred inhabitants. The nearest approach to this number is Stockholm, Sweden, with 17.2 per hundred. Copenhagen has 6.9; Berlin, 4.8; London, 2.5; and Paris, 2.3.

In 1907 there were 11,372,605,000 telephone conversations in the United States, and 4,264,819,000 in Europe. The total telephone investment of the world January 1, 1908, was estimated as \$1,251,119,000, of which \$819,667,000, or over sixty-five per cent. was in the United States. On January 1, 1910, this total had probably increased to \$1,500,000,000 or \$146 per station.



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KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

Efficiency and safety in electrical installations depend chiefly on insulation. For fifty years KERITE insulation has been the standard of excellence.

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The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

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The Railroad.

Mr. W. W. Ryder, general superintendent of telegraph of New York Central Lines west of Buffalo, was a recent New York business visitor.

Mr. W. L. Cook, formerly railway sales engineer of the Western Electric Company at Chicago, has resigned to accept a similar position with the United States Electric Company, manufacturers of the Gill Selectors, in their Chicago office.

A patent, No. 960,586, for a signaling system, has been secured by H. O. Rugh, of Sandwich, Ill. Selective signaling system with a telephone at each substation for the train despatcher, so that he may call any desired station.

The June meeting of the Railway Signal Association was held in New York, June 14, about 250 members being in attendance. Recommendation was made that the next annual meeting be held at Richmond, Va. Papers were read by J. H. Wisner, Jr., on "The World Signal," and by J. M. Waldron on "Speed Controlled Signals." Reports of several committees were also read and discussed.

Mr. J. C. Johnson, superintendent of telegraph of the Pennsylvania Railroad, Philadelphia, accompanied by a large number of the division operators, inspectors, repair foremen and train despatchers, on June 24, came to New York on a special train through the new North River tunnels and made an inspection of the new Pennsylvania terminal at Seventh Avenue and Thirty-third Street, and also of the new Sunnyside yards at Long Island City.

According to the Block Signal and Train Control Board of the Interstate Commerce Commission, there were, on January 1, 1910, 65,758 miles of railroad in the United States operated under the block system. Of this mileage 14,238 was automatic and 51,520 was manual. For the year 1909 there was an increase of 2047 miles in the length of road covered by the automatic block system and an increase of 4162 miles in length of road covered by the manual system. With the manual system the telegraph is used on 39,477 miles of road; the telephone on 8105 miles; electric bells on 945 miles.

The Santa Fe Telegraph and Telephone System.

We are in receipt from Mr. C. H. Gaunt, assistant general manager and superintendent of telegraph of the Atchison, Topeka and Santa Fe Railway, Topeka, Kans., of a blue print prepared under his direction, showing all of the telegraph and telephone circuits found on the entire system. This print, which is twenty-eight by fifty-two inches in size, gives a most comprehensive outline of the telegraph and telephone system of the Santa Fe, and gives a large amount of information in regard to the various circuits. Western Union, joint Western Union and railway, railway copper, railway iron, Postal, joint Postal and railway and telephone wires are all distinguished on the drawing by different kinds of lines. Distances from Chicago to the important points in

the system are indicated as well as the equipment found on the different railway circuits. A map of this nature would be of great assistance in the operation of any railway telegraph system, and other superintendents who are not already provided with a similar guide to the system over which they have charge, would find that such a map would, in many cases, save them much valuable time. There are now in operation on the Santa Fe, 3004 miles of despatching circuits and 2645 miles of new circuits are under construction. In addition to these 285 miles of second despatching circuits are in use and 158 miles more of such circuits under construction. These together with 875 miles of railway and commercial message circuits will increase the telephone system of the Santa Fe to a grand total of 6969 miles.

A New Lightning Arrester.

Every telegraph official who has been interested in apparatus connected with train despatching, has found the type of lightning arresters in connection with this work is an important matter. The successful operation of despatching service may be greatly impaired by an inefficient instrument or one of poor construction.

The carborundum arresters eliminating the air gap have met with considerable favor among telegraph superintendents. The arresters are known as the "Brach" Types Nos. 20 and 21, and are built in single unit form with an interlocking brass plate to connect one unit to the other at the same time joining them electrically to a common ground. The arresting feature is accomplished through the medium of a carborundum block supported between a carbon electrode. The carborundum block is of such resistance as to thoroughly insulate the line to ground, avoiding the dangers of cross-talk or other trouble, and at the same time it will permit static current or heavy induction from lightning or other causes to dissipate through the material.

The efficiency of this arrester has been demonstrated to show that it would protect insulation on magnet wire under conditions that the air gap type of arrester would not, since the distance of opposing electrodes would be of greater dielectric resistance than that of the carborundum plate.

Of a number of these arresters in use in connection with train despatching work, additional favorable points have been noticed: It has the ability to take off the sharp clicks from the receiver which are caused by static current and are of so much annoyance to the operator. In connection with the mechanical design, the elimination of porcelain or slate from the base makes them more substantial and less liable to breakage. The binding posts are large and well made and afford substantial connection.

The instruments are the product of the L. S. Brach Supply Company, No. 143 Liberty Street, New York City.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Mayer and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER VII.

What means is used to operate the armatures of the relays and other instruments in a single circuit?

How is a local circuit operated?

Does the direction in which a current flows make any difference in the operation of a single line circuit?

Does it make any difference in the efficiency?

What is the effect in an electro-magnet if we cause two electric currents of equal strength to traverse the two coils through an equal number of convolutions in opposite directions?

What material is usually employed for the artificial line of a duplex set and why is this used?

How is the resistance for the artificial line arranged so that it can easily be made to balance the resistance in the main line?

How is the main line circuit of a Stearns duplex kept constantly closed?

Why does not the current from the home battery affect the relay at that station but does cause the relay at the distant station to operate?

Draw a sketch of the theoretical connections which illustrate the action of the Stearns duplex.

What is the action when a key at one end is closed and the key at the other end is open?

What is the action when both keys are closed at the same time?

What steps are taken in balancing the Stearns duplex?

CHAPTER VIII.

What is the effect of wet weather on the operation of a Stearns duplex set?

What magnetic principle was made use of in designing the polar duplex?

Why is a polar duplex set immune from the harmful effects of a wet weather escape?

Draw a sketch illustrating the connections of a polar duplex.

What is the action of the polar duplex when the key at the home station is closed and the one at the distant station is open?

What is the action when both keys are closed at the same time?

What is the first step to be taken in balancing a polar duplex?

What is the object of doing this?

How is the relay of a polar duplex constructed? What is the second step to be taken in balancing?

How is the effect of the static discharge of the line eliminated?

Obituary.

Samuel Perrin, a press operator, employed at Atlanta, Ga., died at Augusta, Ga., June 8.

J. V. Baskerville, until recently manager of the Postal Telegraph-Cable Company at Scranton, Pa., died suddenly on June 9.

Prescott S. Watson, aged seventy-one years, for many years superintendent of fire alarm telegraphs at Brooklyn, N. Y., died at Wurtsboro, N. Y., June 19.

Mrs. Helen M. Mills, aged seventy-two years, said to have been the first woman regularly employed as a telegraph operator, died June 17, at Rock Island, Ill. She was a telegrapher in Greenville, Pa., in 1848.

Samuel C. Potts, a telegrapher in the employ of the Atlantic Coast Line, died at Lake Waccamaw, N. C., May 28, aged sixty-five years. Mr. Potts was an operator in the Confederate service during the Civil War.

Henry Frank Tracey, chief train despatcher of the Chicago division of the Santa Fe System, died June 11 at Chillicothe, Ill., aged fifty-eight years. Mr. Tracey was born in Newark, N. J., and entered the service of the Western Union Telegraph Company at New York, as messenger, when thirteen years of age. He afterward became a first-class press operator, being employed in that capacity in many of the larger cities throughout the United States. Since 1884 he has been in the Santa Fe service at Chillicothe.

Convention of Commercial Telegraphers' Union.

At the national convention of the Commercial Telegraphers' Union, held in Chicago, June 13 to 17, the following officers were elected: S. J. Konenkamp, Pittsburg, president; Durward Warner, Winnipeg, vice-president; Wesley Russell, Chicago, secretary-treasurer; executive board, Charles E. Hill, Toronto; James B. Finan, St. Louis; E. M. Moore, Chicago; J. F. McMasters, New York; George C. Towne, Akron, O.; delegates to the American Federation of Labor convention, James B. Finan and S. J. Konenkamp. The executive board will select the next place of meeting.

According to measures adopted by the convention steps will be taken to organize the telephone girls throughout the United States, the new organization to be known as the Commercial Telegraphers' Union of America and the Telephone Operator's association.

It was decided at the convention that the commercial telegraphers would follow the policy of the railroad brotherhoods and not press for the closed shop, but the officers of the union would represent them in any negotiations with the telegraph companies.

Representatives of the Canadian branches of the union and the Order of Railroad Telegraphers were at the convention and arrangements were made to organize the wireless operators the pay of whom, it is claimed, is lower comparatively than in any other branch of telegraphy.

United Press Election.

At the annual meeting of the United Press, held in New York recently, the old board of directors was re-elected. It is composed of H. B. Clark, C. D. Lee and R. W. Howard, New York; J. C. Harper, Cincinnati; B. H. Canfield, San Diego; H. N. Rickey and W. B. Colver, Cleveland. At the annual meeting of the board of directors held in Cleveland June 11, the following officers were elected: C. D. Lee, president; Roy W. Howard, first vice-president; Oliver S. Herschman, second vice-president; Alexander Dodds, third vice-president; J. C. Harper, secretary and C. J. Stein, treasurer. H. P. Clark, the retiring president, was elected to serve as chairman of the board of directors for the next year. Roy W. Howard was re-elected to the office of general news manager. According to the annual report the United Press is now operating over 40,000 miles of wire circuits in its work of disseminating news for afternoon and Sunday morning newspapers.

Increase in Capitalization of Publishers' Press.

The Publishers' Press, in order to extend its business, has been re-incorporated in New Jersey, as briefly announced in our June 16 issue and has increased its capital stock to \$500,000. The growth of the business of this organization has convinced its backers that there is a field for a first-class, up-to-date Feature News and Syndicate Service, along the lines it has been working, and uncontrolled by any newspaper or combination of newspapers. The business has developed so rapidly that in order to meet the call for its extension promptly and satisfactorily, it was determined to increase its capital stock.

The meeting of the Board of Directors, which decided upon this action, re-elected Mr. Curtis J. Mar, president and general manager, and he was given charge of the work of the further extension of the service.

Many of the leading papers in the country are now taking either the News or Syndicate Service of the Publishers Press, and its list of clients is steadily growing.

Legal.

According to a decision of Judge Pendleton of the Superior Court of Georgia, telegraph operators in that state are classed as day laborers and are exempt from garnishment. This opinion was

based on a ruling of the Supreme Court which had declared a stenographer exempt from garnishment. The Supreme court held that as a stenographer learned only a certain number of characters and put these in use in his business daily he was a day laborer and exempt. Judge Pendleton, in making his ruling, pointed out that an operator learned a certain number of characters in the telegraph code as does the stenographic code, and was therefore exempt under the ruling of the supreme court.

A Problem for Our Readers.

Possibly some of our readers who have had extensive experience in line testing will be able to give a satisfactory solution of the following problem which has been given by Mr. D. B. Grandy of the American Telephone and Telegraph Company, St. Louis. If so, we would be glad to hear from them:

"A lineman is out after a cross. In testing with him he puts a cross on the pair which is in trouble and the measurement to his cross is higher than the original cross. I have known of such cases and doubtless others have experienced the same difficulty. I have a theory in regard to it, but it is not entirely satisfactory."

LETTERS FROM OUR AGENTS.

PHILADELPHIA, WESTERN UNION.

Mr. F. H. Shriner has been appointed assistant manager in place of R. A. Black transferred to the General Superintendent's office at New York.

Mr. John McCoy, from Carlisle, Pa., but now in this office, and Miss Isabella Ferguson were married on April 6.

Mr. John C. Landin, of this office, while hurrying to get out of a severe electrical storm, June 18, dropped dead in the street from heart disease. Mr. Landin was forty years of age and came from Atlanta, Ga., about a month ago. His parents reside at Belleville, Ontario.

The Electrical Aid Society of Philadelphia gave an outing at Woodside Park on Saturday, June 18, at which about four hundred were present. Athletic sports of all kinds were indulged in, including a game of baseball, sack races, etc. Though the sports were interrupted by a severe thunder shower at about 3.30 the event, so far as it proceeded, was pronounced a success, and will probably be repeated.

Recent arrivals in this office are: John L. Vale, from Pittsburgh; Wm. F. Wilcoxon, from Chicago; E. M. Lewis and H. N. Lewis, from Cape Charles, Va.; L. W. Arwell, from Trenton, N. J.; Miss Olive Boyce, from the Baltimore and Ohio Railroad; C. G. Danenhower, J. A. Donahue and D. A. Coyle, from brokerage offices; J. P. Simons, A. J. Ryan, F. H. Lytle, Miss Elizabeth Fitzgerald and Miss Anna Bloomfield.

E. Standifer has gone to Boston; L. Neigut and F. Engle have been transferred to Wilmington, Dela.; A. B. Cain and W. E. Lowe to Atlantic City and G. A. Truit to a broker's office.

NEW YORK, WESTERN UNION.

The electrical class held a very instructive meeting on June 24. Mr. Charles Thom, of the Quadruplex department, and Professor Williams, of Erasmus Hall High School, delivered lectures of an interesting nature. The class, owing to the extreme warm weather decided to postpone further meetings until September.

Business in the operating department is unusually heavy, presaging a very busy summer.

OTHER NEW YORK NEWS.

The Magnetic Club, of New York City, has decided not to hold any outing during the present summer.

Assessment No. 510 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of E. Frank Blanchard, at New York; Charles E. Chandler, at Los Angeles, Cal.; Edward Gordon, at Hudson, N. Y.; Charles A. Tommaney, at Albany, N. Y.; William H. Hartman, at Indianapolis, Ind., and Tunis H. Fisher, at Brooklyn, N. Y.

Trade Note.

If you wish to save money, there is no better way than to purchase a diamond on the Loftis Confidential Credit System. As a safe investment, diamonds excel even banks for security. They pay a higher rate of interest than any bank, because they increase in value 10 to 20 per cent. each year.

For wedding, graduation, confirmation and birthday gifts nothing is more appropriate than a fine diamond or high-grade watch.

A sample copy of the Loftis Magazine, devoted to "Styles and Stories of Diamonds, Precious Stones, Fine Watches, and Artistic Jewelry," will be sent free, postage paid. Address Loftis Bros. and Co., Dept. G 795, 92 to 98 State Street, Chicago, Ill.

General Mention.

It is reported that about 4,300 miles of new telegraph lines will soon be constructed in Brazil.

Telegraphic communication has been established between Cape Colony and German South-West Africa.

Some experiments have been carried on recently in telephonic transmission through the earth with a view of facilitating communication with miners in case of accident.

The Order of Railroad Telegraphers is having plans prepared for a new sixteen-story building which will be erected by them in St. Louis on land which has recently been bought for this purpose. It is said that this will be the only building owned by a labor organization in the country. Mr. Leon W. Quick, secretary and treasurer of the organization, who is city treasurer of St. Louis and president of the Washington National bank of that city, is in charge of the movement to erect the new building.

Twenty-five Western Union messenger boys in a western city went on a strike recently because of a quarrel between one of the night clerks and Nils Jensen, one of their number, and refused to work until the clerk was discharged. One of the boys explained the cause of the strike as follows: "Dey tried some rough stuff but dey couldn't get by wit it. Dey tried to slip de crutcher to Nifty (meaning Jensen) but we crabbed de game. We're out 'til dey slips de hook to dis brow, an' if we need any help de rest of de gang at de Postal and de other joints will ramble wit us."

The Serial Building Loan and Savings Institution, of 195 Broadway, New York, is assisting hundreds of telegraphers to buy their homes, instead of paying rent all of their lives. Most men with families pay enough for rent in the course of their lifetime to buy several homes as good as the rented one. The Serial was organized for the purpose of assisting telegraph and telephone people to buy their own homes, so that when they had paid for the same they would have an opportunity to save something for their old age. Write for particulars.

Advertising will be accepted to appear in this column at the rate of fifty cents a line, estimating eight words to the line.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care Telegraph and Telephone Age, 253 Broadway, New York.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

Leg Pattern \$2.50
Legless Pattern 4.00
F.O.B. Columbia, Pa.

THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,
Columbia, Pa. R. F. D. No. 1.



Telegraph and Telephone Age

No. 14.

NEW YORK, JULY 16, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons in Electrical Measurements.

PART VI.

In the preceding installment of this article it was shown that when measuring a conductor for resistance, while Ohm's law $\frac{E}{C}=R$ is strictly correct for the final answer everything depends upon the conditions existing at the instant the measurement is taken. For example, it has been shown that inductance, in the shape of a coil of wire, and capacity in the form of a condenser, either singly or in combination, when inserted in a circuit play a very important part and must be considered in the computations.

In a closed circuit wherein a direct current is flowing neither inductance nor capacity can affect the value of the quotient obtained by the formula $\frac{E}{C}=R$, because they are not developed or present except during the period in which the current is actually rising and falling. Hence the value of R is somewhat different for a closed circuit than it is when the latter is working. The faster such a circuit is worked the greater becomes the apparent resistance, and vice versa, the slower, the less resistance. This fact explains why slow sending is necessary on certain long railroad wires containing a great number of relays, or inductance developers. Obviously the actual resistance of

relays and the wire itself does not alter in the least owing to the speed.

If any one doubts the harmful effect of inductance in a fast working circuit and should attempt to belittle its importance, let him study its value when inserted in an alternating current circuit where the changes in the value of the current are rapid and frequent.

The first thing he will discover is that in a straight conductor, that is to say, one containing no inductance, such as an incandescent electric light circuit, the current, or heating effect, as well as the ohmic resistance will be the same with an alternating current, as it is with a direct current provided the electromotive force is the same.

If an inductance of four or five ohms, say a four-ohm sounder, is then inserted in the direct current circuit, in series with a sixteen-candlepower lamp, the brilliancy of the latter will scarcely be altered but should the same coil be inserted in the alternating current circuit the lamp would barely glow. This proves that while actually but four ohms resisting material was added, there was really a great deal more resistance inserted. The actual amount of resistance developed by the coil is called the impedance or apparent resistance, and where the frequency of the current is great this apparent resistance is often much more than that of the wire itself. Hence for alternating current circuits an entirely different formula is required for electrical measurements. The formulas for ascertaining the value of the current in a circuit fed by an alternating current machine, therefore, vary according to the conditions existing in the circuits measured and which must be known in advance. That is to say, one must know whether the conductor contains merely ohmic resistance, coils or inductance, capacity, or the three in combination.

As this subject is too deep to be treated in an elementary lesson of this kind, the various formulas should be studied separately when the student has reached the chapter relating to the theory and actions of alternating currents. The facts given in this article should partially prepare the student for what follows and help him to grasp the true meaning of the formulas he will later come across.

MEASURING THE RESISTANCE OF WIRES WITHOUT BATTERY OR CURRENT.

If manufacturers of telegraph wires had to wait until the conductors were constructed before being able to tell their resistance per mile after making the $\frac{E}{C}=R$ test, it would be rather a difficult task to furnish conductors to order which would meet given specifications. Fortunately there is a way of knowing in advance just what the ohmic

resistance of any conductor will be when carefully drawn.

The necessity of some such method of ordering wires constructed should be apparent when the fact is considered that the various gauges of coils now in use differ somewhat in the ohmic resistance per mile for the same number with different manufacturers. Thus a twelve-gauge copper wire made by Brown and Sharp (B. & S.) is a smaller wire than a twelve-gauge manufactured by Birmingham (B. W. G.), while the British standard and others also differ slightly. A chief operator therefore should not depend solely upon the rated ohms per mile of any particular gauge of wire unless he knows who manufactured it.

Wire measuring without battery or galvanometer is accomplished by comparing a conductor with the weight, length, diameter, and resistance of one foot of the metal drawn out into a circular wire possessing a uniform diameter of exactly on thousandth of an inch.

For example, a copper wire of these dimensions has 10.79 ohms resistance. Hence the resistance of a longer wire possessing the same diameter would be found by simply multiplying 10.79 by its length in feet.

If the wire to be measured was two thousandths of an inch in diameter we know that the resistance of one foot will be only one-fourth as great as a foot of wire of half its diameter because the resistance varies directly with the length and inversely with the cross section.

From the knowledge of these facts to begin with it is possible to construct the following formula:

$$R = \frac{K+L}{D^2}$$

Where R=Resistance of wire measured.

L=Length of wire in feet.

K=Resistance of one mil foot, i. e., of a piece of wire one thousandth of an inch in diameter and one foot long.

D=Diameter in thousandths of an inch.

As D represents a fraction of one thousand the area or cross section of a wire is usually expressed in whole numbers as so many mils. A mil, therefore, is the unit of area and refers to the diameter, and not to the length of the wire. As wires are round the area is computed in circular mils and the number of circular mils in any wire is equal to the square of the diameter in thousandths of an inch. Hence $CM = D^2$.

Suppose it is desired to determine the resistance of 5000 feet of copper wire having a diameter of two-tenths of an inch.

Now, two-tenths of an inch means 200 mils and the square of 200 is 40,000, which represents D^2 . Hence according to the formula the total resistance of the wire is 1.34 ohms, because substituting these figures in the formula given we have:

$$\frac{10.79 \times 5,000}{40,000} = \frac{53,950}{40,000} = 1.34 + \text{ohms}$$

If the wire is iron instead of copper the same

formula is used, but K for iron is always 63.35. The value of K is different for different metals, but always the same for the same metal of standard grade.

The weight per mile of any copper wire is found by dividing its area in circular mils by the constant 62.5.

For iron wires divide by 72.13.

If the reader will work out a few examples of his own he will readily see how simple the problems are. Remember that CM and D^2 are of equal value and that there are 5280 feet in a mile.

(To Be Continued.)

Recent Telegraph and Telephone Patents.

A patent, No. 961,815, for a telephone relay or repeater, has been granted to L. W. Southgate, of Worcester, Mass.

A patent, No. 962,082, for a printing telegraph, has been awarded to T. M. Foote, of Allston, Mass. An independent printing wheel parallel to the main printing wheel, one for printing the title and the other the quotations and a third wheel for printing the numbers of past quotations.

A patent, No. 962,431, for a type carriage propelling mechanism for printing telegraph receivers, has been issued to G. S. Hiltz, of Brooklyn, N. Y. For effecting the return of the carriage from any point to its initial position.

A patent No. 962,645, for a telephone system, has been taken out by R. C. Livingston, of Spring Valley, N. Y.

A patent No. 962,604, for a printing telegraph receiver, has been secured by Marie Burry, of New York, executrix of John Burry, deceased. Type carrier setting mechanism including an electro-magnet and a printing mechanism with actuating magnet, with a third magnet for causing the first two to actuate their mechanisms in the order named.

A patent No. 962,709, for telegraphy has been granted to I. Kitsee, of Philadelphia. For telegraphing on lines such as submarine cables with great capacity, by means of an alphabet having heavy lines above an imaginary zero line, the space consisting of a heavy line below and above the zero line.

A patent No. 962,800, for a telephone system, has been awarded to J. B. Taylor, of Schenectady, N. Y. Transmission circuit and switch, a transformer with one winding connected to the receiving and transmitting apparatus and a second winding connected through the switch to the transmission circuit and a bell connected across the circuit between it and the switch.

The following patents have expired:

Patent No. 499,748, for a telephone exchange, issued to Alfred E. McClaren, of Joplin Mo.

Patent No. 499,811, for telegraphy, issued to Pierson J. Wicks, of Brooklyn, N. Y.

Patent No. 500,545, for a telephone system, issued to George L. Anders, of London, Eng.

Personal.

Mr. W. T. Gentry, president of the Southern Bell Telephone Company, Atlanta, Ga., was a recent New York visitor, coming to this city in the interest of the service.

Mr. E. C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company, San Francisco, is in New York on company business.

Mr. Ernst Halling, assistant manager of the Government telegraph office at Stockholm, Sweden, has returned to that place after visiting this country for the past four months for the purpose of inspecting our telegraph systems.

Dr. Robert B. Lawson, formerly a member of the telegraph profession at Lynchburg, Va., but for some years past a member of the faculty of the University of North Carolina, Chapel Hill, N. C., accompanied by his wife and daughter, is spending the summer at East Orange, N. J.

Mr. L. W. Storrer, special representative of the Postal Telegraph-Cable Company on the Pacific Coast since 1907, before which time he was for many years general superintendent at San Francisco, has resigned to accept the position of supervisor of telegraphs of the Pacific Telephone and Telegraph Company.

Mr. A. C. Terry, for many years identified with the Western Union Telegraph Company at Buffalo, but for the past ten years district manager of the American Telephone and Telegraph Company, Pittsburgh, Pa., was a recent New York business visitor. While in the city Mr. Terry took occasion to call on his numerous friends.

A recent number of the Electrical Review and Western Electrician contains a large engraving and biographical sketch of Mr. Ralph W. Pope, who has for the past twenty-five years been secretary of the American Institute of Electrical Engineers and who was formerly a prominent figure in telegraph circles. Mr. Pope is one of the most widely-known men connected with the electrical industry.

Mr. John A. Townsend, a forty-niner of the telegraph, for many years, and until four years ago, manager of the Western Union Telegraph Company, at Dunkirk, N. Y., now living in retirement at Rochester, N. Y., is spending the summer at Akron, O. Mr. Townsend was born at Akron, April 24, 1837, and became an operator at the same point in 1849, since which time he has been one of the most honored members of the telegraphic fraternity.

Postal Telegraph-Cable Company.**EXECUTIVE OFFICES.**

Mr. E. J. Nally, vice-president and general manager of the company, left July 11, for a three weeks' vacation.

Mr. L. Lemon, division superintendent, after spending two weeks at Beach Haven, N. J., will relieve Mr. C. E. Bagley, superintendent at Philadelphia, while the latter goes on a vacation.

At a recent meeting of the New York State Welfare Committee of the National Civic Federation, Mr. E. J. Nally, vice-president and general manager of this company, told how his corporation kept its employes from falling into the hands of loan "sharks." The company's Mutual Investment Association, he said, is a savings association organized by the employes in New York, and has for one of its features the lending of money to employes at the legal interest rate of six per cent. per annum, the money to be repaid in small weekly installments. The company also has an organization which provides for employes who are incapacitated.

A large photograph of Manager F. F. Norton and twenty-eight of the chief operators comprising the official staff of the operating department, was recently taken in the vestibule of the building on the Broadway side. It is a handsome picture, and one of them suitably framed has been placed on the wall in the office of Mr. E. B. Pillsbury, general superintendent of the eastern division.

Mr. J. B. Coggins, manager of the Denver, Colo., office was a recent executive office visitor.

A charter has been issued at Oklahoma City to the Postal Telegraph-Cable Company of Oklahoma City. The capital stock is \$10,000 and the directors are A. B. Richards and George Rheem, of Kansas City, and W. A. Logan, of Oklahoma City.

Mr. Charles Kiryon, of Newton, Iowa, has accepted a position in the Davenport, Iowa, office of the company. Mr. Kiryon is a man of some experience in the service, having been employed in the main office in Chicago and acted as manager of the Marshalltown, Iowa, office temporarily.

RESIGNATIONS AND APPOINTMENTS.

Mr. R. H. Cook has been appointed manager of the Pittston, Pa., office, vice J. Mondeau, resigned.

Mr. W. W. Morrison, formerly manager at Des Moines, Iowa, but who has been out of the service for some time past, has been appointed manager at Lincoln, Neb., of this company's interests.

Western Union Telegraph Company.**EXECUTIVE OFFICES.**

Many of the friends and business associates of Mr. E. J. Hall, chairman of the executive committee, were at the dock on Saturday, June 9, to see him start for Europe on the steamer Minnewaska. His trip abroad is for rest.

Mr. E. J. Hall, chairman of the executive committee; Mr. Belvidere Brooks, general manager; Mr. S. M. Williams, special agent; Mr. A. G. Saylor, general superintendent, and Mr. E. M. Mulford, superintendent of the first district of the eastern division, all of New York, recently inspected the New York Central lines between this city and Buffalo, including the various important offices of the company at Buffalo, Rochester, Syracuse and Albany.

The general superintendents of the company, consisting of Mr. C. H. Gaunt, of San Francisco; Mr. B. F. Dillon, of Atlanta; Mr. T. P. Cook, of Chicago, and Mr. A. G. Saylor, of New York, together with other executive officers of the company, held conferences in New York several days last week. The matters discussed related to general service methods.

Among recent executive office visitors were, Mr. Charles H. Gaunt, general superintendent at San Francisco; Mr. T. P. Cook, general superintendent at Chicago, accompanied by his secretary, Mr. M. T. Cook; Mr. B. F. Dillon, general superintendent at Atlanta, accompanied by his secretary, Mr. R. L. Barnes; Mr. John C. Nelson, superintendent at Omaha, Nebr.; Mr. D. C. Dawson, superintendent at St. Johns, N. B.; Mr. J. S. Calvert, superintendent at Richmond, Va., and Mr. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line, Wilmington, N. C.

At a meeting of the board of directors of the American District Telegraph Company of New Jersey, held July 12, Mr. William H. Baker was elected a member of the board of directors and of the executive committee and vice-president of the company. He will at once assume active administration of the duties of that office with headquarters at 195 Broadway, New York. Mr. Baker still retains his connection with the American Telephone and Telegraph Company as special agent.

Mr. E. D. Hall, son of Mr. E. J. Hall, chairman of the executive committee, has been appointed a special agent of the company and attached to the general manager's office. Part of Mr. Hall's duties consist in looking after the commercial end of the business. Mr. Hall for some years past has been identified with the service of the New York Telephone Company.

Mr. H. W. Ladd has been appointed assistant auditor of the company with offices on the sixth floor.

Commencing August 1, two new field divisions of this company's service will be established as follows:

The Mountain division—Mr. J. C. Nelson, general superintendent with headquarters at Denver, Colo., embracing the lines and territory in the states of Montana, Idaho, Wyoming, Colorado, Utah, Nebraska, Kansas and New Mexico.

The Gulf division—Mr. L. McKisick, general superintendent with headquarters at Dallas, Texas, embracing the states of Texas, Oklahoma and Louisiana.

The boundaries of the Western, Pacific and Southern divisions will be changed accordingly.

Mr. John W. Reed, manager of the Philadelphia office, has been advanced to the superintendency of the seventh district, eastern division, with headquarters at New Haven, Conn., to take effect on August 1, vice Mr. F. E. Clary, who has resigned to engage in commercial business at Los Angeles, Calif.

Mr. J. S. Calvert, superintendent at Richmond, Va., and T. P. Cummings, manager of the New Orleans office, will be the guests of Mr. F. E. Clary, superintendent at New Haven, during the next week. Before their return to the south, Messrs. Calvert and Cummings will visit many points in New England, including a trip to Mount Washington in company with their host.

Mr. J. A. Hill, assistant superintendent of the first district, New York, has been transferred to the office of the general superintendent of the eastern division. Mr. L. D. Beall, storekeeper of the company at New York, has been appointed assistant superintendent to succeed Mr. Hill.

The cable steamer, Robert C. Clowry, which has for some time past been engaged in overhauling the company's Atlantic cables, has completed her work on the long sections and is now working on the New York-Canso ends, and has succeeded in greatly improving their working conditions. Mr. C. B. Dunham, manager of the Canso cable station of the company, had charge of the expedition.

At the annual meeting of the Maine Telegraph Company, held June 25, the following board of directors was chosen: R. C. Clowry, B. Brooks, G. W. E. Atkins, A. R. Brewer and J. B. VanEvery, of New York, and Franklin A. Wilson and Charles E. Bliss, of Bangor.

RESIGNATIONS AND APPOINTMENTS.

Mr. R. D. McMillan, manager at Sydney, N. S., has been temporarily appointed to a position on the staff at Halifax, N. S. Mr. Parker Whitney of St. John, has been appointed temporary manager at Sydney to succeed Mr. McMillan.

Mr. John D. Steele, manager of the Nashua, N. H., office has been appointed to a position in the Boston office. He was relieved at Nashua by Mr. F. M. Headle, of Lincoln, N. H.

Mr. E. C. Davis, electrician of the Kansas City, Mo., office, has accepted a position in the Los Angeles, Calif., office. Mr. Davis is a telegraph engineer of ability.

Mr. C. J. Raby has transferred his services from Tampa, Fla., to the Dunnellon, Fla., office.

Mr. Oscar Marshall, of the Savannah, Ga., office, is now Associated Press operator at Lexington, Ky.

Mr. J. W. Reed Becomes Superintendent at New Haven, Conn.

Mr. John W. Reed, manager of the Western Union Telegraph Company at Philadelphia, has been advanced to the position of superintendent of the same interests at New Haven, Conn., to succeed Mr. F. E. Clary, resigned. Mr. Reed, during his incumbency of the managership in the Quaker City has made a splendid record for himself, his ability and excellent judgment in the management of a large telegraph center naturally qualified him for advancement and his superior officials wisely selected him to take charge of the seventh district of the eastern division.

Mr. Reed was born at Urbana, Ill., May 11, 1866. It was in September, 1881, that young Reed, then a lad of fifteen, entered upon his telegraphic career, at Rosendale, Mo. He was quick to learn the meaning of the dots and dashes, and from the first was a good operator, so that when he reached the position of telegraph operator and station agent of the Kansas City, St. Joseph and Council Bluffs Railroad, he was accounted a



JOHN W. REED.

Superintendent, Western Union Telegraph Company, New Haven, Conn.

"good man for the place." The commercial service, however, was more attractive to Mr. Reed than that of the railroad, and seeking employment therein was given a position as an operator for the Western Union Telegraph Company at Muscatine, Iowa. He subsequently served in the same capacity at Cedar Rapids, Iowa, Omaha, Neb., Butte, Mont., and Helena, Mont. During this period he had steadily gained reputation, and in many ways had demonstrated his capacity for executive direction.

His next position was that of manager at Durango, Colo., followed by a transfer to the head of the office at Colorado Springs, that state. Here his record was of such character as to lead to his appointment to the important office at Philadelphia, which position he has held for the past seven years.

Canadian Notes.

Mr. Wm. J. Camp, electrical engineer of the Canadian Pacific Railway's Telegraph, Montreal, Que., is making a trip of inspection of the system from the Pacific Coast eastward.

The Canadian Railway Commission has given notice that the question of commercial rates into and out of Winnipeg will be taken up for settlement at the meeting of the board in that city in September. The onus of proof will rest with the telegraph companies in regard to the tariffs which have been filed by the companies.

The Canadian government telegraph system is being extended westward from Edmonton, Athabasca, to the Peace River district. This work has been interfered with to a great extent by forest fires and windstorms.

The Great Northwestern Telegraph Company and the Canadian Pacific Railway's Telegraph have issued instructions that night telegrams written in French as well as in English would be accepted for transmission to any point of the company's service in Canada.

The development of the plant of the Canadian Pacific at Moose Jaw will necessitate the stringing of a number of new telegraph wires in and out of that city. In all about two thousand miles of wire will be strung immediately. The work will include four new wires from Moose Jaw to Regina, and two new wires from Regina to Winnipeg. There will also be strung a new direct wire to Prince Albert running via Regina and Saskatoon.

R. N. Young, Superintendent, Canadian Pacific's Telegraph, Moose Jaw, Sask.

We frequently have the pleasure of recording the advancement of Canadian born telegraphers who have come to the United States and been successful in their chosen profession. Fortunately, however, for the telegraph companies in Canada, some of the best of their operators remain in their native country and assist in developing the Canadian telegraph systems. Among these is Mr. R. Nelles Young, whose appointment to the superintendency of the Canadian Pacific Railway's Telegraph at Moose Jaw, Sask., was briefly announced in our July 1 issue. Mr. Young was born at Cayuga, Ont., September 4, 1870. At the age of nineteen he joined the forces of the Canadian division of the Michigan Central Railway as operator. The next year he transferred to the Canadian Pacific Railway in the same capacity and has been in their employ since that time. He soon became a train despatcher and next was advanced to the position of circuit manager. In 1903 he was appointed inspector of telegraphs for the central division with headquarters at Winnipeg, Man. In March, 1907, he was again advanced, this time to the assistant superintendency at Winnipeg, which position he held until his recent promotion. When the expansion of the company's business in Western Canada rendered a readjustment of the divisional lines necessary and required that another division be created, Mr. Young was the logical choice for the position of superintendent of the new division and was accordingly selected. The territory over which he now has charge is developing with astonishing rapidity and he will find many important matters to occupy his time and attention in the new field of labor.

His many friends, however, predict for him a high degree of success in the discharge of his new duties.

The Cable.

The Commercial Cable Company has finished overhauling its trans-Atlantic cables, replacing some of the shore ends with much heavier cable.

It is reported that France and Germany have concluded an agreement covering the South Atlantic Ocean, according to which each country guarantees to the other the use of its cables in the event of breakdown of the other's cable system.

The report of the Mexican Telegraph Company for the quarter ending June 30, part of which is estimated, shows gross operating receipts of \$207,000, an increase of \$42,000 over the corresponding month last year, and income available for dividends amounted to \$181,000. After paying the regular quarterly dividend of two and one-half per cent. there was left to be added to the surplus \$91,265. The total surplus of the company now amounts to \$2,399,139.

Municipal Electricians.

The members of the International Association of Municipal Electricians will regret to learn of the death, on July 5, of Mrs. A. W. Kittredge, wife of Mr. A. W. Kittredge, superintendent of police telegraphs of New Haven, Conn.

The work of placing the fire alarm telegraph wires in Brooklyn underground will not be started until a new fireproof building for the central office has been erected. An appropriation has been made for this purpose, but a site for the building has not as yet been selected.

A patent, No. 961,853, for a fire alarm system, has been granted to J. H. Garratt and W. J. McGovern, of Rochester, N. Y. A line circuit and a source of current connected therein within a signaling instrument and electromagnetically operated devices responsive to the line current for connecting the signaling device with the actuating means.

The annual convention of the International Association of Fire Chiefs will be held in Syracuse, N. Y., August 23 to 26. Among the papers which will be discussed will be one on "The Necessity of Quick and Accurate Notice of Location of Fires in Connection with Rapidly Moving Fire Apparatus," by William L. Riehl, superintendent of fire alarm telegraphs, Cincinnati, Ohio.

Plans for the fifteenth annual convention of the International Association of Municipal Electricians, which meets at Rochester, September 6, 7, 8 and 9 are now well under way. Among the subjects upon which papers will be presented are: "Wireless Telephone and Telegraph," "Lightning Protection," "Mercury Arc and other Rectifiers," "Relation of the Telephone to the General Organization of Fire Department Service," "Underground Work" and "Modern Police Telegraph Systems."

All of these are live subjects of vital importance to fire alarm and police telegraph superintend-

ents, and will bring out discussion, that all, who expect to keep abreast of the times, should hear.

Mr. Frank P. Foster, of Corning, N. Y., secretary of the Association, is busily engaged in the finishing details of the arrangements and is prepared to answer any question relating to the coming convention.

Obituary.

E. J. Lane, an old time press operator of Dayton, Ohio, died in that city on June 16.

William McInnes, aged eighty years, who was a member of the operating force at 195 Broadway, New York, until the time of the strike in 1883, died at Belvidere, N. J., on July 10. Mr. McInnes was the inventor of the hotel annunciator for which he received \$30,000.

Frank T. Howser, an old-time and military telegrapher, died at Landham, Md., July 2, aged seventy-three years. Mr. Howser rendered important service to the Government during the war, being located at that time at Frederick Junction. He was for a long time after the war ticket agent for the Baltimore and Ohio Railroad at Washington.

William Martin, aged sixty-six years, an old time and military telegrapher, died at Irondale, Mo., July 3. He was born at Baltimore, Md., and entered the service of the Iron Mountain Railroad as telegraph lineman under Colonel R. C. Clowry, now president of the Western Union Telegraph Company. He remained in the employ of that company for upwards of fifty years. He was a member of the United States Military Telegraph Corps and was present at the battle of Pilot Knob in September, 1864.

Benjamin Franklin Bush, an old time and military telegrapher, died at Denver, June 25, aged seventy years. Mr. Bush, after serving with distinction in the United States Military Telegraph Corps during the civil war, went west, and in 1869 became manager of the Denver office of the Western Union Telegraph Company when the telegraph was first extended to that point. Since that time, with the exception of two years in the early eighties, when he was engaged in other business, Mr. Bush has been continually employed in the Denver office until two years ago when he was retired on a pension. E. C. Bush, a brother, who was also a well known old time and military telegrapher, died in 1896.

Mr. E. W. Collins, superintendent of the Postal Telegraph-Cable Company at Cleveland, Ohio, in remitting to cover his subscription says: "During the past twenty-eight years I have become so accustomed to renewing my subscription to the Age that it has become a habit with me. It gives me pleasure to remit for same. Telegraph and Telephone Age is an education, an inspiration and a convenient ready reference on matters telegraphic. More power to it."

The Telephone.

The Tri-State Telephone and Telegraph Company of St. Paul has declared a quarterly dividend of one and one-half per cent. on its common stock.

It is reported that the Pacific Telephone and Telegraph Company is preparing to expend \$700,000 in improving its facilities in Spokane, Wash., and vicinity.

The Mexican Telephone and Telegraph Company is making preparations to double its facilities in the city of Mexico by installing a second central office having the same capacity as the one now in service.

In pursuance of its policy of forming a closer union of its subsidiary companies the American Telephone and Telegraph Company has offered to exchange its shares for stock of the Nebraska Telephone Company on the basis of three shares of American for four shares of Nebraska.

The New York Telephone Company on July 8 certified at Albany to the Secretary of State that it had merged the New York and Pennsylvania Telephone and Telegraph Company. The latter company was capitalized at \$1,000,000 and operates telephones in the southern tier of counties of New York State and some of the adjoining counties of Pennsylvania.

An innovation in telephone practice has been introduced by the Home Telephone Company of Detroit. What are known as wayside telephone stations or connection jacks, are installed at various street corners and public places. Regular telephone subscribers are furnished with a pocket telephone set for connection to these stations at a cost of fifty cents per month. This portable set weighs but a few ounces and is provided with a cord and plug which fits in any one of the wayside jacks and thus gives the user connection with a central office.

The Public Service Commission of the second district of New York is gathering information concerning the telephone companies of the state preparatory to assuming jurisdiction over them on September 1 under the law recently passed by the Legislature. All companies or persons engaged in the telephone business and having less than \$10,000 worth of property used in the service or which do not operate for a profit are exempt from supervision. There are over 1,100 telephone corporations in the state, but it is probable that less than half of these will come under the control of the Commission.

The Cumberland Telephone and Telegraph Company has been fined \$175,000 by the Chancery Court of Mississippi for alleged violation of the anti-trust law of that state. The Cumberland Company was charged with entering into a contract with an independent company for the purpose of shutting out competition. As the contract in question is the usual one which has been effected by the Bell companies throughout the country for traffic exchange with independent interests and its legality has not before been questioned, the case will be appealed to a higher court.

At a conference of Western Union and telephone officials at Kansas City a few days ago an arrangement was reached whereby the wire of the telegraph company will occupy the underground conduits of the telephone company.

The New England Telephone and Telegraph Company has bought on a mortgage foreclosure the property, franchises and rights of the People's Telephone Company of Exeter, N. H., which has operated for the past ten years in Exeter and nearby towns.

The telephone telegraph is the idea of three Danish engineers, and its purpose is to leave a recorded message for any subscriber called when away or otherwise prevented from responding to the call. The transmitting apparatus includes a keyboard like that of the ordinary typewriter. The receiving apparatus prints the message on a tape in ordinary characters, and single communications or a series of them can be sent at any time, to await prompt attention on the subscriber's return.

Mr. George F. Preston, general manager of the London telephone service, who accompanied Major Walter A. J. O'Meara, engineer-in-chief of the British Post Office, to this country last fall on his trip of inspection of our telegraph and telephone systems, upon his return to London, gave an interesting resumé of the impressions which he received of our telephone system. He did not hesitate to admit that the service in New York was unquestionably superior to that in London and attributed this condition largely to the fact that in New York there is only one organization responsible for the provision of telephone service, while in London there are two.

Items of Interest.

A son was born on June 18 to Mr. J. A. Crawford, manager of the Western Union Telegraph Company at St. Joseph, Mo. To make sure that the newcomer gets a proper start in the telegraph field Mr. Crawford will a little later have his name entered as a subscriber of Telegraph and Telephone Age.

Three employees of the Postal Telegraph-Cable Company at Salt Lake City were married on one day recently. Miss Anita Green, delivery clerk, was married to F. L. Thomas, a lineman and W. E. Bouma, a bonus operator, was married to Miss Perle Z. Hall, of Grand Rapids, Mich.

A New York Postal messenger boy was probably the means of saving the life of a man who was suddenly taken ill with appendicitis in a downtown subway station recently. Other passersby thought he was intoxicated and paid no attention to him, but the messenger boy discovered that he was sick, helped him to a bench in the station and asked him if there was anything he could do for him. The man gave the messenger his brother's telephone number and the boy disappeared. Within fifteen minutes the brother came and in less than an hour the stricken man was on the operating table and the operation was performed in time to save his life.

Morse Electric Club Annual Outing.

The annual summer outing of the Morse Electric Club, which occurred at College Point, L. I., July 9, was a most enjoyable affair, all present voting it to be one of the pleasantest outings ever held by the club. Special cars from Long Island City carried the party to the picnic grounds. The first event on the program was a ball game between two picked nines. This proved to be a closely contested affair, the umpire, Mr. F. J. Scherrer, assistant secretary of the Western Union Telegraph Company, doing his best to make allowances for any differences in the ability of the opposing players.

The scorekeeper, M. J. Hayden, manager of the Western Union Telegraph Company in Brooklyn, was unable to tell the exact score but it was evident that the team captained by W. C. Merly, secretary to General Manager Belvidere Brooks, of the Western Union, had beaten the other team whose captain was Mr. Gardner Irving, manager of the commercial news department.

The ball game was followed by several foot races, the most exciting of which was the hundred-yard dash for fat men. The first race was won by Mr. J. F. Nathan, but as some dissatisfaction was expressed because he did not carry as much weight as some of the other contestants the handicaps were readjusted and another heat was run. This time the race was never in doubt as Mr. W. E. Athearn led the field from the start and acquired such a momentum that he ran to the top of the steep bank beyond the finish line, before he could stop.

Further honor came to the department of the engineer of equipment in the next race when Mr. Frank Kitton won with ease from a large field. In the last race three sons of William Finn, also of the same department, were the prize winners. Mr. W. E. Athearn, engineer of equipment, expressed himself as highly pleased with the work of his staff in securing a majority of the honors of the day, and rewarded his faithful workers with good cigars.

At the conclusion of the sports all present did justice to the excellent dinner that had been prepared for them at Donnelly's Boulevard Hotel. After the dinner came the drawing for prizes. The committee having this matter in charge had secured enough prizes so that every member present was the recipient of something of value.

Among those present were: J. B. Van Every, F. J. Scherrer, R. J. Murphy, H. F. Van Every, J. Piccolo, L. D. Beall, H. E. Roberts, B. M. Downs, J. Forson, Gardner Irving, J. A. Dierks, J. W. Connolly, J. B. Taltavall, H. E. Dunham, F. E. Fitzgibbon, George Schreiner, Lewis Dresdner, Charles Jacobson, Patrick Mulhauser, B. H. Reynolds, J. F. Nathan, E. A. Baird, C. F. H. Johnson, W. L. Geehr, F. J. Sheridan, C. A. Kilfoyle, Joseph McCusker, E. F. Howell, M. J. O'Leary, William Finn, William Finn, Jr., T. A. Finn, Walter Finn, W. E. Athearn, F. Kitton,

M. J. Hayden, G. C. Atkins, J. W. Behre, J. A. Berry, J. J. Creamer, A. M. Lewis, J. Cahill, J. Veitch, Alex. Kline, H. V. Shelley, T. G. Singleton, M. H. Kerner, F. W. Lienau, G. W. Messer, H. Durland, T. A. Moore, T. Singer, W. C. Merly and T. Story, all of New York; F. E. Clary, of New Haven, Conn., and J. S. Calvert, of Richmond, Va.

Outing of Postal Branch Office Managers.

On June 25 the Branch Office Managers of the Postal Telegraph-Cable Company, New York, had their third annual outing at Witzel's College Point grounds, College Point, L. I., and every one present voted it the most enjoyable of any of the series of outings held so far. The guest of honor was Mr. C. F. Leonard superintendent of the first district, who, at the conclusion of the dinner, complimented his staff, and in his speech dwelt on the importance of the messenger boy in the telegraph field, pointing out that an obligation devolves upon those having to do with the boys to promote their physical, mental and moral welfare, so that those who in the course of time become our officials and those who may select another field of endeavor will have had the proper example and training to be good men and good citizens. Mr. Leonard was accompanied by Mr. J. B. Coggins, manager of the Denver, Colo., office, who was visiting New York, and who said he would take back West with him a very pleasant impression of the intelligence, loyalty and warm good fellowship of the personnel of the New York staff.

Twelve prizes were competed for in the field events. The first baseball game was won by the uptown managers under the captaincy of William Finley of the 703 Broadway office. The second game between two picked nines proved an interesting event.

E. S. Butterfield, general agent of the money transfer service, who distributes the company's millions and who is treasurer of the Serial Building Loan and Savings Institution, also chairman of the finance committee of the mutual investment association, played center field. Nothing got by him. No fly was too high to catch and his one handed stops were marvelous. He wielded the wagon tongue in Ty Cobb style, bringing in several runs. In fact, he made a hit each time he went to the plate. His base running made the old-time baseball players who were present gasp in admiration.

Superintendent Leonard, who is an enthusiastic baseball player, had to take orders from the captain of his team and was assigned to second base. He picked up grounders cleverly and as rapidly as he picked up messages in his earlier days, and he was voted by those present as good a ball player as he is a telegraph official.

The other positions on both sides were filled by the various branch managers, and the contest was exciting. We are still waiting, however, for the returns from the artist on the adding machine as to the complete footing of the runs and the total of the hits and errors columns.

The Military Telegrapher in the Civil War.

PART XLIII.

Mr. William K. Smith was a telegraph operator before the outbreak of the Civil War, but at the beginning of that conflict left the key to take up arms for his country. Later having been incapacitated for duty in the field he continued to serve the Union cause by joining the United States Military Telegraph Corps. In writing to Colonel William R. Plum, the historian of that organization, in 1878, he gave in part the following account of his military telegraph career:

"On October 27, 1864, while I was a member of the Forty-seventh Ohio Volunteers I was ordered to report to Colonel S. G. Lynch, assistant superintendent of United States Military Telegraphs at Cleveland, Ohio, for duty in the telegraph corps. Although ostensibly a member of the regiment mentioned, I had never joined my company or ever known of its whereabouts as I entered the service at this time for the sole purpose of joining the United States military telegraph, having been incapacitated for active service in the field on account of having been severely wounded in the battle of Antietam, while connected with the Seventh Michigan Volunteers in which regiment I had served in various positions from the time of its organization until I became disabled. A gun shot wound in the left shoulder kept me in the hospital for over a year. During the campaign in front of Richmond, Va., and the retreat of McClellan's forces to Harrison's Landing, I had frequently rendered important service in connection with the signal, telegraph and hospital corps. On account of the wounds received I was discharged from the Seventh Michigan.

"At the solicitation of Henry W. Stager, then train despatcher of the Lake Shore and Michigan Southern Railway between Cleveland and Toledo, I left the office in which I was then operating at Elmore, Ohio, and again braved the dangers of the war. I was assigned to duty in the department of West Virginia, and reported on the morning of November 7, 1864, to Charles O. Rowe, who was then assistant manager in charge of the Clarksburg office. On my arrival at that place, I was directed to proceed to New Creek Station, 201 miles west of Baltimore, and open a telegraph office at that point as it was deemed important that, inasmuch as numerous Confederate raids had recently been made in that direction, the department should be kept posted as to the movements of the Confederates in that locality who consisted mainly of small bands of guerillas. Before, however, I had started for my assigned post of duty, the order was countermanded and I had the pleasure of a ride on horseback to Bulltown, about fifty miles south of Clarksburg, and which was the outpost of our army in that direction. Another operator was sent to New Creek which, as events afterward showed, was very fortunate

for myself. In company with an escort of cavalry the journey to Bulltown was made in two days. The weather was stormy and the roads very bad. At Weston, a halt was made on the evening of the 7th of November, and the party remained in town that night. On the morning of the next day an early start was made, although the rain descended in torrents, completely drenching the operator and his escort. As it was the day on which the Presidential election took place, and there being quite a number of voting precincts along the road to Bulltown, and the means of transportation was limited, I was prevailed upon to carry a good supply of tickets for the admirers of Lincoln and McClellan, respectively, which I distributed along the sparsely settled valleys of Lewis and Braxton counties. The telegraph office at Bulltown I found was established in the house of an old resident near where the sutler held forth and the officers lodged.

"Soon after my arrival at Bulltown, I learned that the Confederates had made a raid on New Creek, sacked the place and captured the telegraph operator, W. H. H. Lancaster, taking away his boots, hat and coat, in which condition he was forced to travel on foot to Richmond, where he was incarcerated in Libby Prison and almost starved to death. After the close of the war, he was liberated and returned north, looking somewhat worse for wear but glad that his life was spared.

"The telegraph line from Clarksburg to Bulltown ran through a very rough country, but few poles were used between Weston and the southern terminus of the line, the wire being strung along from tree to tree through the woods. It required constant care and watchfulness on the part of the operators and repairers to keep the circuit clear. The wire near Bulltown was frequently cut by bushwhackers and parties hostile to the advance of civilization. While at Bulltown, I discovered that the wire was very often tampered with at a certain point in the woods on the Weston road, and on one occasion, I determined to investigate the matter, so giving directions for my telegraph repairer who took care of my horse to get ready late one evening, I provided myself with plenty of ammunition for my Colt's revolver and such other articles as were necessary and started for the neighborhood of the trouble. Having the countersign and a pass, I had no difficulty in passing the pickets. After a tedious ride along the dark and winding way, I arrived just at daybreak at a part of the road which wound its way around the side of a rough and rugged hillside at the bottom of which ran a small creek. At this point, I plunged into the thickly wooded upland and tied my horse to a sapling in a dense thicket. Approaching the road along which the telegraph wire was strung, by the aid of a pair of creepers I climbed a high tree where I could observe matters some distance. I had been in that position but a short time when

I heard a faint noise as if some one was approaching on horseback. I had not long to wait for in a few minutes I discerned a party of three persons on horseback dressed in butternut and armed with carbines leave the road and approach the place where I was seated in the tree top. Just as they came within hearing one of the party who seemed to be the leader suggested that inasmuch as they had learned that a raid was to be made in the direction of the Baltimore and Ohio Railroad, it would be a good thing to destroy the telegraph line as much as possible, and it was arranged that one of the party should cut the wires while the other two watched the road in both directions. The party then separated, one passing directly under the tree in which I was secreted, without observing me. I was prepared, however, for the worst and had my revolver all ready with the intention of firing the very instant I was discovered.

"This man who passed my hiding place made his way to the telegraph wire, and riding up onto the steep bank stopped his horse directly under the wire which at that point sagged considerably. Standing up on the back of his horse he attempted to cut the wire with the sharp edges of a pair of small plyers. Just at that moment I took deliberate aim and fired, the bullet striking one of the glass insulators which had been detached from a tree and was hanging on the wire. The glass fragments flew in all directions, some into the man's face and others striking the horse. The sharp report and the commotion made by the flying glass startled both horse and rider and the former started off at a gallop, throwing its rider who rolled down the steep bank into the road. That gentleman gathered himself together started as fast as he could in the direction his horse had taken and was soon lost to view. Nothing further was seen of either of the men, and I concluded that thinking they were caught by a scouting party of the Union forces they had scampered off as fast as they could. Satisfied that the coast was clear, I descended from the tree, mounted my horse and retraced my way back to camp.

"We had but little trouble after that with the wires while I remained at Bulltown. The latter part of February, 1865, I was transferred from Bulltown to Webster, a small station on the Parkersburg branch of the Baltimore and Ohio Railroad, four miles from Grafton, W. Va., where I established an office for the accommodation of the troops then stationed at Phillippi, the county seat of Barbour county, and about eight miles from Webster, where the Eighth Ohio Cavalry was looking out for the numerous bands of bushwhackers that infested that country.

"Nothing startling occurred until the morning of April 15, when the news was flashed over the wires that President Lincoln had been shot the evening before and had died that morning at 7.22. While at Webster, as well as at other points, I always slept by the side of my telegraph instru-

ment, and on the morning in question, I was awakened from my slumber by the words clicked out on the instrument, 'President Lincoln died at 7.22 this morning,' at first I thought that I had been asleep and dreamed it for I could not realize for an instant that such was the fact. But it was indeed too true. When I announced this news in the village and to the troops none believed me.

"The war having closed, telegraphic operations were at once opened with the principal cities of the south and on the second of May it was announced to 'all offices' that messages for the south would be received at the tariff then given.

"Upon the withdrawal of the troops from Phillippi the Weston office was closed, and during the latter part of July, I was assigned to duty at Red House Shoals on the Kanawha River, relieving Robert Wirth. Here the telegraph office was in an old frame building on the road to Charleston facing the river.

"It was while here that Alfred Gunn, employed in the quartermaster's department at Charlestown was discharged, the record of the department standing against him thus: 'A. Gun discharged for making a false report.' The regiment to which I had been attached having been on August 11, 1865, mustered out of service, I was notified in October to report to the mustering officer at Columbus, Ohio, to be mustered out. I accordingly did so and on October 30 received my discharge and returned to my home in Cleveland."

A patent has been granted recently in England to Mr. R. K. Gray, which has for its object the increasing of the self-inductance and the reducing of the capacity of submarine telegraph or telephone cables. The conductor is formed of wires of two different metals, one of which is magnetic. Thus a solid central copper core is braided with two sets of strands of copper and iron, respectively, the two sets being interlaced and insulated from one another.

In a recent paper presented before the British Institution of Civil Engineers Sir John Gavey gave a resume of the progress of electrical communication since the earliest days. In discussing the Wheatstone system the author pointed out that the limit of speed in connection with this system is set by the self-induction of the receiving apparatus. A speed more than double that of the Wheatstone recorder has been attained with an electrochemical receiver, which can be worked at 1,000 to 1,200 words a minute under favorable conditions, but in practice the difficulty of supplying the sending apparatus with the perforated slip, and of distributing the slip at the receiving end, constitutes a very serious obstacle to the commercial use of such high speeds. Even momentary contacts due to linemen at work result in the loss of several words at these high speeds.

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The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

A Future Possibility of the Telegraph.

The great business expansion of the past twenty-five years and the accompanying consolidation of small and widely separated interests into large corporations has resulted in such greatly changed methods of doing business that the methods in vogue a quarter of a century ago would mean failure for any great enterprise to-day. The growth of our industrial systems has gradually forced upon the leaders the adoption of a more systematic way of carrying on the work in order to reach the goal of success for which all are striving. In former times there were no companies of any kind so great but that one man could look after all of the details of their management in a general way. As expansion and consolidation have progressed, however, necessity has been the mother of invention and systematization of efforts has been the natural result until to-day the most successful industries are without exception, those in which the most perfect system has been developed. The success of the late E. H.

Harriman in welding together the separate units of the great railroad system which he founded was due to his recognition of the fact that all of the separate units must be made to work together in harmony for the good of all and to his ability to so organize the forces under him that this result should be accomplished. The railroads were the leaders in this line and to-day furnish models from which other enterprises may well pattern. Each department has its own particular work to do and in performing its tasks endeavors to assist the other departments in every way possible and not to hinder. Thus the various branches of the work are carried out in unison and the motive which guides all concerned is the best interests of the company at large.

Leaders of other industries have gradually come to recognize the fact that in order to win out in the race for supremacy and make their administrations a success they must adopt similar methods. The telegraph companies especially at the present time are making rapid strides in this direction, and are almost daily putting into effect new plans for increasing the efficiency of the service.

The days when telegraph officials were satisfied with the operating methods in use in the systems under their jurisdiction is past. Haphazard ways of handling the traffic, of keeping the accounts and of conducting the business in general no longer prevail. The best way to do each particular part of the work is being sought and each employe is having the fact impressed upon him that he is one unit in a great whole and that his duty first of all is to pull with and not against each of the other units. His own success as well as the success of his employing interests depends upon this one thing. We believe that this spirit of co-operation is more prevalent in the telegraph ranks to-day than it ever was before and not only that, but it is growing fast. If this continues and there is no reason why it should not, it will not be very many years before the people of our country will point with pride to their telegraph systems as models which other industrial enterprises may follow with profit.

Annual Reunion of Old Time and Military Telegraphers.

Those who expect to attend the twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, which meets in Chicago, September 8, 9 and 10, should notify the committee on hotels as soon as possible, in order that reservations may be made in ample time to secure satisfactory accommodations. This committee consists of A. C. Murphy, Western Union Building, Chicago, chairman, E. S. Williams, F. V. Moffitt and M. J. Kenyon. The schedule of rates at the various hotels was given in our July 1 issue. In a circular letter sent to the military telegraphers, Colonel William Bender Wilson, of Holmesburg, Philadelphia, Pa., president of their organization, urges all to make a special effort to attend the com-

ing reunion. In his letter Colonel Wilson says in part:

"Already nearly thirteen hundred from our ranks have crossed the 'dark river' and for the few of us who remain, the march to its shores is daily becoming so rapid that it is evident none can hope to linger very far behind. Therefore, let us meet around the hospitable board of Chicago, look into each others faces and gather strength and courage to make further efforts to secure the recognition and rights which have been so long denied to our corps.

"While national legislation in our favor is in fair shape, I regret to say that our bills now in the masterful charge of Hon. E. L. Taylor, Jr., in the House and Hon. N. B. Scott in the Senate, did not pass during the recent session of Congress—I look for certain success, however, in the short session beginning next December. It behooves us therefore to present a strong front and battle with all our might until the cause is won and victory perches on our banners."

Any additional information regarding the reunion may be secured by addressing Mr. F. J. Scherrer, assistant secretary of the Western Union Telegraph Company, New York, who is secretary of the Old Timer's Association, or David Homer Bates, 658 Broadway, New York, secretary of the Military Telegrapher's Society.

A Record in Handling Press Matter.

It is estimated that the Western Union and the Postal Telegraph-Cable Companies transmitted 800,000 words over the wires from Reno during the eight hours after Johnson won the pugilistic championship at Reno, Nev., on July 4.

The five press associations and seven newspapers in New York City received, it is estimated, 300,000 words from their staff correspondents. The other big cities of the country shared in the remaining business over the direct wires.

There were over one hundred extra operators on duty and every transcontinental wire was in use. From the big cities the fight story was relayed to the smaller cities and towns, so that every telegraph operator did a share of the gigantic work.

Five direct wires flashed bulletins of the fight to the press associations from the arena. The temporary telegraph offices in Reno were used by special sporting writers who represented nearly every large newspaper in the country. In this way Reno set a record as a centre for distributing news of one single event.

In the seven New York newspapers who had staff correspondents at Reno 121 columns of space were devoted to the story of the fight.

Because of the holiday the telegraph companies had little commercial business, so they were enabled to give a large proportion of their wires over to the fight news. At night special operators were required to handle the thousands of fifty-word messages which were sent from Reno to every city in the country.

The cable and wireless companies sent reports to Europe, Cuba, South America and to ocean steamships wherever they could be reached. Special wires carried the stories of the fight to Canada and Mexico. The Panama Canal Zone also received direct news from the press associations.

The Telephone in the Philippine Islands.

Mr. A. E. Noble, general manager of the Philippine Islands Telephone and Telegraph Company, who has been visiting in this country for some time past, gives in a recent number of the Pacific Telephone Magazine some interesting facts in connection with telephone service in our island possessions.

A modern telephone system was installed in Manila in June, 1906, and the exchange now numbers 2700 subscribers. About one-third of these are natives and the appreciation and demand for service on their part is rapidly increasing. The company occupies its own two-story concrete building with a switchboard of eighteen positions, the whole outside and inside equipment being of the latest pattern. There are twenty-three private branch exchanges in the city. The government has no telephone system of its own, but is served through the local company.

On account of tropical conditions, plant construction is as yet practically in experimental stages. About one-third of the outside construction is underground and plans have been approved for a plant entirely of this character. The poles used are imported white cedar, and single wire with rubber covering makes up the aerial construction. It is impossible to use duplex on account of the rapid changes from bright sunshine to heavy rains. Mr. Noble states that probably more cable is used in proportion to the size of the exchange than in any city in the United States. On account of the humidity of the climate, the terminal room of the exchange is entirely enclosed in glass and is kept at a constant temperature of 112 degrees.

At present twenty-four young ladies constitute the operating force. They are all natives, and they have shown adaptability and efficiency in their calling. They all speak the native Tagalog, Spanish and English. It is a fact worthy of remark that this company is the first to avail itself of the labor of women in any capacity in the islands. At first there was difficulty in securing operators on account of the fancied lack of dignity in labor; an idea fostered by our Castilian predecessors. However, the situation is now entirely changed and there is a large waiting list for positions as operators. Every young lady is chaperoned to and from her work by a vigilant parent or duenna.

The Bolivian Government has appropriated \$33,000 for the construction of new telegraph lines during 1910 and \$18,000 for the repair of existing lines.

American Telegraph Engineering---Notes on History and Practice.*

BY WILLIAM MAVER, JR., AND DONALD MCNICOL.

Although there may not be any startling technical announcements to make relative to recent progress in American telegraph engineering practice, yet within the twenty-five years past, in common with the progress in other lines of engineering, substantial developments have been also made in the telegraphic art along numerous lines, such as the standardization of equipment, and the adoption of improved apparatus and methods of operation which have generally resulted in increased efficiency of the plant, greater reliability of operation, a more rapid handling of the traffic, and consequent improvement in the service rendered the public; and which developments have, in fact, been adequate to meet the demands made upon the telegraph.

The time has been deemed opportune to record some of the salient features of present telegraph engineering practice in this country, but first in order more clearly to illustrate the differences between past and modern practice a resumé of the early history of telegraph practice in this country will be essayed in which resumé certain more or less interesting items of information relating to that history, perhaps not hitherto published, or in any event not readily available, may be recounted.

The first electric telegraph line in this country was constructed by Morse in 1844 between Washington and Baltimore. The progress of this art into public favor was slow; due mainly to the high rates for service and to more or less imperfect service, the latter due mainly to poorly constructed lines and the former largely to heavy legal expense incurred in the effort to maintain for the Morse interests a monopoly of the telegraphic art. Morse gradually endeavored to obtain a British patent for his electro-magnetic telegraph, but failed on the score of previous publication. Bain of Edinburgh came to the United States in 1848 to obtain a patent covering his chemical telegraph which was refused on the allegation that his device infringed the patents of Morse. Bain's telegraph consisted of a device for perforating long and short holes in a strip of paper, which were used to transmit long and short impulses of current over a wire. At the receiving end he used a sheet or strip of paper saturated with a chemical solution consisting of nitric acid two parts, prussiate of potash twenty parts and pure liquid ammonia two parts, which solution was decomposed by an electric current from the sending station thereby leaving long and short marks on the receiving paper sheet or strip. Bain pressed his claims in the United States Supreme Court and in the year 1849 a patent was finally allowed. A British patent to Morse would have been of doubtful value at that time, as during the life of the United States patent the Morse telegraph was but sparingly used in Great Britain, vari-

ous needle and dial telegraph systems having obtained a strong foothold in that country.

The maximum speed claimed for the Bain system was about 1,000 words per minute, but as a writer of that day remarked, "The process of preparing the message to be transmitted, took quite as long as to transmit it" by the Morse method, and while "Mr. Bain's plan was entirely successful as far as it went it was found that after the quick receipt of a long despatch, it would take about as long to copy it into manuscript as it would have taken to transmit it in the ordinary manner in the first place." Following the granting of the United States patent to Bain, numerous telegraph companies were organized and lines built on which the Bain automatic chemical system was employed, in opposition to the Morse companies, but in 1850 an injunction was obtained, based on the charge that Bain's apparatus infringed the Morse telegraph patent of 1840. A consolidation of many of the chemical automatic companies with the existing Morse lines soon followed, and subsequently the Morse manual system (in which the Morse stylus recorder, or register was used) went into almost general use. The Morse register was gradually displaced by the reading sounder, but not without opposition on the part of the superintendents of telegraph who were apprehensive, needlessly as experience proved, of the introduction of errors thereby. The first printing telegraph was that due to Royal E. House, of Vermont, the use of which was begun in 1847-1848 and continued for many years in this country. This system employed a key-board, the depression of a key of which resulted in the printing of a given letter on a strip of paper at the receiving station. The speed of transmission by this system was about fifty words per minute. It was operated on lines 1,000 miles in length. The Morse interests endeavored to bring this telegraph printer within the scope of the Morse patents, but were over-ruled by the courts.

In the early days of the electric telegraph the methods of line construction were naturally crude, but every year saw improvements in the direction of

*In a personal letter to Mr. Maver dated August 22, 1890, Mr. D. H. Craig, who was a prominent figure in the early annals of American telegraphy, writes: "I used Bain's system on lines between New York, Boston and Portland between 1850 and 1853 and was able often in stormy weather to send to the Boston press columns of news when the Morse lines would not telegraph a word. We frequently, however, had trouble with 'tailings' when the dots and dashes all ran together and made the record partially or wholly unreliable, so that in a message or series of messages of 500 or 1,000 words there would be yards of record that would have to be discarded and the messages repeated. The later use of artificial resistances or magnets largely eliminated this trouble. Bain used on his early lines (for his chemical solution) nitrate of ammonium, two pounds to a gallon of water, and muriate of ammonia one pound to a gallon of water, and one-half ounce of yellow prussiate of potassa. This makes a fair solution, but we discarded it. (date not given) and substituted one half ounce red prussiate of ammonia and one pound of muriate of ammonia dissolved in one gallon of pure rain, or distilled water—iron pins were used with this."

*A paper presented at the Twenty-seventh Annual Convention of the American Institute of Electrical Engineers, Jefferson, N. H., June 28-July 1, 1910.

workmanship and materials used. Wooden poles were used from the first in this country, but the forms of insulators and the materials used in their construction were multitudinous, and it was not until much bitter experience was had with various "improvements" in insulators that practice converged on the glass petticoat form now universally employed in overhead electric telegraph work in this country. One of the so-called improvements termed the "brimstone" insulator was especially defective and nearly ruined several of the competing companies that employed it. This insulator consisted of an iron arm which screwed into an augur hole in the pole, the outer end of the arm carried a hollow pendant filled with sulphur into which an iron hook that upheld the line wire was inserted.

The civil war in this country, 1861-1865, again directed the attention of the world to the great utility of the electric telegraph in war, and while its use at this time did not perhaps materially aid in the advancement of telegraph engineering it emphasized the value of the Morse telegraph system for this purpose because of its simplicity and reliability in operation.

The source of electromotive force for telegraph purposes in this country up to the year 1855 was the Grove cell, which was displaced by a modification of the Smee cell known as the Chester battery, and this battery in turn gave way to the Callaud or gravity battery, of which up to the introduction of the dynamo machine in the year 1882, many thousands were in use. In some of the main telegraph offices 5,000 to 15,000 such cells were employed; entire floors of large office buildings being set aside for their occupation.

To meet the increasing demand for additional telegraph facilities in the decade 1870-1880, without resorting to the continual construction of additional line wires, the thoughts of inventors were directed to means for increasing the capacity of existing wires. To this end the chemical automatic telegraph, and the duplex and quadruplex systems of telegraphy were called into service. Thus in 1870 a compound wire of steel core and copper was erected between New York and Washington, a distance of 275 miles on which a chemical automatic system due to Mr. George Little was employed. This system was a modification of the Bain chemical telegraph previously mentioned herein. Originally, adequate means were not provided in the Little system for diminishing the "tailings," or prolonged currents, due to the static capacity of the line, at the receiving instrument, in consequence of which the speed of signaling was low. Subsequently Little introduced a plain resistance in shunt around the receiver with beneficial results.

The Varley devices consisting of electro magnets in shunt with the receiver, and of condensers in series with the receiver for the purpose of eliminating the tailings were subsequently employed, the electro-magnets probably first by H. Grace, to great advantage in this and certain other later automatic chemical

systems in which a single row of holes in the perforated paper (and a uni-directional current) was employed; the condenser as thus employed virtually giving the equivalent of the double current method. Still later the speed of transmission on this New York-Washington line was increased to 900 words per minute by the substitution of an iodine solution and by using a platinum needle in place of a nitric acid solution and an iron needle.

An important contribution to the art of chemical automatic telegraphy at this stage, was the Edison key-board perforator, which by the depression of a key perforated in a moving paper tape the characters necessary for any given letter. By the Little method of preparing the perforated tape not more than seven or eight words per minute was feasible, while with the Edison keyboard perforator the tape could be prepared at a maximum rate of forty words per minute, the average being about twenty-five words per minute. This key-board perforator while highly ingenious from a mechanical point of view was somewhat cumbersome in operation. The key board was about eighteen inches in length, and the keys had a drop of about two inches, requiring strong pressure to carry them down. As a writer of the period remarked "An hour's work on one of these punches is a severe strain on the muscles of a strong man." An important test of this system was made between Washington and New York, January 27, 1874, when the President's message on the Spanish "Protocol," consisting of 11,130 words, was transmitted. This matter was prepared for transmission by ten perforators in 45½ minutes. The message was transmitted in 59 minutes. Time from the beginning of perforation until message received at distant end of the wire, 53 minutes. The time consumed in translating the characters by ten operators in New York was about 45 minutes, or roughly it required 72 minutes for the entire operation. Four Morse operators on 4 single wires, it may be remarked, are capable of transmitting a message of this length in 55 minutes. In the practical operation of this system by the Automatic Telegraph Company on its single wire from New York to Washington, D. C., during 1873-1874 business was frequently badly delayed by the breaking of the wire, there being no emergency wire, or alternate route. This fact undoubtedly detrimentally affected the commercial success of this system, a result that must obviously follow in all cases where but one route or only a limited number of wires between the important business centers are available. This automatic system was subsequently employed, more or less in combination with the Morse manual system, on the lines of the Atlantic and Pacific Telegraph Company until the year 1876, when it was gradually displaced by the Morse manual method of transmission.*

*About the years 1875-77, the widely advertised claims of the Atlantic and Pacific Telegraph Company relative to the advantages of the chemical automatic and Wheatstone automatic telegraph systems controlled by that company were having a depressing effect on the stock of the Western Union Telegraph Company. Presumably to offset this effect Presi-

From about 1880 to 1884 the American Rapid Telegraph Company and its successors the Banker's and Merchant's, and United Lines Telegraph Companies, operated a chemical automatic system known as the Foote and Randall system. These companies lines (compound copper coated wires) extended from Boston and New York to Washington, Pittsburgh, Buffalo, Cleveland and intermediate points. In this system the double-current method was employed. The prepared paper was perforated in two rows.

Dots were represented by one hole on either side of the strip, the dashes by two holes. Consecutive dots, and dashes, were perforated diagonally on alternate sides of the paper strip. Two metal drums connected with the positive and negative poles, respectively, of a battery were placed side by side in such a manner that one drum came under the holes on one side of the paper, the other under the holes on the other side. Transmitting needles or brushes connected jointly to the line wire were arranged so that each was in line with one row of holes on the paper. By the arrangement of the holes each consecutive character of a letter, and the first character of a following letter were made by a different polarity to that making the preceding character, and consequently all letters containing more than one character were represented by dots and dashes on alternate sides of the received paper strip. At the receiving station needles were arranged in series in the line circuit as outlined, and rested on the sensitized receiving paper. As the chemical solution is decomposed only by a current of positive direction, marks were made by one needle with currents from one battery, and by the other needle with currents due to the other battery. In this system advantage was taken of the retardation of current due to the static capacity of the line in forming the dashes; the short perforations, all of uniform length, also limiting the time of contact of battery with the line, and thereby limiting the charge imparted to the line at each contact. The records thus produced were easily read by copyists. This system was capable of transmitting clear, legible characters between New York and Boston at the rate of 1,000 words per minute, and 500 words per minute were ordinarily so transmitted. Messages were prepared by operators using the Anderson key-board by means of which thirty to fifty words per minute could be perforated, the

dent Orton of the last named company contracted with Messrs. Craig, Randall and Foote to pay \$500,000 for a chemical automatic telegraph system that would be superior in every respect to that operated by the rival company. Tests were made of the new automatic system and the experts reported that all the technical conditions of the contract were fully met. Upon the sudden death of President Orton shortly thereafter, however, complications arose, a compromise offer of \$250,000 being declined, whereupon the contract was annulled and the inventors' interests in this system were turned over to the American Rapid Telegraph Company. It may be added on the authority of Mr. C. A. Landall that the inventors finally received about \$15,000 as their portion of the amount received for the patents covering the automatic system bearing their name (W. M. Jr.)

machine operating with the ease of an ordinary typewriter. In June, 1883, the American Rapid Company had in operation over 2,400 miles of pole line and 14,000 miles of wire. As already intimated this company began operations with the use of compound wires (six ohms per mile) consisting of a steel core covered with a copper strip each weighing 200 pounds to the mile. This compound wire proved unsatisfactory, owing it was claimed to imperfections in manufacture which led to breaks or openings in the copper strips admitting moisture and ultimately causing the copper to peel off in long lengths. Subsequently No. 6 iron wire was employed as line wires by this company. The rates charged by this company in 1881 for transmitting messages was \$1.00 for 195 words between New York and Boston, but experience showed this rate to be unprofitable and it was increased to fifteen cents for twenty words. The Foote and Randall automatic system was set aside in 1884 upon the financial failure of the company.

In 1881 the "Leggo" chemical automatic system was installed by the Postal Telegraph Company between New York and Chicago (1,000 miles) on its two 1.7-ohm-per-mile wires (compound steel and copper) on which by the Leggo system 1,000 words per minute were commonly transmitted. Taylor found by experiments on these wires that up to 400 miles, a speed of 400 words per minute was possible by the old Bain method; that is without compensating for the line static (see article by Theodore Taylor in *Electrical World*, May 24, 1884), but at a distance of 700 miles the signals arrived in a continuous black line. To remedy this defect Taylor introduced an extra battery at the receiver in opposition to the transmitting battery. The e.m.f. of the extra battery was one third that of the transmitting battery. With this arrangement a speed of 1,200 words per minute was possible on this New York-Chicago circuit.

The method of preparing the messages for transmission by the Leggo automatic system consisted in depositing an insulating ink spirally on a revolving metallic cylinder by means of a spout attached to the armature of an electro magnet operated by a relay or Morse key in a main or local circuit, somewhat analogous to the method by which speech is now indented on phonograph cylinders. The dots and dashes thus recorded were transmitted from the metallic cylinder at high rates of speed over the line circuit. An advantage claimed for this method of recording signals for re-transmission by Morse telegraphy was that the business originating at branch offices and way offices could be transmitted over through wires automatically without further preparation. The extra battery was kept constantly to the line during operation and at the instant when the transmitter needle or brush passed onto the insulated ink on the drum this negative polarity cut short the tailings. The Leggo automatic system was abandoned for lack of patronage after a comparatively short period of operation.

(To Be Continued.)

Education for Efficiency in Railroad Service.*

BY D. C. BUELL, OMAHA, NEB.

Chief of Educational Bureau of Information, Union Pacific Railway.

(Continued from Page 460, July 1 issue.)

INCREASING THE KNOWLEDGE AND EFFICIENCY OF EMPLOYEES.

In order that any employe desiring information, on any particular question or problem that arises from day to day, can obtain such information promptly, it has been arranged that such question or problem may be sent to the Bureau for an answer. There is no formality connected with this matter; all that is necessary is that the employe mail the question to the Bureau. The information requested is furnished through the Bureau in a simple, practical manner, as promptly as possible. All answers are passed on by the Advisory Board, thus insuring the accuracy of the information so furnished. As the Bureau has its own telegraph office, officials can get information direct by wire, using cipher code if desirable.

In cases where questions asked the Bureau are of such a nature that the questioner would be benefited by practical demonstrations or personal instruction, arrangements are made either to bring the questioner to a point where he can be given authoritative and thorough information on the subject, or to have a representative of the Bureau call on this man and give the information personally; e. g., questions on filing systems have been asked and the questioner has been brought to headquarters where he can familiarize himself with filing systems in effect in the different offices. To make sure that the questioner has absorbed the information, it has been a practice to make such a man write a report of his observations in a case of this kind. This serves the double purpose of giving assurance that the man has profited by his opportunity, and at the same time, puts on record information that will answer similar questions that may be asked in the future. In other cases the Test Department has been asked to arrange apparatus to demonstrate practical problems which the questioner has had difficulty in understanding.

While this part of the Bureau work has not met with the response that was expected, it is, nevertheless, an important adjunct to a proposition of this kind, and serves a useful purpose, in allowing certain classes of men who want information about a few practical points connected with their work, to obtain this information without going through the long course of study necessary by other methods. It is well to observe that this feature is separate from the ordinary

correspondence school feature, which allows students to ask questions about their lessons, the questions about points in the lesson being answered by the Instruction Department in the regular routine of the instructional work.

PREPARING PROSPECTIVE EMPLOYEES FOR SERVICE.

In order not only to increase the efficiency of the men in the service, but at the same time to improve the class of men taken into the service, it was decided that the Bureau should assist in whatever way possible in selecting and preparing prospective employes for the service. It was not intended that any official should feel that his help must be hired through the Bureau, but it was felt that if the Bureau could keep in touch with good material to fill minor positions, the officials would be glad to take advantage of such an opportunity to get a better grade of help into their organization. With this end in view, the Bureau keeps in touch with universities and other schools, and with such other sources of material as produce good men for minor railroad positions. In a great many cases, applicants for position with the road are referred directly to the Bureau, and all applications received by the Bureau are carefully investigated by it as to the personal history, references and physical qualifications of the applicants, so that the Bureau is practically assured, when recommending a man for a certain position, that the man can pass both the physical examinations and the mental examination, and has a good character and a clean record. In certain cases where prospects of this kind show up well, and it is expected that they can be placed in service at a not too distant date, they are allowed to start in studying on the history and geography of the road, and even on the more advanced courses along the lines of the work in the field which they desire to enter. Since the Bureau was established, 388 applicants for positions with the company have been investigated, 73 of these have been recommended for positions, 36 of these having been put into the service. This is exclusive of station helpers. In all cases of applications for employment, preference is given to those coming from relatives of employes.

The Bureau does not solicit positions for any of these applicants, it being understood that a request will have to be made to the Bureau if its assistance is desired in furnishing help, but the Bureau is glad to assist in any way possible, when requested to do so. It is also understood that the interest of the Bureau in the men furnished ceases when they are employed, unless they later take advantage of the privilege of the educational features of the Bureau work.

Applications of experienced railroad men, when received, are looked up by the Bureau, and if their records are satisfactory, their names are placed on file so that in case it should be necessary to go outside of the organization for help of this kind, the Bureau will have records of

*Paper read at the convention of the Association of Railway Telegraph Superintendents, Los Angeles, June 20-25.

suitable men. It is expected, however, that all positions of this kind will be filled from our own ranks, and with this end in view, the names of students making marked progress in their studies are placed before the General Superintendent, so that, in this way, men who are available for promotion will have a better chance to connect with vacancies which they may be qualified to fill when the opportunity is offered. This obviates to a great extent the necessity of ever going outside of our own ranks for men to fill advanced positions.

In addition to the foregoing, there has been established under this third object a station training school at the Bureau's headquarters for the preparation of station helpers who will be available for promotion to operators. This feature of the work, gentlemen, is of particular interest to you.

Conditions met with on the Union Pacific, in common with other roads, in obtaining satisfactory material from which to make operators, led to the experiment of making an arrangement with telegraph schools along our line to furnish their graduates for our station work. Such arrangement was made some two years before the establishment of this Bureau. These contract telegraph schools were furnished with main line telegraph wires. Station blanks and forms were also furnished, the authorities of the schools agreeing to teach the station work to their telegraph students. The company appointed an instructor to make regular visits to these various schools and to keep in touch with the situation and also to assist the students after they got out on the line. The results obtained, while more satisfactory than before any systematic effort had been made to recruit material for operators, had many objections, the principal objection being that the schools would not teach the station work properly. When these students were sent out it was found they were of but little assistance to the agents, and the agents would not help them with their station work, nor give them much opportunity for practice on the wire. Our figures show that we lost about fifty per cent. of all such telegraph school graduates before they had served long enough to be promoted to operators. When the Bureau was established, plans were immediately made to organize a station training school in connection with the Bureau work. With the active co-operation of Mr. J. B. Sheldon, our Superintendent of Telegraph, a model local freight station was equipped at the Bureau headquarters; main line wires were cut in; the station posted as a regular telegraph office, both for railway and Western Union business; sounders connected to the main line circuits were distributed about the room; practice circuits were arranged; a regular station switchboard and cut-out plugs were provided; and a five-station telephone-despatching circuit, with the dispatcher's selector set, was installed.

In addition to this a complete set of regular station forms and record books, letterpresses, tariffs, baggage checks, tickets, etc., etc., were provided. One of the older station agents who had had particular success with station helpers was selected as the instructor, and a regular course of training was outlined for the students, five hours a day being devoted to station work, and three hours a day to copying off the main line wires or to sending and receiving on the practice circuits.

Telegraphy is not taught in this school, no one being admitted who cannot receive at least twenty words a minute. Candidates for admission must also be 18 years of age and must have had a good common school education as proven by their ability to read and write legibly, and to figure simple arithmetical problems correctly. They must also pass the required physical examination before being admitted to the school. A course of training is laid out for the student on the basis of four weeks' attendance. This course takes up in a regular order all the simpler station work, such as the making of bills of lading, the making of way-bills, a correct understanding and use of the tariffs, copying, abstracting, baggage and ticket reports, etc., etc. Experience has demonstrated that in four weeks the average student becomes well informed in the simpler routine of station work. Sometime during the course he is sent to the freight house at Omaha, and is given two days' experience in trucking, piling, stowing, checking and receiving freight in actual service. This school has an average attendance of about 20 students, which has proven sufficient to supply the needs of the entire Union Pacific system, practically all station helpers being furnished from this school. During the first sixty days of its organization, 37 students had been in attendance, 19 had qualified and been sent out as helpers, and 18 were still in attendance at the school. Of the 19 who were sent out to qualify as helpers, three were promoted to operators within thirty days of the time they had left the school, none of the three having had any previous railroad or telegraph experience. From present indications there will not be more than ten per cent. of the men trained in this station school who will drop out before being promoted, as against fifty per cent. by the old method. The saving made in sending out trained men for these positions will more than pay for the comparatively small expense of maintaining the school. The success of this work has been such that every superintendent of telegraph who has had trouble in getting efficient operators or material from which to make operators should be greatly interested in investigating the work being done in this station school, and I take pleasure in joining Mr. Sheldon in extending an invitation to each of you gentlemen to visit this school at Omaha at any time.

In addition to the plans which are under way, and which have been described, numerous other plans for practical educational work among the employes are under consideration. It is expected that local classes will be organized at various points on the line. It is the intention to have a lecturer on the road equipped with stereopticon and lantern slides, who can stop at various points where students are located and lecture on various propositions connected with the work. The Bureau also expects to co-operate with the present apprentice classes which are being successfully conducted by the Motive Power Department at the larger shops, and assist in establishing apprentice instruction at some of the similar shops. An extensive library of scientific and technical books is being established at the Bureau headquarters, which is expected will be available for circulation among employes.

It was stated early in the paper that men selected for advancement to minor official positions would be afforded an opportunity, before formal appointment was made, to acquire a knowledge of the principal workings of such departments as they had not been intimately connected with, through a temporary connection therewith under the direction of the heads of such departments, and at a salary fixed by the Board of Supervisors. This might be likened to the post graduate course of the ordinary university, or the winning of a scholarship. The practical working of this plan can best be explained by an example of how it is actually being put into effect. One of our train masters had shown by his work that he possessed qualifications that would ultimately assure him promotion; in fact, he was selected as a man who later would be promoted to be an assistant superintendent. He was relieved from service as train master on his territory, and is now taking this course of training at his same salary. This course will embrace three months' work on track as laborer under a competent foreman, three months' work as a handy man in the roundhouse and back shop, two months in the Auditor's office at the desk, where the mistakes made by passenger and freight conductors pass, one month in the station school, his training ending with a couple of months in the general offices. At the end of his training this man may be sent back to his original position as a trainmaster, or may be put in a similar position in some other territory, but wherever he is placed, he is an employe who has been proven in actual service and trained for promotion when the first vacancy occurs. Men from other departments are receiving similar opportunities.

The expense of the Bureau, which is quite reasonable, is divided between the various departments, so that the proportion of the expense borne by each is nominal.

CONCLUSION.

While it is impossible to show in dollars and cents the value that is derived from this educational plan, it is plain to see that a scheme of this

kind founded on practical principles is bound to create increased loyalty throughout the organization, is certain to set a number of the employes thinking upon and considering problems connected with every day work which they would otherwise pass over without proper attention. It will bring out the latent good qualities of employes, making them more efficient and capable workers; it is producing a supply of qualified men who can be promoted to fill vacancies as they occur; and at the same time it is giving a wider field from which to draw promising material into the service. Six months ago it was an untried experiment; to-day it is an assured success, receiving the support and approval of the entire organization. It is increasing the safety of travel and making better citizens for our commonwealth.

Composited Telephone Blocking.*

BY W. F. WILLIAMS, PORTSMOUTH, VA.

Superintendent of Telegraph of the Seaboard Air Line.

The Seaboard Air Line has been blocking its trains by telephone over one of its most congested districts, a distance of 154 miles, four years, using an iron wire solely for this purpose with one telephone, two bells (one bell for north block and one for south block) and a switching key arrangement at each station. This circuit proved so successful that a little more than two years ago, we were called upon to extend the telephonic block 53 miles south to be operated under the same conditions, i. e. one telephone at each station with bells or howlers, north and south, and a switching key arrangement to throw the telephone over on the north or south block as occasion would require.

Not having a spare wire available to do this, and wishing to avoid the expense of stringing one, we selected a circuit 175 miles long with 35 telegraph stations thereon and composited an intermediate 53 miles. On the 53 mile stretch are located ten intermediate telegraph stations and eleven telephone stations, both operated simultaneously. The telegraph circuit works as well now as it did before, and while we know there is lag, we have not discovered it in the operation. The scheme has been a success from the first. This has been very gratifying because the iron wire that makes up this circuit has been in service for about forty years, and it would not be unnatural to expect some bad effects from this on the telegraph service. As a matter of fact, there has been no failure on this circuit since the telephone equipment was added to it, two or more years ago. The transmission obtained is perfect.

The line is composited in such a way that each station can call only the two adjacent stations,

*Paper read at the convention of the Association of Railway Telegraph Superintendents, Los Angeles, June 20-25.

one north and one south, without calling any other station. At each station a portion of the windings of two repeating coils are cut into the telegraph line and the composited telephone sets are wired from the secondaries of these. These coils are for the purpose of reducing noise on the line and preventing interference between the telephone and Morse circuits. Whenever one wire is to be used for simultaneous telephony and telegraphy it becomes necessary to provide some means of preventing the telephone currents from passing off over the telegraph lines and thereby reducing the transmission of speech in the telephone. This is ordinarily accomplished by the use of a retardation coil connected in series in the telegraph line.

The retardation coil offers a high impedance to the high frequency telephone currents thereby preventing them from passing through to the next station, but because of the low resistance to direct current telegraph impulses allows the telegraph currents to pass on.

The condensers wired from the coil to ground are for the purpose of preventing telegraph currents being diverted from the line to ground.

Retardation coils usually employed are used purposely to choke out the telephone currents, whereas in the Seaboard circuit this is not accomplished by the repeating coil alone but also by the telegraph relay which has a high impedance.

These repeating coils have shown up most satisfactorily for block service, where it is not of great importance if the conversation in blocks adjacent to the one in use is interfered with; it is not but if the line is quiet, conversation one or two blocks away can be faintly distinguished.

Telephone signaling is accomplished in block work in the same way as with the ordinary composite set. The operator wishing to call the adjacent block presses a button in the set which places high frequency current on the line by means of an interrupter and induction coil.

The current of the signal station passes through a condenser and howler to ground, causing the howler to produce a sufficiently loud sound to be heard in the station.

Block wire compositing differs from the ordinary through composited line in that it is only necessary to be able to talk to the two adjacent blocks on either side of a tower or station at the utmost; ordinarily any operator does not talk over more than one block on either side of him. This is one reason which made it possible in our case to omit some of the apparatus usually necessary and to use repeating coils in order to divide the line into blocks. The condenser and resistance usually bridged around the telegraph keys on a composited line are omitted because a by-path around these keys is not required. In no case in block work is it ever necessary to signal telephonically past a telegraph relay.

There are two causes of trouble to be consid-

ered in reference to the telegraph circuit: (a) Drag, i. e., decrease in speed of telegraph signaling, (b) Interference of telephone signaling current with the telegraph line relays.

The increased load of the line occasioned by the introduction of the repeating coils used and one-half microfarad condensers to ground at each station, is not sufficient to cause any perceptible drag on the telegraph circuit.

The high frequency telephone signaling current from the induction coil does not interfere with the operation of the line relays at all.

In reference to the telephone circuits the following things must be considered: (a) Morse thump; (b) Interference with conversation on any block in the circuit by telephone signaling current in any other block; (c) Interference with conversation on any block in the circuit by cross-talk from conversation on any other block.

The Morse thump is at no time of sufficient intensity to be disagreeable or to interfere with the talking circuit. The howlers we are at present using are being operated on four cells of dry battery and are unnecessarily loud, these will be reduced, as under ordinary conditions two or three cells are sufficient to secure good signaling.

If it is desired to cut out one or more stations at night or extend the block during light load periods, this can be done and the two blocks on either side thrown together for operating purposes. It simply becomes necessary to short circuit the apparatus (both telephone and telegraph) of the way station being cut out. On the Seaboard this is done by a small knife switch in the telephone ground to prevent a possible leakage and the wire cut out at the telegraph switchboard.

The electrical features of the telephone blocking scheme have here been given in some detail. This is in order that a fairly clear idea may be obtained as to just how the equipment is operated and the simplicity of it for the purpose. It operates with us under very severe conditions, namely the heavy load of telegraph stations along the line. If these could be cut out, and in many cases this would be possible, the grade of service would be equal to much of that obtainable today either in commercial or train despatching service. The wire could still be used for through telegraph business and undoubtedly would be so used, the advent of the telephone merely making it possible to do without the local telegraph stations.

It is not necessary to go into the advantages of this method of blocking. The same arguments apply to it as to the case of despatching trains by telephone and railroad men are becoming thoroughly acquainted with those. The greater speed of operation obtainable, the advantages of direct personal communication between the operators, the quicker the response to the sound of a howler or a bell than to the telegraph sounder, all of

these work for the better efficiency and therefore better service.

There is another and an important advantage of this system of blocking. It enables a railroad to get one hundred per cent. more service out of existing block wires. A railroad can change over a block wire telegraph line to a through circuit, while at the same time operating the blocks as efficiently, if not more so, than before. For this reason it seems worth while bringing the advantages of this system before the Association in order that, when necessity for its adoption arises, it will stand as a ready solution of a problem which otherwise might prove both complicated and expensive.

A New Selector.

BY K. W. ENDRES.

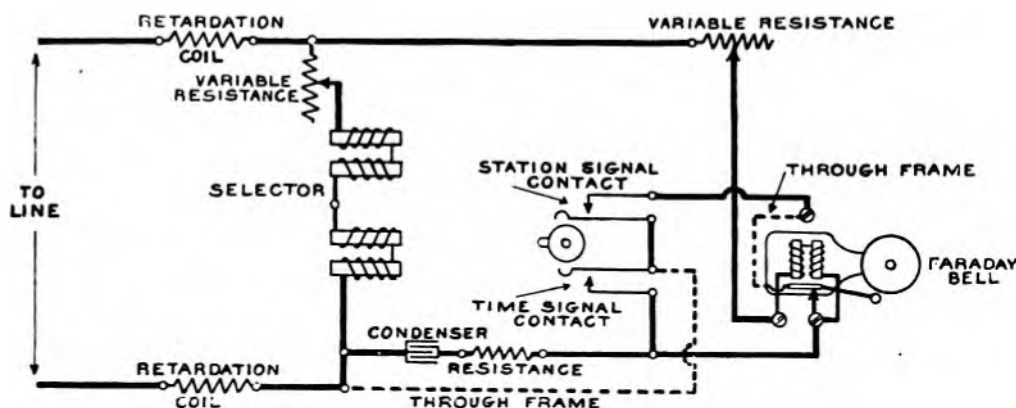
The new selector of the Western Electric Company which has recently been placed on the market, is a high speed, individual call mechanism, and consists of two electro-magnets or relays, which are connected in series across the line;

changing its adjustment if such a thing becomes necessary in case of an emergency.

The selector is normally operated on the central energy principle—that is, the battery for stepping it around as well as the battery for ringing the bell is located at the despatcher's office. It can, however, be arranged for local battery service if so desired.

The operation of the selector is as follows: In front of the despatcher are a number of keys, one for each equipped station on the line. These keys are practically noiseless, and each one sends out a number of rapid direct current impulses on the line when it is operated. The number of impulses which are sent out can be regulated by adjustable cams on the rear of the key so that a standard key is employed in all cases and adjusted for the particular station desired.

The first impulse which one of these keys sends out is a long impulse, the tooth being three or four times the width of the ordinary tooth. This impulse operates one of the selector magnets, which is a slow acting relay; it pulls up the arma-



ture of this magnet, which in turn causes the two pawls to engage with the ratchet wheel. The remaining quick impulses which the key sends out operate the magnet on the opposite side of the selector, but do not affect the slow acting magnet, which remains held up; these quick impulses work the pawl and step the ratchet wheel around the proper number of teeth, at which point the two contacts make and the bell in the station is rung.

The moving parts consist of a ratchet wheel to which is fastened a contact; this wheel is stepped around by means of a hardened steel spring pawl. This pawl and a corresponding one on the under side of the ratchet wheel are connected directly to the armatures of the magnet and therefore as long as the magnet operates, the pawl must move.

The contact is adjustable so that one standard form of selector is supplied at all stations. The position of the moving contact with reference to the ratchet wheel and the stationary contact determines which station shall be called, and this adjustment is simple and can be made without difficulty. It is thus seen that a selector can be taken out of one station and used in another by

ture of this magnet, which in turn causes the two pawls to engage with the ratchet wheel. The remaining quick impulses which the key sends out operate the magnet on the opposite side of the selector, but do not affect the slow acting magnet, which remains held up; these quick impulses work the pawl and step the ratchet wheel around the proper number of teeth, at which point the two contacts make and the bell in the station is rung.

The remainder of the revolution of the key, after the signaling impulses are complete, keeps the key contact closed and therefore keeps battery on the line during a period of about five seconds. As long as this battery is on the line, the bell at the way-station rings.

By installing a simple strap key, the despatcher can hold this down and make the way-station bell ring as long as he pleases, this strap key merely taking the place of the key contacts and keeping the circuit closed.

The selector is rapid in its operation. It requires approximately three seconds to call the

thirtieth station on the line, and any one of the first ten stations will be called in one second or less. It is possible to place as many sets on the circuit as may be desired, this number being limited by the size of the ratchet wheel. The present selectors which are installed are equipped to care for fifty stations, which would cover the majority of train despatching districts.

The diagram herewith shows how the selector is wired across the circuit, and also illustrates some of the auxiliary apparatus which is used in connection with it. Retardation coils are employed to choke back any lightning which may get by the protectors at a station. A variable resistance is required at each selector, since each must receive approximately the same current and voltage, and if this were not installed, the high voltage near the despatcher would give the stations adjacent to his office much more current than they should obtain. The selector requires approximately eight milli-amperes to operate and ring the bell and thirty volts across its terminals.

It will be noted on the diagram that two contacts on the selector are shown. One of these is the station signal contact which normally rings the bell at the station when the train despatcher wishes to call the operator, and the other is a time signal contact which is operated by a special key in the despatcher's cabinet and which makes on all selectors along the line simultaneously. The despatcher can, therefore, with this key give all the way stations along his division a time signal whenever he may so desire. It also permits of his calling all the stations at once if this ever becomes necessary on special occasions.

The condenser and resistance shown bridged around the contacts of the Faraday bell and in series with the windings of the bell are for the purpose of eliminating any spark at this contact and also serve to render the answer back signal of the proper loudness.

A New Alternating Current Telegraph System.

Patent No. 960,482, for a multiple telegraph system, which has been granted to Mr. Eugen P. Batzel, of Buffalo, N. Y., is based upon the principle that electric currents of different frequency or periodic intensities may be passed over a conductor or circuit independently of each other. This principle has already been employed in multiple telegraph systems, but not in the manner in which it has been adapted to the present system.

The new invention may be briefly and generally described as follows:

Each station is equipped with one or more single-phase alternating current generators, one generator being supplied for each transmitting key or device. The transmitting generators are preferably driven mechanically by gear transmission and each generates a current of different periodic intensity from the currents developed by all of the other generators so that the currents from all of said generators may pass over the line

without interfering with each other. As many generators may be employed as may be desired, each being supplied with its signal-transmitting device. The transmitting generators at one station will, of course, develop currents having periodicity of alternations different from those developed by the transmitting station at the other end of the line so that messages may be sent from both ends of the line simultaneously and without interference. The receiving apparatus at each end of the line consists of a series of wattmeters or wattoscopes, one for each transmitting generator at the other end of the line. For each wattoscope is provided an alternating current generator, each of said generators working in harmony with and developing a current corresponding in periods of intensity, or alternation, with one of the transmitting generators at the other end of the line. Through the tension coil of each wattmeter is passed current from one transmitting generator to the other end of the line and through the current coil is passed a corresponding current from the local or receiving generator. These corresponding currents passing through the coils of the wattmeter, causing a displacement of the moveable coil thereof. The moveable coil of each wattmeter acts as the armature of a relay to close a local circuit in which is placed a suitable receiving apparatus. It is to be noted that the transmitting generators at each end of the line operate synchronously and in harmony with the local or receiving generators at the other end of the line, suitable synchronizing apparatus being employed.

From the foregoing it will be seen that each wattmeter will be influenced by currents from the transmitting generator having a periodic intensity corresponding to the periods of alternation of the receiving generators connected to said wattmeter, and that said wattmeter will not be affected by current from any of the other transmitting generators connected to the line. In order to displace the moveable coil of a wattmeter it is necessary that the current or currents passing through the current coil and the tension coil must be of the same periodic intensity. It is, therefore, evident that by providing what are termed receiving generators developing currents corresponding in such intensity with the transmitting generators at the other end of the line each wattmeter will be affected by the current of only one of the transmitting generators. It is, therefore, evident that as many transmitting devices may be employed as desirable, it being only necessary that the periods of alternation be varied in each transmitting generator and correspondingly varied in the receiving generators.

Any suitable synchronizing apparatus may be employed for securing the synchronous operation of the motors for driving all of the transmitting and receiving generators at both ends of the line.

Telegraph and Telephone Age is headquarters for electrical, telephone and telegraph books. Write for catalogue.

The House Printing Telegraph.

BY JOSEPH L. EDWARDS.

Reading with much pleasure the article of my old and honored friend, Gerrit Smith, in your June 16 number recalls the fact that in due course of time, in 1855, it became my lot to sit within a few feet of that dummy in the Boston office the ups and downs of which he presided over so faithfully in front of a House Printing instrument, supplying the guests of the Nahant Hotel at Nahant with their telegraphic pabulum. This was within a few months after having studied the intricacies of the telegraphic instrument at the factory where it was made, at the foot of Grand Street, New York, and emerging as a first-class plug from the office of the New York City and Suburban Telegraph Company, located at No. 4 Chatham Square.

To the writer's knowledge this company has never had honorable mention in public print, but as one of the telegraph projects of the nineteenth century, it ought to be chronicled before all of those identified with it have passed away. Its history is brief. It was made up of ten offices scattered throughout New York City and two in Brooklyn. Mr. John Hecker, originator of Hecker's flour, was the president. Thomas K. Austin was the superintendent. His main function was to feel sorry every Saturday night that he was unable to pay the operators and messengers in full and to receive delegations of messenger boys at his home periodically, demanding their due. My salary was eight dollars per week, of which I received about five. The balance is still due.

The corporation's chief characteristics were lack of patronage, paucity of funds and ultimate failure.

The survivors of the wreck now living are John K. Calvert, Leonia, N. J., Joseph Knittle, Brooklyn, N. Y., and the writer. The late Henry Bentley, municipal telegraph promoter of Philadelphia, began his telegraph career in the office of this company at the Irving Hotel, Broadway and Chambers Street.

Retiring from the scene of these experiences, my services were engaged by the Commercial House Printing Telegraph Company, New York to Boston, Springfield to Albany and Troy, and Boston to Nahant with twenty-two offices all told. There were two wires from New York to Boston, a through and a way wire, and one from Springfield to Troy. The latter was an unfortunate affair, constantly breaking at the joints from the effects of use, by an ignorant constructor, of strong acid as a cleanser in the process of jointing, thereby eating away the wire. The magnet of the House instrument would be considered a monstrosity in this age of enlightenment. It was a spool wound with many miles of No. 36 wire charged by a battery of one hundred Grove cells at each end of a circuit of about one hundred miles with a reserve of more cells for wet weather. If it would not work with the battery at hand more

wire was added to the magnet. The law of proportioning battery to line was unknown to us.

The Commercial Company transmitted all of the Associated Press reports.

This association was composed in New York of the four leading papers. D. H. Craig, always vivacious, vituperative, virulent and vitriolic in business affairs, genial, generous and gentle socially, was the general manager.

The four papers also supplied special reports. These specials were very remunerative to the New York operators, each of them, as well as the Associated Press, paying fifty cents an hour extra after 10 p. m.

During the trial in Washington of Daniel E. Sickels for the shooting of Barton Key in 1858 the writer was in Springfield, the repeating station between New York and Boston. The Associated Press handled the report of the trial in full, which occupied a single through wire from early in the evening till three o'clock in the morning. One night a newspaper, not a member of the association, pre-empted the wire by tearing pages from the Bible and presenting them for transmission while he was preparing his report, thus effectually shutting out the Associated Press until late at night. A repetition of this display of journalistic enterprise was afterward guarded against. Another instance of reportorial shrewdness occurred in the winter of 1857. A noted prima donna was to sing at the Academy of Music in New York but the performance was postponed in consequence of a severe snow storm. The following report, however, went over the wire late at night, with the spicy comment of Charlie Simmons at the end of it which my spirit of ingenuousness (or maybe for a joke) impelled me to leave on the end of the printed slip for the information of the night editor of the Springfield Republican, who permitted it to be printed as part of the reliable news of the day.

Mozart's great opera of "Marriage-Figaro" was performed last night at the Academy of Music, New York, for the first time in America. The house was filled to overflowing, notwithstanding the continued storm, and Piccolomini achieved, in the character of Susannah, another splendid triumph.

[Private Commentary on the Above—By Telegraph Operator:—Ths ben hre sins fiv klock. Nose dmsit abt it.]

The staff of the Springfield office at the time of the absorption of the company by the American Telegraph Company in 1859, was John E. Selden, manager; Rufus B. Bullock, John G. Tobey, James F. Gormley and myself.

The office as a repeating station was abandoned and the House instrument was succeeded by the Phelps combination printing instrument which worked direct from New York to Boston.

In 1858 a line was built from San Francisco to Sacramento by a brother of A. A. Lovett, superintendent of the Commercial Company, to operate the House Printing instrument and William Blanchard, formerly of Springfield and Charles F. Sim-

mons, of New York, were employed to work it. It did not succeed and in a few month the system was abandoned.

Another individual ownership line was supplied with House instruments in 1856 by Mr. Joseph Hale, of Montreal, Canada, running from Troy, N. Y., to Montreal. Alfonso Prescott, a brother of George B. Prescott, one time manager at Springfield and later author and electrical engineer for the American and Western Union Telegraph Companies, was the superintendent, the writer working the Troy end in connection with his services on the Springfield line.

The undertaking never paid and was abandoned after a brief effort.

Thinking over the personnel of the Commercial Company it would appear that for so limited a number of operators it turned out a goodly percentage of individuals of more or less distinction. There were Rufus B. Bullock, of Springfield, who became superintendent of express in the South and later Governor of Georgia; James N. Ashley, Washington correspondent of the New York Herald; Frank Ashley (his brother), editor and proprietor of a newspaper at Providence, R. I.; J. W. Stancliff, of Hartford, an artist, a painter of marine scenes; John E. Selden, inventor of improvements of the stock ticker and of a self steering electric toy boat; Samuel J. Burrell, of New York, electrical constructor and mine promoter, and the writer, angler for black bass, which is "Inch for inch, and pound for pound the gamest fish that swims."

Collingswood, N. J., June 20, 1910.

Some More Reminiscences of the Boston Office.

BY G. F. MILLIKEN.

The articles on the old time Boston office, contained in the June 1 and June 16 issues of Telegraph and Telephone Age have recalled many pleasant recollections and I heartily thank my old friend Gerrit Smith for his friendly allusions to myself and family which are fully reciprocated.

Fortunately I have one of the albums similar to that owned by Charles Bedlow, as described in the first article, and prize it highly.

In connection with events occurring at about the time of which Mr. Smith writes, I am reminded of a little practical joke in which the operator at Springfield, familiarly known as "Jack," was made the victim. If he is still living and happens to see this article, he will recognize the occasion.

At the time referred to, the House printing lines (two wires between Boston and New York via Springfield) were located on one side of the Boston operating room, and the eastern Morse lines on the other side. Troubles on the "House" lines were frequent, and "Jack" was often called up on one wire to test the other and report.

Frank H. Palmer, a prominent telegraph man of that period, was manager or superintendent and it was he who proposed the little diversion from regular business to perpetrate the joke.

We had just installed a new switchboard and additional battery equipment of the "Grove" type, the switchboard enabling us to easily pile up a high voltage on any one wire.

The then universal method of testing was by touch of moistened fingers, which fact suggested the conspiracy.

Several batteries having been placed in series on No. 1, "Jack" was then called up on No. 2 and requested to test for trouble on No. 1. Then we waited expectantly for his report, which, in due time, came as follows: "No. 1 O. K. south, but I should think H --- was in it east."

J. N. Ashley was one of the conspirators and was the "House" operator who called "Jack" to make the test.

We imagined Jack's surprise and possible remarks when he got that voltage.

The time at which this incident occurred was undoubtedly a few years later than that of the experience of Mr. Smith in the same building, as repeating at Springfield on the "House" lines at the time to which I refer was the exception; due probably to improvement in line conditions.

The operating forces as given by Mr. Smith are also somewhat different from those I remember, which include "Jack" Selden, in charge at Springfield, but who is not included in Mr. Smith's list.

Boston, Mass., June 21, 1910.

The Philosophy of a Business Man.

Grievances voiced are half cured.

The door of achievement is never left open.

The easiest thing to cultivate is suspicion.

The "sharp" man generally cuts his own fingers.

The best working formula to success is "concentrated energy."

The sunny side of your make-up best lights the road to success.

Orders given aggressively are usually obeyed just the same way.

You can improve your own business by keeping out of other people's.

Simple hard work has made a garden out of a wilderness many a time.

An ounce of directed enthusiasm is worth a ton of constrained effort.

System is like money—useful when you master it; ruinous when it masters you.

Failure anticipated jolts hard the plank of opportunity across the stream of success.

When you see your employer cheating a customer, resign before he tries his hand on you.

Don't forget how vast is the number of subjects on which you are highly qualified to keep silent.

It's possible to worry so much about what you ought to do that you never find time to do what you might.—Bookkeeper Magazine.



EAST SLOPE,
SIERRA-NEVADA MOUNTAINS.



DONNER LAKE, CALIFORNIA.



AT THE TIMBER LINE.

An Interesting Telegraph Publication.

In the Postal Telegraph for July will be found several interesting articles written by officials of the company. The first of these contributions was prepared by Mr. Welcome I. Capen, general superintendent of plant, who describes the difficulties of line construction. Mr. Capen deals particularly with the line recently erected between San Francisco and Reno, Nev., and now in course of construction to Salt Lake City. This line crosses the Sierra Nevada mountains and the illustrations are unusually interesting and are reproduced here.

Colonel Albert B. Chandler, chairman of the board of directors, contributes an interesting bit of reminiscences of the early days of telegraphy.

Mr. Charles P. Bruch, second vice-president of the company, under the heading of "Always on the Lookout," describes in an entertaining way the marine station at Fire Island, L. I., N. Y., of which we present a picture herewith.



"THE HOUSE AND TOWER ARE SEPARATE."

Mr. Walter D. Francis, superintendent of supplies, in a contribution on "Imagination" shows how the name or brand of an article seems in the minds of some to be incontrovertible evidence of good quality while the absence of the name is

taken as indicating inferior quality, while, as a matter of fact the reverse is often the case.

Mr. Minor M. Davis, electrical engineer, discusses the question "Why Don't Telegraph Oper-



SUMMIT OF SIERRA-NEVADA MOUNTAINS.

ators Learn the Telegraph Business?" Mr. Davis shows that telegraphy offers many opportunities to ambitious young men either in the service or as a stepping stone to positions of responsibility in other business.



FIRE ISLAND BEACH, MARINE STATION IN THE DISTANCE

Mr. Edward S. Butterfield, general agent, money transfer service, who is an experienced amateur photographer, writes of "Photography for Telegraphers," showing how a camera may be a source of much pleasure and benefit to others as it has to him.

New York Telegraph Reminiscence.

BY W. H. SAWYER, OF WEEKAPANG, R. I.

I entered the telegraph service as office boy, May 16, 1861, in the office of the American Telegraph Company, at 145 Broadway, New York, at the age of sixteen.

J. C. Hinchman was manager of the office at that time, and after looking me over critically, decided that I would probably fill the bill. He was informed by my brother that I wished to become an operator.

My salary was to be three dollars per week and as I paid two dollars and fifty cents per week for my board, there was little danger, from a financial point of view of my getting out of the straight and narrow way in the great city of Gotham.

My duties consisted mainly of collecting messages from numerous operating desks and dropping them down a chute, which connected with the delivery department on the ground floor.

As I was anxious to give satisfaction, I followed the old saying, that whatever was worth doing, was worth doing well. I endeavored to keep the desks clear and managed to get all of the messages on the way down stairs and not on the floor or in the waste paper baskets. I was a small boy, fresh from school and was anxious to become a telegraph operator, which profession seemed to me to be something above the ordinary. After a month of day work I was given a night trick, from 5 p. m. until "good night" was received from Washington. This was a decided change for me and occasionally I found it difficult to keep awake, until the call for "boy" in loud tones, brought me to a realizing sense of my importance.

After the delivery department closed, at 11 or 12 o'clock, my services were in demand to carry installments of press matter to the editorial rooms of the Herald, Times, and Tribune, and this gave me a chance to see the venerable Horace Greeley, in his editorial sanctum, as well as other editors of the great papers. As my salary of three dollars per week would not allow me to dine at Delmonico's, I usually resorted to Blane's bread and milk refectory, just around the corner from the office, or the old Belmont Hotel on Fulton Street, when I was flush with the scrip of war days.

The force was then and later composed of the following: Doctor Josiah A. Cure, William Porter, John Horn, Jr., Dixon F. Marks, Wm. B. Clum, M. H. Redding, O. W. Willis, James L. Lillis, Jesse H. Bunnell, C. H. H. Cottrell, Robert M. Mattocks, Joseph L. Edwards, P. H. Shaughnessy, J. M. Fairchild, A. C. White, Irving S. Fitch, Thomas P. Scully, Fred. J. Grace, B. F. Ely, Gilbert Simmons, Edward A. Calahan, James J. Calahan, Robert J. Cunningham, Waldo Collins, Julius Finney, Charles B. Noyes, Gerrit Smith, Edward W. Gibbons, T. B. Fulton, William Blanchard, Stanley MacNider, W. G. Wilkie, Charles Ferris, Wm. H. Hoyt, D. W. McAnecny, Frank L. Pope, Ralph W. Pope, Henry W. Pope, Louis H. Smith, Mike Sherman, Frank G. Beach, Geo. Warren, Samuel H. Edwards, Edward Hall, A. W. Pearkes, Henry Cowan, Richard Schutt,

R. W. Martin, E. E. Beardsley, Geo. Clark, A. S. Downer, David R. Downer, H. H. Ward, Ransom Phelps, Robert H. Smith, J. W. Pitfield, K. S. F. Randolph, Mike J. Lillis and others, many of whom I can remember, but cannot recall their names.

Old Doctor Cure was a person of peculiarities. He worked No. 2 South, also the Astor House wire. He was unable to read by sound and would start his Morse register and depart for the back part of the office with a brush and comb and a bottle or two of hair dye and hair invigorator to arrange his toilet. When he returned he would be confronted with a few hundred feet of paper tape from his register, from which he would laboriously copy off the messages. He was in the habit of giving a string of good advice to the various operators on his wires, in a fatherly way and sometimes when he was started in on this line some operator at the switchboard would plug in and make some personal remark which irritated him.

Mr. M. S. Roberts became manager of the office, succeeding J. C. Hinchman. Mr. Roberts was a perfect gentleman, and was held in the highest esteem by all. He was exceedingly kind-hearted, and did everything in his power for our comfort. He would, upon request, issue an order on John Horner (who was cashier) for a single day's pay, and some of the boys frequently availed themselves of such daily orders on Mr. Horner.

Waldo Collins, who worked on the southern wires usually, was possessed with the idea that steel pens as manufactured, were imperfect, at the best, and before starting his work spent considerable time with a small oil-stone, getting the point of his pen in shape for business, while some of the rest of us, who were capable of turning out a copy, equal if not superior to his, could work with any old pen found on the floor.

On the city lines connecting the various hotels, were: Joseph Brunham, Fifth Avenue Hotel; Henry Fairchild, Everett House; J. B. Page, Metropolitan Hotel; F. Marsh, New York Hotel; Thomas Brennan, Stock Yards, Forty-fourth Street; Mr. Clark, Madison Square; Joseph Knittle and Fred. Seibert, Williamsburg, L. I.

In the ordinary course of events I acquired the art of sending and receiving slowly and became what is known as a "plug" operator, and was kindly allowed by the regular operator on the city lines (who probably wanted a rest) to send for him, and later to receive. I owe my thanks to those on the city lines, who had the patience and kindness to tolerate me. Joseph L. Edwards kindly allowed me to take his seat at the House Printing instrument and I soon learned to read by sight of the letter wheel, which was no great feat compared with the fact that Edwards himself could read considerably by the sound of the instrument. I then considered, and do now consider this a wonderful performance.

It is a known fact that there exists a period in the life of the young operator when advancement is very rapid. My advancement was satisfactory, at least to

myself, and must have been to others, as I was soon transferred from the city lines to the southern side of the office, to receive press from Washington. It made me scratch, especially when Morrell Marean, F. A. Stumm and other speedy senders "salted" me. However, I managed to keep my place, and my salary was soon raised from sixty to one hundred dollars per month, which was not an everyday occurrence at that time, and I doubt if at present. During the war we were kept busy. I remember upon one occasion, having worked my day trick from 8 a. m. to 5 p. m., my relief failed to put in an appearance, I was compelled to work his trick until about 6 a. m., and then continue my day trick from 8 a. m. to 5 p. m. We frequently worked almost steadily from 5 p. m. to 5 and 6 the following morning, with only supper relief.

After the Battle of Bull Run, when the soldiers reached Washington, in their flight from the battlefield, J. A. Swift, at Willard's Hotel, sent me 125 messages at his usual rapid gait, each one of which conveyed to some relative, or friend in the east, the fact of a safe arrival at the capital.

When the Confederates were north of Baltimore I was receiving press from Washington and immediately after copying the words "The Confederates are now north of Baltimore and communication may be severed at any instant," all southern wires opened and remained so for nearly two days. Battery was kept on all wires at New York and Washington, in the hope that two wires would get in contact. Such an event finally happened, and through the cross, one operator at New York and one at Washington took turns at sending and receiving the most important messages, dropping out "from," "to," "sig.," etc., to make time. I was one of these who took turns, and we did our best, until tired out.

When President Lincoln was assassinated I received the first information from Washington of the sad occurrence. I was in the New York office when "S. F.," San Francisco, first called up "N. Y.," the through connection being made with numerous repeaters.

There existed a fascination in the telegraph business which I think was more generally enjoyed in the early days than now. I have known of operators, working a through wire on press, to refuse to go to supper, knowing full well that their relief would hold the through wire, in preference to working a way wire. I have been there myself, but perhaps I was not hungry, or anticipated a poor meal.

In 1866 I resigned my position as assistant night manager of the New York office, under D. Wilnot Smith, and went to Philadelphia as assistant manager of the Insulated Lines Telegraph Company, in the Philadelphia office of which Suel Smith was manager, and P. B. Delany, chief operator. Delany, who has won fame as an inventor of various electrical devices, was an operator of marked ability, especially as a receiver. I have seen him keep seventeen words behind on press matter for a long time without getting things mixed. I returned to New

York in 1868 and worked a while for the People's Telegraph Company. In 1869 I accepted a position as inspector with the Gold and Stock Telegraph Company, just started by E. A. Calahan with P. H. Shaughnessy, who is still in the harness at 195 Broadway, as his assistant. In the Gold and Stock Telegraph Company I first met Thomas A. Edison. In those days he wore a linen duster. The Calahan stock printer required three wires, one for letters, one for figures and one for printing. Mr. George B. Field, president of the company, asked Edison if the work could not be done on one wire. Edison replied to the effect that he would see what could be done. In a few weeks he brought over from Newark (under his arm) an instrument, which had a polarized attachment and a shifting pad, and worked finely.

The three-wire Calahan instrument circuit would be frequently thrown out printing X, Y, Z, etc., and when this occurred on a whole circuit, operations would be suspended, until all instruments on such circuit, or circuits were properly set by hand. Edison devised a unison, by means of which all instruments could be set from the main office. What he cannot do would be hard to tell.

After this Henry Van Hovenbergh and myself devised unisons, which was an easy matter after Edison paved the way.

In 1872 I resigned as superintendent of the Gold and Stock Telegraph Company, and accepted a position as general superintendent of the American District Telegraph Company. In 1875 I was appointed superintendent of the Bureau of Telegraphy for the Centennial Exposition, and in 1878 I went to Providence, R. I., as superintendent for Eugene F. Phillips, in the manufacture of insulated telegraph wire. This business was growing, and Mr. Phillips saw the necessity of having some one more familiar with electrical affairs. I used the first coil of covered wire made by Mr. Phillips, at his small factory, and had used a considerable amount of his wire in construction work for the Gold and Stock Company and the American District Telegraph Company. The Phillips' product was appreciated and his business rapidly increased. In 1882 the American Electrical Works was formed, and the business has constantly increased, and at the present time is one of the largest manufactories of insulated and bare wire in the country. Mr. Phillips' genial disposition made for him numerous friends and his product was regarded as the best in the market. In the early days the business was confined to covering of copper wire, which was purchased, principally of Wallace and Son, Ansonia, Conn. Later the drawing of copper wire from the medium sizes down to finer sizes was inaugurated, and at the present all of the copper wire used is rolled down from the bar to rod size and then drawn through metal dies, and finally through diamond dies, down to one thousandth of an inch diameter, with multiple wire drawing machinery. The hole in the diamond is drilled at the factory, and in the case of the finest size is quite a delicate operation.

In the early days of the telephone it was thought desirable, by Theodore N. Vail, who was president of the Bell Company, to make exhaustive experiments on a long length of underground cable, and he gave an order to Mr. Phillips for five miles, of a twenty-one conductor cable, to contain copper wires of different sizes and various styles of insulation.

This cable was made in sections of 500 feet and covered with lead pipe, and the lead pipe drawn down snug to the cable, by means of dies. The reels holding the fifty-two sections were shipped to Attleboro, Mass., by rail, and after a trench had been made between the tracks of the Providence and Boston Railroad, by means of several ploughs, for a number were actually worn out, pulled by a locomotive, the sections were deposited in the trench and then covered over. After connecting the sections, various tests were carried on by Prof. Jacques and his assistants, between Attleboro and a point near West Mansfield, Mass. The cable was afterwards removed and sold for junk, the Bell Company being out of pocket financially, but rich with added experience electrically, and Mr. Phillips probably having the best of the bargain. At the present time a cable five miles long could be made in one section and then continuously covered by a lead press, but of course it would be rather bulky to handle to advantage.

In 1899, after forty years of hard work I decided to take a rest, and since that time have been living in Pasadena, Cal., during the winter and in Rhode Island the remainder of the year. Nothing pleases me more than to meet an old timer and talk over the good old days.

Radio-Telegraphy.

The Marconi Wireless Telegraph Company reports that at the present time over 350 vessels are equipped with their apparatus.

A wireless telegraph station having a radius of from 800 to 1,000 miles has been established in the Crystal Palace, London.

The Radio-Telephone Company is preparing to establish a wireless telephone system between Catalina Island, Cal., and the mainland, a distance of about sixty miles.

It is stated by the Electrical Review of London that the British War Office is negotiating with the Marconi Wireless Telegraph Company for the purchase of 300 sets of apparatus for army use.

It is reported that the experiment which has recently been tried by some of the steam turbines in the North Sea to utilize wireless telegraphy in their fishing operations has not proved successful.

The Massachusetts Volunteer Signal Corps has been provided with a portable wireless telegraph outfit similar to those in use by the signal corps of the United States Army.

A patent, No. 962,262, for a wave detector for wireless telegraphy, has been issued to W. Schloemilch and P. F. Pichot, of Berlin. Two contact bodies, one of manganese compounds.

A patent, No. 961,855, for a detectorium, has been awarded to H. Gernsback, of New York. Means for tuning and acting as a detector, being a sliding contact for tuning—coil tipped with a material to form the detector.

A patent, No. 961,914, for a wireless lighting system, has been taken out by E. B. Tustin, Jr., of Bloomsburg, Pa. For lighting a series of lamps by wireless which actuates an electrical circuit closer for the lighting circuit.

The British Post Office has issued a notice to the effect that radiotelegrams intended for transmission to ocean liners through Post Office coast stations in the United Kingdom, are now accepted with simplified addresses, consisting of the name of the addressee and the name of the ship, with the addition of the word "wireless." The name of the appropriate coast station is still necessary in the address of radiotelegrams to packet steamers.

The annual report of the Marconi Wireless Telegraph Company, Limited, of London, the parent Marconi company, for the year ending December 31, 1909, shows a profit for the year of £11,432. The French and Belgian subsidiary companies have during the past year declared dividends of five per cent. and ten per cent. respectively. At the annual meeting of the company it was voted to pay the cumulative seven per cent. dividend on the £250,000 of preferred stock of the company up to July 30, 1909.

The following patents have been granted to R. A. Fessenden, of Brant Rock, Mass.:

No. 962,014, for a method of electric signaling. For wireless waves by producing a bubble in a body of liquid by the action of the waves and utilizing the movement of the bubble to give a signal; No. 962,015, for a receiver for electric signaling. A wave detector consisting of a constricted conducting fluid path with means for producing a bubble therein; No. 962,016, for a receiver for electromagnetic waves. A liquid barretter having two fine terminals, a large terminal and an electrolyte; No. 962,017, for an electrical apparatus. A receiver for electromagnetic waves having a coil the ratio of whose self-induction to its mass is greater than one hundred thousand, with a movable element controlling a local circuit, and No. 962,018, for a method of signaling. Transmits waves continuously except for interrupting them to present dots and dashes and reinverting the signals at the receiving station by causing the interruptions only to be sensible.

The civil service commission of an eastern city is seeking a man for appointment as chief's driver in the fire department. This is a possible chance, according to the announcement, for a man who holds a chauffeur's license, who can take care of horses and pass a good examination in telegraphy to command a salary of \$1.75 a day. This announcement is only equalled by the action of the British Navy and some steamship companies in classifying wireless telegraphers with coal passers.



KERITE



Insulated Wires and Cables

KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

Efficiency and safety in electrical installations depend chiefly on insulation. For fifty years KERITE insulation has been the standard of excellence.

Results count. KERITE wires and cables installed half a century ago are in service to-day. The wonderful durability of KERITE insures the highest safety and economy.

Initial tests determine the properties of an insulation only at the time they are made. They do not determine how well it will do its work years afterward.

The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

Experience of others should be useful to you. Insure your service by using KERITE.

KERITE INSULATED WIRE AND CABLE COMPANY

INCORPORATED BY W. R. BRIKEY

Sole Manufacturer

**Hudson Terminal, 30 Church St.
NEW YORK**

Western Representative

WATSON INSULATED WIRE CO.

Railway Exchange, CHICAGO, ILL.



The Railroad.

The next annual meeting of the Railway Signal Association will be held October 11, at the Hotel Jefferson, Richmond, Va.

The Chicago, Milwaukee and St. Paul Railway is installing telephones for train despatching between Marion, Iowa, and Council Bluffs, a distance of 260 miles.

Mr. A. B. Kratz has been appointed superintendent of telegraphs and telephones of the Panama Railroad. Mr. Kratz has been acting superintendent for the past four months since the resignation of Mr. J. Beaumont.

Mr. L. M. Jones, assistant superintendent of telegraph of the Atchison, Topeka and Santa Fe system at Topeka, Kans, has been advanced to the position of superintendent of telegraph, vice Mr. C. H. Gaunt resigned to become general superintendent of the Western Union Telegraph Company at San Francisco. Mr. Jones is eminently qualified to take entire charge of the telegraph department, as he has the various details of this great system thoroughly embedded in his memory, he having risen to his present official position through various stages in the telegraph department from the ranks as an operator.

The twenty-third annual convention of the Train Despatchers' Association of America was held at Spokane, Wash., June 21, 22 and 23. Among the papers read and discussed were: "The Train Despatcher's Office: How It Should Be Equipped and Furnished"; "Train Despatching by Telephone" and "Inconsistencies of Instruction in Train Rules." Over seventy members of the association from all sections of the country were present, and the convention was one of the most successful ever held. F. C. Dow, Sheridan, Wyo., was elected president; J. B. Alvey, Fulton, Ky., vice-president; J. F. Mackie, Chicago, secretary, treasurer and editor. The members of the executive committee elected were B. S. Sperry, S. H. Brow, S. S. Conley and T. W. Kane. Baltimore, Md., was selected as the place for the next meeting, the date of which will be June 20, 1911. The re-election of Mr. J. F. Mackie to the position of secretary-treasurer and editor recalls the fact that he has occupied this post for the past twenty years. It is largely due to his sturdy manhood and unfailing energy that the association has been brought to the successful position which it occupies to-day, and the members are to be congratulated upon being able to retain the services of Mr. Mackie during such a long period.

Echoes of the Los Angeles Convention of the Railway Telegraph Superintendents.

Those who attended the convention are loud in their praise of the hospitality and kindness extended to them at Los Angeles. President Dyer was continually on the lookout for the comfort of the visitors and the local reception committee co-operated with him in his efforts to

make the week one which would long be remembered by those in attendance.

One of the most enjoyable events of the week was the day spent at Avalon, Santa Catalina Island. A most appetizing dinner was served at the Hotel Metropole, the menu for which was arranged in the form of a telegram. Mr. D. E. Riordan, the proprietor of this hotel, who was once a telegrapher himself, welcomed the visitors, giving them a cordial reception and extending to them the freedom of the city of Avalon.

The following committees have been announced by President Dyer:

Executive Committee—I. T. Dyer, chairman; J. B. Sheldon, William Bennett, C. Selden, E. A. Chenery and P. W. Drew.

Entertainment Committee—S. A. D. Forristall, N. E. Smith, W. Marshall, M. Magiff, B. A. Kaiser, P. W. Miller and A. P. Eckert.

Auditing Committee—A. B. Taylor and L. A. Lee.

Topics Committee—W. C. Walstrum, W. L. Connelly and E. A. Klippel.

Committee on High Tension Wire Crossings: G. A. Cellar, chairman, G. H. Groce, W. W. Ashald, W. P. Cline, C. Selden, C. A. Parker, J. M. Walker, Wm. Bennett and S. A. D. Forristall.

Committee on Miscellaneous Matters—W. F. Williams, chairman, S. L. Van Akin, F. T. Wilbur, W. W. Ryder and Geo. Boyce.

Committee on Resolutions—E. P. Griffith, W. J. Camp and E. W. Mason.

The committee appointed by the eastern division of the association to consider the proposed standard railway telephone agreement, made its report. The committee consisted of Mr. E. P. Griffith, chairman, Mr. L. B. Foley, Mr. F. G. Sherman and Mr. A. B. Taylor of New York; Mr. J. C. Johnson, of Philadelphia; Mr. N. E. Smith of New Haven. The report of the committee was as follows:

"At the regular quarterly meeting of the eastern division of the Association of Railway Telegraph Superintendents, held in Washington, D. C., November 18, 1909, the 'Standard Telephone Operating Agreement' for Railroads was taken up for discussion. After listening to the telephone company's representatives' explanation of the agreement, and considerable discussion by the members present, it was agreed that a careful analysis of the proposition should be made by a committee of five, who should report their conclusions to either division, or in annual meeting.

"It is clear to the committee that the document in question is ably prepared with a view to standardization, and to meet any existing laws, or contemplated legislation with respect to discrimination, and at the same time provide amply for railroad telephone service. Particular care is taken, in every clause of the agreement, to state that the rates to be applied shall be the regular charges of the telephone company to

its business subscribers and lessees in similar service, under substantially similar conditions. It takes away nothing that we now enjoy, except possibly a few comparatively low rentals for apparatus, which would be more than offset by the substitution of the flat rate for measured service at a few points where the railroads, under the present Standard Telephone Agreement, are placed on a measured basis and other subscribers or lessees in similar service under substantially the same conditions, have a flat rate.

"It permits the use of any apparatus the railroad company may elect for use on private lines, not connecting with any public or private branch exchange, or mileage line furnished by the telephone company. It requires the railroads to use only apparatus approved by the telephone company when such apparatus is for use on lines likely to be connected with their system. There is no objection to such restriction, if it can be termed a restriction.

"The commercial department of the American Telephone and Telegraph Company, Mr. Geo. W. Peck and Mr. F. A. Baker, in particular, have been untiring in their efforts to aid your committee. They have furnished us with extracts, and marginal notes showing how each phase of our service, under the present contract, would be taken care of under the proposed new agreement.

"The Standard Railroad Contract, under which most of the railroads are now operating, was introduced nine years ago. Great progress has been made with the telephone in railroad service since that time, and possibly the conditions of to-day may require some readjustment of the old agreements. The Standard Telephone Operating Agreement, otherwise known as the new agreement, which is now before you for consideration, was conceived, we believe, about two years ago, and brought before this association at our last annual meeting in Detroit. The new agreement is presented now as originally prepared by the telephone company.

"Within the current year a new and important feature has entered the telephone and telegraph field. The telegraph company, which controls the lines on a majority of the railroads represented by this association is working in harmony with the American Telephone and Telegraph Company, or the parent company, of the various telephone systems, forming a part of the proposed new agreement. Within the past few months we have noticed, and we believe, all classes of business, or users of the telephone and telegraph, will agree with your committee, that the development of the telegraph and telephone, under such harmonious workings, has been a great benefit to the public generally. If such benefits show themselves so conspicuously under a few months of operation, it is hard to estimate what the development will be within a year, or two years. It is, therefore, Mr. President, the conclusion of your committee that this association

should postpone action on the acceptance of the Standard Telephone Operating Agreement for Railroads until the telegraph and telephone companies have further developed their traffic arrangement, in order that we may be in a better position to judge as to the service of the various railroads. When such time shall arrive, a committee representing this association can meet, in joint session, with a committee representing the American Telephone and Telegraph Company, and formulate an agreement suited to the new conditions."

This report was discussed and adopted with the amendment that such railroads as may require some form of a contract before the next annual meeting of the association accept the proposed agreement for one year and thus give it a trial. The same committee having the matter in charge was continued for another year.

Mr. L. C. McIntosh, of the Southern Pacific Railroad, Los Angeles, who attended the convention, after listening to the discussion in regard to the proposed plan for delivering telegrams to passengers on trains offers the following scheme:

"It was quite manifest from the discussion that the greatest difficulty was to find the addressee and it occurred to me that if a small bulletin board were placed in each passenger coach at either end, having the words 'Telegram for' printed in large letters across the top with a blank space underneath for addressee's name, the public would soon become educated to this mode of announcement and delivery could be made by the conductor.

"As a general rule only passengers traveling long distances receive messages on trains and are on the alert for anything that distracts from the monotony of a long trip and are not likely to overlook any notices or instructions posted en route."

A New Insulator.

A new form of insulator, intended to eliminate leakage and cross-fire troubles in electric wires, is soon to be placed on the market. This consists of two parts separated by an area of still air, in such a way as to maintain at all times a clean and dry space between the tie wire and pin. Floating particles of dust, carbon or moisture do not enter beyond the first arm of the zig-zag separation between the two parts. This insures good insulation, particularly in a wet country. It is stated that this will obviate all troubles usually occurring in foggy districts. This insulator is the invention of Mr. Leonard W. Storrer, formerly general superintendent of the Postal Telegraph-Cable Company, San Francisco, whose practical experience showed him its necessity. It is to be manufactured by The Brookfield Glass Company, of New York.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Mavor and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER IX.

What principles have been combined to produce the quadruplex?

What is the fundamental basis of producing signals at a distant point?

Why is it necessary to employ two relays at each end of a quadruplex circuit?

What is the difference in the action of the two relays?

How is the battery arranged for varying the strength of the current sent to the line?

Why is extra resistance inserted in the tapwire of the battery?

What is the path of the home current after reaching the tongue of the transmitter?

What is the function of the pole changer?

Why is the construction of a pole changer more complicated when gravity batteries are used than when dynamos are used to supply current?

How is the equivalent of two batteries obtained?

Does a reversal of the pole changer affect the "long" or "short" ends of the battery?

How would you proceed to balance a quadruplex set?

CHAPTER X.

What was one of the first difficulties experienced in quadruplex operation?

How was this difficulty overcome by Thomas A. Edison?

Draw a sketch of the connections and describe the action of the Edison repeating sounder.

What principle is involved in the Jones inductorium method of accomplishing the same results as are secured by Edison's repeating sounder?

What principle is employed in the Smith arrangement?

Why is it necessary in this scheme to have a few ohms resistance between the relays and the tap for the artificial line?

Is there any objection to the insertion of this extra resistance?

In what direction have all of the later improvements in quadruplex apparatus been made?

How is the neutral relay constructed in order that the magnetism in its cores shall rise quickly to its full value?

Draw a sketch of the arrangements of F. W. Jones and Gerrit Smith and explain their action.

Trade Notes.

The Western Electric Company has recently issued an interesting illustrated bulletin, describing their telephone and signaling apparatus designed for use in mines.

Mr. M. J. Kenna, whose advertisement appears on the last reading page of this issue, is a well known and respected old time telegrapher. Mr. Kenna, who has recently embarked in the real estate business, is handling property in the territory adjacent to greater New York and is prepared to buy or sell real estate of any kind.

Bulletin No. 1008 describing telephone power plant equipments for non-multiple switchboards, has just been issued by the Western Electric Company. It contains twenty-four pages and is illustrated with many diagrams and cuts. This bulletin presents some features of power apparatus designed especially for telephone plants. The subject matter covers only such apparatus as is required for non-multiple switchboards having a capacity up to 800 lines.

On another page in this issue will be found the announcement of Mr. J. E. Albright, who is engaged in the business of furnishing typewriters, typewriter supplies and sending machines for telegraphers' use. Mr. Albright is a well known member of the profession and hence is thoroughly conversant with the operators' needs. He has been engaged in the typewriter business for a long time past and the experience he has gained qualifies him to provide for the requirements of any operator in a satisfactory manner. He sells typewriters on the installment plan and will make arrangements for payment in a way which will meet the convenience of the buyer. Mr. Albright has the reputation of giving everyone a square deal and is worthy of the patronage of any telegrapher.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

Several of the lady operators of the eastern division have been assigned to summer offices.

Mr. R. J. Murphy was in charge of the force as usual at the Poughkeepsie and New London boat races and a vast volume of business was handled without the slightest hitch.

Miss Mabel Green, daughter of wire chief Maxwell Green, was married to Mr. Percy Varian, of the Brooklyn Eagle staff, on June 30. The newly married couple are now enjoying an extended western trip.

The veteran operator, Mr. Matt Scanlan, of the eastern division, is still confined in St. Francis Hospital, Jersey City, suffering from injuries received while attempting to board a trolley car.

Mr. J. Harry Haworth has been appointed assistant traffic chief. Mr. Haworth was formerly connected with the Boston Herald staff.

Mr. R. W. Matherson, wire chief of the western division and Miss Frances Haberstroh, were married in Brooklyn on July 5. After the ceremony a wedding supper was served at Raub's. Mr. and Mrs. Matherson went to the Thousand Islands and Toronto on their wedding trip.

Edgar N. Tomlinson, a forty-niner of the telegraph, died at Jamaica, N. Y., June 30, aged seventy-nine years. Mr. Tomlinson was born at New Haven, Conn., and entered the telegraph service at Hartford, Conn., in 1846. During the war he served as operator for the Confederates at Corinth, Miss., and Memphis, Tenn., until the latter place was captured by the Union forces and he was required to take the oath of allegiance. He then engaged in other business and was for many years employed by the government as special agent for various difficult duties. About thirty years ago he returned to the telegraph service, accepting a position in this office, where he was employed until a few years ago, when he retired from active service.

CHICAGO, WESTERN UNION.

Mr. M. Levey of the operating department who has represented Telegraph and Telephone Age for some time past, has resigned to accept a position in other business. His numerous friends unite in extending best wishes and hope that he may be successful in his new field of endeavor.

Mr. J. J. Welch, traffic chief of the office, has accepted the agency of Telegraph and Telephone Age. Those desiring to place orders for books, subscriptions, etc., with this paper can do so through Mr. Welch.

Mr. Frank Richardson, the well known old timer of this office and an annual visitor at the reunions of the Old Time Telegraphers' and Historical Association, has gone to Pasadena, Cal.

General Mention.

One of the greatest feats in telegraph transmission which has ever been accomplished was the sending to a Spokane, Wash., newspaper from Washington, D. C., on the night of June 29 of the Interstate Commerce Commission's findings in the Spokane rate case. This report consisted of 23,748 tabulated figures and 9,120 words and was all sent from Washington and relayed at Chicago between 6 p. m. and 3.30 a. m. The work was divided between the two commercial companies and the part handled by the Postal Company was carried over a circuit by way of Omaha, Denver and San Francisco, a distance of 6,500 miles. This accomplishment shows that the transcontinental telegraph facilities are ample to meet any requirement.

An injunction seems to be a rather expensive luxury in Kansas. Some time ago one of the telegraph companies secured an injunction in that state to prevent the collection of a tax which had been levied on them which they considered excessive. The injunction was afterward dissolved

and a penalty of five per cent. was added to the amount of the tax. There is a law which provides that if any person or corporation obtains an injunction to prevent the collection of a tax and the injunction is dissolved the party obtaining the same is liable to a penalty of fifty per cent. of the total tax. The state authorities are now seeking to collect this penalty.

Systematic saving of small amounts has been the basis of some of the largest fortunes. The Serial Building Loan and Savings Institution of 195 Broadway, New York, offers a safe place of deposit for savings of any amount weekly or monthly, no matter how small, and pays a higher rate of interest than any bank. This association has been doing this for over twenty-five years and is now in better condition financially than ever before. Inquiries, either by mail or in person, will receive careful attention.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care Telegraph and Telephone Age, 253 Broadway, New York.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. They render the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

If you are interested in Suburban Homes, and Investment Property on Long Island or in New Jersey, write for Booklet.

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Telegraph and Telephone Age

No. 15.

NEW YORK, AUGUST 1, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons on Electrical Measurements.

PART VII.

Electro-Plating.

Another property an electric current possesses is the ability to decompose a solution through which it flows and thereby cause the separated molecules of which it consists to move onward and either reunite with some other element, or attach themselves bodily to some object placed in their path.

We are all familiar with the fact that in an ordinary cell of bluestone battery the negative electrode in time becomes heavily coated with copper. This is because the blue stone consists of crystals of copper sulphate, which, after being dissolved in the water contained in the jar, are caused to move forward, and the negative plate is, of course, their natural goal.

Hence an electro-plating outfit consists primarily of a bath in which the solution contains the particular metal to be deposited, while the object to be coated must be connected to the negative pole of the battery.

Iron, steel, zinc and tin, cannot be coated with silver or gold until they have first been plated with a thin film of copper. This fact is well worth remembering during the students period of experimenting.

Almost any substance other than metal can be electro-plated if first properly treated. The usual method is to give such objects a coat of powdered graphite, which substance readily takes a deposit.

Again, in electro-plating the deposit should not be made too rapidly, as the coating under this condition is apt to be rough and present a powdered appearance. On the other hand a comparatively low current density usually gives a hard, close-grained finish. The necessary amperage required per square foot of area of the object to be plated differs for different metals and baths, but this information may be found in almost any book treating on this subject.

It will thus be seen that the art of electro-plating is also governed by a set of rules and formulas, the principal factors of which are weight time and current density.

For instance, one ampere of current flowing for a period of one second will deposit .0003286 gram of copper on an object, or .001118 gram of silver, while other metals will each have a particular weight value. From this we get the working formula:

$$\text{Amperes} = \frac{\text{Weight gained}}{\text{Gain per sec. X Time}}$$

or $C = \frac{W}{KT}$ Where K represents the gain in weight per second for one ampere. The letters of this formula, like those of $C = \frac{E}{R}$, are, of course, capable of being transposed according to which factors are known.

SHUNTS.

The object of a shunt is to provide a means of diverting part of the current flowing in a circuit into another channel where its volume may be regulated to suit certain requirements.

For instance, in using a galvanometer for the purpose of making different tests the normal volume of current flowing is often too strong to give the needle a proper deflection. In this case a shunt is placed in parallel with the coils of the galvanometer. As the current in the multiple circuits divides inversely in proportion to the resistance it is evident that the resistance of the shunt may be given such a value that the current flowing through the galvanometer will be, say, one-tenth, one-hundredth, one-thousandth, or any other desired fraction of the total volume flowing. The results obtained in this case must be multiplied by the shunt in order to get the correct answer.

The resistance of the shunt bears a definite relation to the value of the galvanometer resis-

tance and is determined by the ratio desired. Example: If with a galvanometer of 1800 ohms resistance the current is to be reduced tenfold what must be the resistance of the shunt?

The formula for determining this is:

$$\text{Shunt} = \frac{G}{R-1}$$

Where G = resistance of galvanometer.

Where R = the ratio or multiplier.

$$\text{Hence shunt} = \frac{1800}{10-1} = 200 \text{ ohms, and } 10$$

would be the multiplier.

To find the multiplying power of any shunt, use this formula:

$$\text{Multiplier} = \frac{\text{Res. of Gal.} + \text{res. of shunt}}{\text{Res. of shunt.}}$$

Example: Using the values in the previous example we get:

$$\text{Multiplier} = \frac{1800 + 200}{200} = 10.$$



FIG. A.

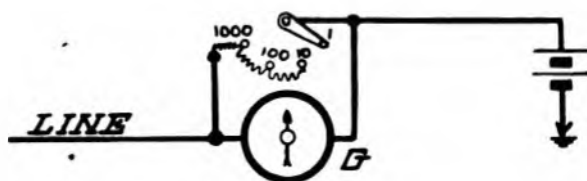


FIG. B.

The original manner of connecting the shunt coils with a galvanometer is shown in Figure A, while Figure B shows the more approved method quite generally used where great accuracy is required. The latter arrangement is called the Ayrton method and is known as the universal shunt. Its superiority over the former type is due to the fact that the arrangement of the coils is such that a shift from one multiplier to another will not alter the total resistance of the circuit to so great an extent as the arrangement in Figure A would bring about, because in the universal shunt that coil of the shunt which is displaced by any change made is shifted so as to be placed in series with the galvanometer coils, thereby causing the joint resistance of all the coils to remain practically the same at all times.

(To be continued.)

Recent Telegraph and Telephone Patents.

A patent, No. 13,130 (reissue), for a telegraphic transmitter, has been granted to P. Dinger, of

Cleveland, Ohio. A vibrator transmitting dots and a short lever pivoted adjacent thereto, a spring checking it, dash contacts and key lever controlling the lever and contacts.

A patent, No. 963,062, for a secret telegraph system, has been secured by W. P. Phillips, of Bridgeport, Conn.

A patent, No. 963,192, for a combined telephone and control system, has been issued to H. G. Webster, of Chicago, Ill.

A patent, No. 963,213, for telegraph apparatus, has been awarded to R. L. Dean, of Kansas City, Mo. Receiver and recorder consisting of a stylus propelled by a screw with shifting mechanism therefor.

A patent, No. 963,298, for a telegraphic relay, has been taken out by I. Kitsee, of Philadelphia, Pa. The contacts of the relays consist of graphite in a metallic housing.

A patent, No. 963,374, for a relay, has also been secured by I. Kitsee. Cable relay, including a plurality of pairs of magnets with a movable coil for each pair, the coils being secured together on a single moving system, each coil being in its own field and also in the field of another coil.

A patent, No. 963,480, for a switchboard for electrical conductors, has been issued to J. F. Skirrow, of East Orange, N. J. For telephone system in which the back board carries metal straps and buttons and is perforated so that the conducting pin may pass through it, and is received and held by converging sections of sheet metal.

A patent, No. 963,875, for a telephone system, has been secured by William W. Dean, of Elyria, Ohio.

A patent, No. 963,954, for a telephone receiver, has been taken out by Sol. S. Sonneborn, of New York.

A patent, No. 964,145, for a microphonic transmitter, has been awarded to C. L. Chisholm, of Marysville, New Brunswick, Canada.

A patent, No. 964,214, for a telephone transmitter, has also been granted to C. L. Chisholm.

The following patents have expired:

Patents Nos. 501,085, for a telephone circuit and apparatus, and 501,086, for station apparatus for telephone circuits, issued to Sherwood J. Larned, of Evanston, Ill., and Frank A. Pickernell, of Newark, N. J.

Patent No. 501,087, for electric signaling, issued to Thomas D. Lockwood, of Melrose, Mass., and Sherwood J. Larned, of Evanston, Ill.

Patent No. 501,102, for telephone signaling apparatus and circuit, issued to Frank A. Pickernell, of Newark, N. J.

Patents Nos. 501,168, for a telephone switch, and 501,169, for telephone exchange apparatus, issued to Charles E. Scribner, of Chicago, Ill.

Personal.

Mr. Jacob Levin, formerly general superintendent of the Western Union Telegraph Company, at Atlanta, Ga., was a recent New York visitor.

Mr. John Newlands has been appointed controller of the central telegraph office, London, England, vice Mr. A. E. Eames, retired. Mr. Eames had been connected with the English telegraph service for over fifty years.

Mr. T. Thorne Baker, of London, England, the inventor of a system of transmitting photographs by wire, who was a recent visitor to this country has been awarded a silver medal by the British Society of Arts for a paper on the subject of photo-telegraphy.

A recent illustrated bulletin of the Department of Architecture of Syracuse University is dedicated to Mr. Sidney B. Gifford, who was for many years superintendent of the Western Union Telegraph Company at Syracuse. Mr. Gifford's father was an architect and in his memory Mr. Gifford founded the Luther Gifford scholarship and prize in the Department of Architecture of Syracuse University.

Postal Telegraph-Cable Company.**EXECUTIVE OFFICES.**

Mr. Clarence H. Mackay, president of the company, accompanied by his wife, sailed for Bremen July 19. They expect to tour Holland and the Black Forest of Germany in an automobile and will be away about six weeks.

Colonel Albert B. Chandler, chairman of the board of directors, who is spending the summer at his country home at Randolph, Vt., was in New York a few days recently on company business.

Mr. S. M. English, of Dallas, president and general manager of the Postal Telegraph-Cable Company of Texas, was a recent executive office visitor.

Mr. Minor M. Davis, electrical engineer of the company, has returned to his office after a two months' absence in the west.

This company gained a point recently in its attempt in the Superior Court of California to secure a right of way along the Southern Pacific Railroad, when Judge Post of that court decided that the company's complaint asking for the right of way contained sufficient grounds to constitute an action.

James P. McBurney, manager of the branch office at 1397 Broadway and other offices in the theatrical district, died July 21, as a result of an operation for appendicitis. Mr. McBurney was thirty-nine years of age, and had been employed by this company for seventeen years. He was highly regarded by both his associates and his employers.

Extensive changes have been made in the New Haven office, a general remodeling having been effected in order to better utilize the space.

Mr. J. McGuckin, manager at Lake Placid, has had his office improved so that it is now one of the finest in the country for an office in the woods.

RESIGNATIONS AND APPOINTMENTS.

Mr. J. B. Coggins, manager of the Denver office has been appointed manager of the San Francisco office, vice Mr. G. W. Holt, transferred to the management at Denver.

Western Union Telegraph Company.**EXECUTIVE OFFICES.**

In the readjustment of divisional lines which has been made and which is effective August 1, all changes have been made on state lines on account of the differences in state laws and regulations governing telegraph operation. Under the new arrangement, indicated by the foregoing, the division territory will, with minor exceptions, be as follows:

Eastern division: New England States and New York, New Jersey, Pennsylvania, Maryland, Delaware, District of Columbia. Headquarters, New York City. General Superintendent, A. G. Saylor.

Southern division: Virginia, West Virginia, North Carolina, South Carolina, Kentucky, Tennessee, Georgia, Florida, Alabama, Mississippi. Headquarters, Atlanta, Ga. General Superintendent, B. F. Dillon.

Western division: Ohio, Indiana, Michigan, Illinois, Missouri, Arkansas, Iowa, Wisconsin, Minnesota, North Dakota, South Dakota. Headquarters, Chicago. General Superintendent, T. P. Cook.

Gulf division (new): Texas, Oklahoma, Louisiana. Headquarters, Dallas, Texas. General Superintendent, L. McKisick.

Mountain division (new): Montana, Idaho, Wyoming, Colorado, Utah, Nebraska, Kansas, New Mexico. Headquarters, Denver, Colo. General Superintendent, J. C. Nelson.

Pacific division: California, Arizona, Nevada, Oregon, Washington. Headquarters, San Francisco. General Superintendent, C. H. Gaunt.

The following appointments have been made, to be effective August 1, in the eastern division: Mr. E. M. Mulford, superintendent of the first district, to be division commercial superintendent; Mr. M. C. Allen, formerly of the American Telephone and Telegraph Company, to be division plant superintendent; Mr. J. A. Hill, of the general superintendent's office, to be division traffic superintendent. The headquarters of all of these officials will be in New York.

In the western division, with headquarters at Chicago, Mr. Morris T. Cook, secretary to the general superintendent, to be division commercial superintendent; Mr. W. J. Lloyd, superintendent, to be division traffic superintendent; Mr. W. H. Clapp, to be division plant superintendent.

In the southern division, with headquarters at Atlanta, Mr. J. M. Stephens, superintendent, to be division commercial superintendent; Mr. D. M. Therrel, to be division traffic superintendent.

In the Pacific division, H. F. Dodge, to be division commercial superintendent; H. B. Chace, assistant superintendent of telegraph of the Santa Fe system to be division traffic superintendent.

Among recent executive office visitors were Mr. L. McKisick, general superintendent at Dallas, Tex.

Mr. A. B. Cowan, assistant superintendent at Chicago, has been made superintendent of the first district, western division at that point, vice Mr. W. J. Lloyd, appointed division traffic superintendent.

Mr. E. Boening, of San Francisco, has been appointed superintendent at Seattle, vice Mr. R. T. Reid, resigned to enter commercial pursuits.

Mr. T. P. Cummings, manager of the New Orleans, La., office, has been promoted to be superintendent at that point.

Mr. C. B. Horton, Jr., assistant superintendent at Omaha, has been advanced to the superintendency at Omaha, vice Mr. J. C. Nelson, appointed general superintendent of the Mountain division.

Mr. A. R. Lingafelt, assistant superintendent at Oklahoma City, has been made superintendent at that point.

Mr. J. C. Hubbard, formerly division supervisor of lines of the American Telephone and Telegraph Company, New York, has joined the staff of the Engineer of Construction of this company and will supervise construction work throughout the plant. Mr. Hubbard has had many years experience in line construction and in conduit and cable work and his duties with this company will be largely of the same character. Mr. Hubbard's headquarters are now with Engineer of Construction, R. E. Chetwood, at 195 Broadway.

Mr. R. A. Black, of the office of General Superintendent A. G. Saylor of New York, has been appointed manager of the Philadelphia office, vice J. W. Reed, transferred to the superintendency at New Haven. Mr. Black was formerly manager of the York, Pa., office, and previous to his being attached to the general superintendent's office three months ago, was for a time assistant manager at Philadelphia.

Mr. A. C. Kaufman, of the general superintendent's office, New York, delivered an address before the Board of Trade of Pittsfield, Mass., on July 13 on the "Evolution of the Telegraph Service."

Mr. George W. Naile, a military telegrapher and an employe of the Omaha office of the Western Union Telegraph Company, has been retired on a pension. Mr. Naile established the first telephone exchange in Sioux City, Ia., in 1879, having secured the franchise in that city from Colonel

John J. Dickey and L. H. Korty, who established the first telephone system in Omaha.

Mr. H. L. Waterbury, manager of the office at Saratoga Springs, N. Y., representing the city, delivered the address of welcome to the New York Press Association, which held its fifty-seventh annual convention at that place recently.

J. C. Nelson, General Superintendent Western Union Telegraph Company, Denver.

Mr. John C. Nelson, who has been appointed general superintendent of the newly created Mountain division of the Western Union Telegraph Company, is the youngest of the six general superintendents of that company. Mr. Nelson was born in Denmark, December 14, 1875. He came to this country when but a young lad and, like thousands of others of our immigrants from the Scandinavian countries, has developed into the highest type of an American citizen. His entry into the telegraph service dates from May 3, 1888, when he began at the bottom of the ladder in the Omaha office of the Western Union, starting as check boy. He soon attracted the favorable attention of Colonel J. J. Dickey, who



J. C. NELSON,
General Superintendent, Western Union Telegraph Company,
Denver.

was superintendent at Omaha at that time and Colonel Dickey took Mr. Nelson into his own office as office boy. Here he was encouraged by his superintendent to take up the study of stenography and typewriting. He made such progress that in 1890 he was given a position as stenographer. He later became chief clerk and private

secretary to Superintendent Dickey. In the meantime he mastered the art of telegraphy and occasionally served as relief operator and temporary manager at various points. In this way and by frequently accompanying Colonel Dickey on inspection trips he gained a thorough knowledge of telegraphic affairs so that in 1902 when the office of assistant superintendent at Omaha became vacant Mr. Nelson was the natural choice for the post. In 1907, he was advanced to the superintendency, which position he has since held. The territory over which he now has jurisdiction comprising the States of Montana, Idaho, Wyoming, Colorado, Utah, Nebraska, Kansas and New Mexico, extends from the Canadian to the Mexican border, and in view of the rapid expansion of business in that part of the country is an important one. Mr. Nelson, however, is well qualified to discharge the duties of his new position and enjoys the confidence of both his superior officials and his subordinates.

**Mr. L. McKisick, General Superintendent,
Western Union Telegraph Company,
Dallas, Tex.**

Mr. Lewis McKisick, who has been appointed general superintendent of the newly created Gulf division of the Western Union Telegraph Company, at Dallas, Tex., as announced briefly in our



L. McKISICK,
General Superintendent, Western Union Telegraph Company,
Dallas, Tex.

July 16 issue, is especially well qualified to discharge the duties of the new position. Mr. McKisick was born at Memphis, Tenn., November 17, 1866. He went to California in 1879 and attended various institutions of learning, finally receiving the degree of Ph. B. from the University

of California in 1890. In August of that year he entered the service of the Western Union Telegraph Company, at San Jose, Cal., but in November he transferred his services to the San Francisco main office. His natural ability and his educational advantages soon brought him advancement and he was appointed chief operator in the Sacramento office. His next promotion came in 1899, when he was appointed assistant superintendent at San Francisco. In 1902 he was transferred to Chicago as electrician of the Western division. This position he held until 1907, when he was again promoted to be assistant general superintendent at Chicago, which post he has since filled. In the supervision of the large territory comprising the States of Texas, Louisiana and Oklahoma, Mr. McKisick will find ample opportunity for the display of the high executive ability which he possesses and there is no doubt but that his administration will be a most successful one.

The Cable.

It is reported that the Japanese government is preparing to lay a new cable between Nagasaki and Formosa.

According to a German publication the essential condition of the Franco-German cable agreement is the laying of a cable between Emden and Brest. The apparent object is to render the two countries independent of British cables for communication with Africa.

The report of the Central and South American Telegraph Company for the quarter ended June 30, shows gross earnings of \$435,000, an increase of \$70,000 over the corresponding period last year, with an equal increase in net revenue. The surplus now amounts to \$2,017,836, an increase of \$561,309 during the past year.

The second three-conductor cable which the Canadian Pacific Railway has been laying between Vancouver and Vancouver Island, near Nanaimo, has been completed. The laying was successfully performed by the Commercial Cable Company's cable ship "Restorer," on June 20, and the cable tested out very satisfactorily. This provides the company with six conductors between Vancouver and the Island, and as the cables were laid at different points, it is unlikely that any interruption should occur which would entirely cut off the island from the outside world.

The Pacific Cable Board has practically completed the arrangements for organizing its trans-continental service over the wire which it has recently leased from the Canadian Pacific Railway between Vancouver and Montreal. Mr. A. S. Baxendale, manager of the Board in London and Mr. Joseph Milward, manager in the Pacific, at Sydney, N. S. W., have been in Canada for some time past looking after the installation of the necessary apparatus. The wire will be operated

by the Wheatstone system, the Continental code being used, thus avoiding the translation from Continental into Morse, which was necessary under the former arrangement, whereby the Canadian Pacific handled the traffic. Relay stations will be located at Vancouver, Calgary, Winnipeg and White River. Mr. Milward will supervise the operation of the wire until the middle of September, when he will return to his headquarters at Sydney. The operating staff for the new wire will be composed of experts from London. At Montreal trans-Atlantic business will be exchanged with the Commercial Cable Company and the Anglo-American Telegraph Company.

Municipal Electricians.

A storage battery plant will be installed at Sandusky, O., to replace the gravity batteries now in use for the fire alarm telegraph system.

The Gamewell Fire Alarm Telegraph Company has been awarded the contract for installing a new fire alarm system in Grand Rapids, Mich.

Mr. B. W. Collins has been appointed city electrician of Tacoma, Wash., and has charge of all municipal electrical work in that city.

The Civil Service Commission of Los Angeles will, in the near future, hold an examination to secure eligibles for appointment as linemen, operators and an assistant superintendent in the fire alarm bureau.

Mr. Clarence R. George, city electrician of Houston, Tex., is engaged in installing a new switchboard in the fire alarm bureau which will increase the efficiency and double the capacity of the fire alarm system. About five miles of underground cable will soon be added to the system and additional street boxes will be installed.

A committee which has been investigating the condition of the fire alarm service in New York has recommended the abolition of private fire alarm companies and that the city take over and operate their properties. There are five such companies and they have a total of over 6,000 subscribers. It is urged that the revenue which would be derived from the operation of these plants by the city would be sufficient to defray the expense of the entire fire alarm system.

Everyone who is in any way interested in municipal electrical affairs should, if possible, attend the fifteenth annual convention of the International Association of Municipal Electricians, which meets at Rochester, N. Y., September 6, 7, 8, and 9. Some unusually interesting papers will be presented for discussion and a first-class entertainment will be provided for the visitors. Mr. J. B. Yeakle, superintendent of fire telegraph of Baltimore, Md., and president of the association, will be prepared to answer any questions concerning the Baltimore underground system. Mr. Frank P. Foster, of Corning, N. Y., is secretary of the association.

An appropriation of \$11,000 has been made in San Antonio, Tex., for improvements to the fire alarm system during the present year. Mr. W. A. White, city electrician, will have charge of the work.

J. Fletcher, Superintendent Canadian Pacific Railway Company's Telegraph, Vancouver.

Mr. John Fletcher, who has been appointed superintendent of the Canadian Pacific Railway Company's Telegraph at Vancouver, was born at London, Ont., January 4, 1856. He entered the telegraph service at Brockville, Ont., in May, 1872, being employed by the Dominion Telegraph Company. He afterward joined the forces of the Montreal Telegraph Company as operator at Ogdens-



J. FLETCHER,
Superintendent, Canadian Pacific Railway Company's Telegraph,
Vancouver.

burg, N. Y. He was next connected with the Montreal office of that company. Among other positions which he has held were those of operator and night chief of the Dominion Telegraph Company at Montreal, and night chief of the Western Union Telegraph Company at Ogden, Utah, in 1881. Since his connection with the Canadian Pacific he has served as chief operator and circuit manager at New Westminster and Vancouver, B. C., where he held the position of chief operator at the time of his present promotion. As he has acted as superintendent at that point at various times during the absence of the superintendent he is thoroughly familiar with the duties of his new office and is well qualified for the position.

Receiver for Rowland Company.

United States Judge Cross at Trenton, N. J., on July 25, named Mr. Louis de Goll, of Baltimore, Md., receiver for the Rowland Telegraphic Company, of Baltimore, a New Jersey corporation, upon the complaint of Edward J. Curran, a creditor of the company. This action will probably result in a reorganization of the company.

Annual Reunion of Old Time and Military Telegraphers.

The twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, to be held in Chicago, Sept. 8, 9 and 10, bids fair to be a record breaker in the matter of attendance and interest. President W. J. Lloyd, on the part of the Old Timers and A. H. Bliss on the part of the Military Telegraphers, both of whom are looking locally after the entertainment of the gathering, are allowing no means to escape them to make the coming meeting one of extreme pleasure and enjoyment. We take pleasure in publishing the following letter of Chairman Bliss addressed to the military contingent, the committee mentioned being the wives and daughters of military members.

"At a largely attended Committee meeting of the Society of the United States Military Telegraph Corps, held July 11, the following Ladies Reception Committee was appointed for the Reunion, September 8, 9, and 10: Mrs. W. R. Plum, Mrs. E. W. McKenna, Mrs. A. H. Bliss, Mrs. Florence D. Niblock, Mrs. A. W. Nohe, Mrs. L. B. Parker, Mrs. Daniel Hogan, Mrs. Charles F. Gross, Miss Margaret Charles Gross, Miss Alice S. Pettit, Miss Livonia Ingram, Miss Nina G. Sloat, Miss Rose Marie Moore and Miss Frances Bliss Moore.

"The program which is being arranged will be elaborate—not tiresome. It will entertain every minute of your stay, giving you the time of your life."

From other sources we learn that great efforts are being made to insure a large attendance of the surviving military telegraphers, who, having been operators in the second decade of Morse telegraphy, are in reality among the oldest of the old timers.

Any additional information in regard to the coming gathering may be obtained by addressing F. J. Scherrer, 195 Broadway, New York, secretary of the Old Time Telegraphers' and Historical Association, or David Homer Bates, 658 Broadway, New York, secretary of the Society of the United States Military Telegraph Corps.

International Conference of Telegraph and Telephone Engineers.

The second international conference of telegraph and telephone engineers which meets in Paris, September 4 to 11, will probably be the most important gathering of telegraph and telephone officials which has ever been held, practically every government telegraph administration in the world will be represented. The list of topics which appeared in our March 1 issue covers many subjects of great importance to telegraph and telephone engineers and there is no doubt that much benefit will be derived by the interchange of views by those present.

Papers intended for presentation at the conference have already been submitted and are now being reviewed. Each administration has also submitted papers detailing the present state of practice in their respective countries in the subjects which are included in this year's list of topics to be discussed. These papers are being printed in Paris, and will be circulated to reviewers nominated by the several administrations, who will in turn summarize the papers and distribute them to the delegates, so that at the Conference they may be taken as read and discussed forthwith.

Mr. John J. Carty, chief engineer of the American Telephone and Telegraph Company, and Mr. Charles E. Scribner, chief engineer of the Western Electric Company, New York, will attend the deliberations of the convention.

Incorporation of Printing Telegraph Company.

Articles of incorporation have been filed at Olympia, Washington, by the Consolidated Printing Telegraph Company. The organizers are Benjamin M. Barr, Frank B. Rae, George F. Parker, Joseph D. Baucus, Gordon Mackay and C. E. Collier. The capital stock is \$15,000,000, and the general offices are located at 2 Rector Street, New York. The object of this company is to purchase patents covering printing telegraph machinery and to develop a workable printing telegraph system. To this end control of several partially developed printing telegraph machines has been acquired by the company and control of several others is now in process of negotiation. This company will have associated with it either actively or in an advisory capacity such well known experts in this line as its chief engineer, Frank B. Rae, Henry Mahnken, for years associated with the New York Quotation Company, and John C. Barclay, himself, an inventor of a successful printing telegraph machine, and for years electrical engineer and assistant general manager of the Western Union Telegraph Company. These gentlemen and others of like standing are, as before stated, interested in the bringing out of a successful and thoroughly practical and commercially operative printing telegraph system. Mr. B. M. Barr is the president and Mr. S. S. Glass is secretary and treasurer.

Conference of British Post Office Engineers.

A four days conference of superintending engineers of the British Post Office was held recently at Leicester, Eng. Major W. A. J. O'Meara, chief engineer, presided. Among the engineers present were J. W. Groves, W. Noble, J. D. Taylor, E. Catley, A. Moir, J. Sheridan, F. H. Machugh, J. M. Robb, G. B. Roberts, W. Slingo, A. J. Stubbs, D. M. Stewart, F. Tremain, I. Probert, A. L. De Lattre, J. F. Lamb, R. McIlroy and E. J. Eldridge. This is the second such gathering which has been held since Major O'Meara assumed the position of chief engineer and it is the intention to hold similar conferences more frequently in the future.

The Telephone.

The regular semi-annual dividend of two and one-half per cent. has been declared on the preferred stock of the Western Telephone and Telegraph Company, payable August 1.

The New England Telephone and Telegraph Company has begun the construction at Boston of a ten story building, which, when completed, will be occupied by the executive offices of that corporation.

The report of the American Telephone and Telegraph Company for the first six months of 1910 shows a gross income of \$17,595,895, an increase of \$2,383,063 over the corresponding period in 1909, and net earnings show an increase of \$1,915,531.

James Bigler, a pioneer telephone man, died at Newburgh, New York, July 16, aged ninety-two years. Mr. Bigler in 1879 organized the Newburgh Telephone Company. He was afterwards associated with the Hudson River Telephone Company, being president of that corporation for several years.

The number of independent telephone companies in New York State has been reduced by sixteen, that number of companies in the western part of the State having been merged with the Federal Telephone and Telegraph Company, of Buffalo, which owned all of the capital stocks of the companies merged.

Upon application of Mr. A. J. Howard, a stockholder of the National Telephone Company, W. C. Handlau and J. W. Ewing have been appointed receivers of that company. The application for receivers states that the Continental Telephone and Telegraph Company procured \$10,000,000 of the stock of the National Company without giving any consideration therefor.

A recent number of the Electrical Review and Western Electrician contains a biographical sketch and engraving of Mr. Jasper N. Keller, who was recently elected president of the New England Telephone and Telegraph Company. Mr. Keller entered the telegraph service in 1862 and served as operator at various points throughout the United States. In 1879 he established the first telephone exchange in the west at Ogden, Utah. He has been connected with the New England Company since 1885.

One of the most interesting telephone exchanges in the United States is that of the Pacific Telephone and Telegraph Company in Chinatown, San Francisco. All of the subscribers are Chinese and all employees in the exchange are Chinese. The operators are girls who speak both English and Chinese. When a call is made the subscriber gives the party desired instead of the number and the operators are trained so that they know the name of every subscriber. The exchange has a capacity of 3,500 lines and is rapidly filling up as the Chinamen are getting educated to the use of the telephone.

The American Telephone and Telegraph Company, following its policy of centralization, has made arrangements to exchange its stock for that of the Michigan State Telephone Company, on the basis of four shares of American for five shares of that of the Michigan Company.

Extensive improvements are being made in the telephone service in the Canal Zone, Isthmus of Panama. An up to date common-battery exchange will be installed at Empire and the present central offices at Culebra and Paraiso will be consolidated with the Empire exchange.

Mr. E. H. Heffernan has been appointed district commercial manager of the Pacific Telephone and Telegraph Company at Reno, Nev., vice Mr. J. F. Adams resigned to accept the general management of the Nevada-California-Oregon Telephone and Telegraph Company.

A Telephone Handbook.

"The Practical Telephone Handbook," by Joseph Poole, A.M.I.E.E. (Whittaker and Company, London, the Macmillan Company, New York, 606 pages, 500 illustrations, price \$1.75). has been revised and enlarged and brought up-to-date. Among the subjects treated in the book are batteries, receivers in general use, transmitters in practical use, sub-station apparatus and instrument connections, intercommunication telephones, switchboard apparatus, relay and lamp signaling, small switchboards, private branch exchanges, multiple switchboards, principles of common battery working, trunk line working, trunk line exchanges, party line working, exchange apparatus, power plant, traffic statistics, aerial line construction, underground work, long distance lines, Pupin system of line loading, submarine telephone cables, faults and their localization, electrical measurements, automatic exchanges and wireless telephony. The subject of telephony is thoroughly covered by this book with particular reference to English practice. As American apparatus and methods, however, have been introduced very largely abroad in the past few years and adopted with modifications to meet local requirements, there is much information in this work which will be of value to telephone engineers in this country. Copies of this book will be sent to any address, carrying charges prepaid, upon receipt of price, by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

A Missouri telegrapher, in receiving a message recently which said "have taken position" made it read "have taken poison." This error, of course, caused the recipient of the message much anxiety and led him to make a long railway journey before the mistake was discovered.

The testimony of progressive operators is that Telegraph and Telephone Age is so thoroughly comprehensive in character as to make it absolutely indispensable to those who would keep informed. Its technical articles are of high practical value.

Testing the Insulation of Wires.*

BY MINOR M. DAVIS, NEW YORK.

Electrical Engineer of the Postal Telegraph-Cable Company.

Chief operators are aware that in wet weather the deflection of the measuring instrument is usually much greater when one pole of the measuring battery is to line than when the other pole is to line. The most common cause is the presence of foreign battery in the wire under test. If two wires rest upon a wet tree limb, one of them open for test and the other in operation, current will pass from the wire that is in use, along the tree limb to the wire under test and this current will augment or decrease the current from the testing battery. Upon open pole lines the insulation values are so variable in wet weather that readings taken within a few minutes of each other will differ considerably. In fact it is difficult to get two readings that agree. These changes sometimes appear to make it difficult to ascertain the exact location of the leak, but there is a very simple way of doing so. In my days of inexperience I took many readings with a tangent galvanometer that proved to be of no value when they were subsequently calculated; I read the plus and minus deflections to the most distant test station upon each wire of a pole line and then read the deflections to an intermediate station. When I got through I had a good deal of misinformation. The results, when checked by judgment, usually indicated the leaky spots; but Ananias would have blushed if he had seen some of the stories told by the galvanometer. After awhile I became conscious that my calculations were useless, that in most cases it wasn't material how many megohms per mile the needle indicated, that the essential question was: Where is the leak? Then this simple way of finding out was used. The wire to be tested was opened at a station beyond the leak and the pole of the testing battery that gave the greater deflection was left on the wire. As soon as the deflection became reasonably steady the needle was closely watched, while the wire was opened at the next station nearer the testing instrument. If the deflection suddenly dropped it was reasonably sure that the leak was between the two stations. If the needle did not change much the wire was opened at another (nearer) station, while the needle was carefully watched. A few tests showed where the leak was, and even when several sections were leaky it was easy to tell which they were. The advantage of this method is that you do not depend upon the value of any reading. It does not matter how much the deflection is, and variations do not matter provided they do not occur so suddenly that you cannot tell the effect of opening the wire at another test point.

By this method the leaky sections can be accurately determined even when the deflections are so variable that they do not remain constant long enough to compare them with a subsequent test to another station. There are more accurate ways of measuring insulation resistance, but it is usually much more important to know where a leak is than it is to know its exact resistance.

A Problem in Telephone Line Testing.

The problem which we published on page 473 of our July 1 issue and which was given by Mr. D. B. Grandy of the American Telephone and Telegraph Company, St. Louis has brought forth the following explanation from Mr. W. C. Stowell, assistant wire chief on the Santa Fe Railroad at East Las Vegas, N. M.:

"I have had considerable experience measuring a copper pair telephone circuit 126 miles long in Illinois, using either the voltmeter, milliammeter or bridge. With the former I used a line battery of fifty volts or more while with the Wheatstone bridge I used not more than fifteen volts. Under these circumstances measuring to a line cross the resistance was usually less when measured with the higher potential than with the small bridge battery. My explanation of the case given is that the lineman did not thoroughly brighten the wires when he put his cross on. Under this condition, the film of oxide left could not be broken down by the smaller potential applied. For with the line cross alone in the full testing potential was applied at the line cross, while with both crosses on, using the same testing potential, the voltage at each contact would be less, probably about half of what it was when the line cross alone was on. This lower potential would not break down as much oxide film, resulting in an increased resistance at the contacts. It is frequently found in both telephone and telegraph testing that application of a momentary high potential will greatly reduce abnormal resistance, either on line crosses or in instrument windings. The low pressure used on most bridge instruments gives at times some very strange figures, when compared with those obtained with regular line battery on voltmeter and milliammeter, when applied to circuits crossed or grounded outside of office where the wires are more or less covered by a film of oxide, soot or other material resulting from exposure to the air."

The theory which Mr. Grandy himself gives to explain the facts observed by him is as follows:

"My theory is that there is a film of oxide at the point of the original cross, which is broken down by the testing battery to such an extent, that there is practically no resistance in it when measured. When the lineman's cross is put on, however, sufficient current is deflected from the original path by the perfect connection formed by the new cross, to cause the film of oxide at

*Article appearing in Postal Telegraph.

the original cross to reassert itself and the resistance there rises, so that the current from the measuring battery practically all flows through the perfect cross put on by the lineman although that cross may be farther away than the original cross, and show the increased distance in a higher measurement reading. In all cases of this kind, of course, the lineman's cross is necessarily beyond the original cross."

If any of our other readers have had experience along this line and have any additional theories to advance or perceive any weak points in the theories of either Mr. Stowell or Mr. Grandy we would be pleased to hear from them.

How to Know How—In the Telephone Field.

The field of telephony is so broad and the types of equipment so many that already the telephone "specialist" is abroad in the land. We see the traffic engineer dealing solely with questions of traffic, the construction engineer with the plant equipment, and the manufacturing engineer with the design of apparatus. Then comes a host of lesser specialists, each man trained to do a certain thing, and having only a superficial knowledge of the other branches. For instance, a cable tester, or as they are commonly known, "galvanometer" men, while expert in the use of cable testing equipment and the location of faults in cables, know practically nothing of switchboard or instrument troubles and their remedies.

Unfortunately, the small exchange or the railway telephone system cannot have a group of specialists, but one man must do all the work from putting up the outside plant and installing the switchboard, to clearing line, cable, instrument, or switchboard troubles. This requires a general knowledge of things telephonic and it is surprising how many men in such situations succeed when the difficulties of obtaining a practical knowledge of the telephone business are so great. There are many men who have only been in the business a short while and who are greatly hampered by not knowing what has already been done, and who are therefore not in a position to take advantage of the "short cuts" and successful methods of others.

Perhaps in no other way can a man's efficiency be so increased as to carefully read the current telephone papers and such telephone books as are available. These, it is to be regretted are very few, but the latest one, "Telephonology," by H. R. Van Deventer, seems to have filled a long felt want and some of the comments on the same by practical telephone men are very enthusiastic.

The trouble with many electrical books is that they contain a great deal of matter of a historical nature which, owing to the rapid advancement of the art soon becomes obsolete as the equipment is no longer made and used, or they are too technical and hard to understand. This is not the case with *Telephonology*, which is simple, clear, and easily understood by the average lineman,

installer, or wire chief connected with a small installation, who has not had the opportunity to become expert on telephone matters, but who desires to inform himself carefully as to the location and remedy of various troubles in all kinds of modern equipment. Only modern apparatus and circuits are described, but trations being used, embracing circuit diagrams, cuts of circuits showing various tests, testing instruments, and information about making galvanometers, volt-meters, slide wire bridges, and other equipment from materials usually found around the exchange.

The book is unique inasmuch as it endeavors to answer accurately many hundred questions which have been asked the author by telephone men all over the country. This data was gathered during the author's connection with the telephone manufacturing companies as engineer, parties often writing these companies for information. A record was kept of this correspondence and a great deal of the data regarding trouble, was compiled therefrom. Copies of this valuable book will be sent to any address carrying charges prepaid upon receipt of price, \$4.00, by J. E. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

Nothing New Under the Sun.

The recent invention in England by Mr. S. G. Brown of a telephone relay or repeater, mention of which was made in our June 1 issue, and extended descriptions of which have appeared in several publications both in England and this country has received favorable comment from many telephone engineers. It is interesting to note in this connection that Mr. Stephen D. Field, the well known electrical engineer and inventor of Stockbridge, Mass., in 1887, was granted a patent for a telephone which accomplished practically the same results as Mr. Brown has secured in a very similar manner. Mr. Field's invention made use of platinum points as does Mr. Brown's, although the application of these points is somewhat different in the two cases. No practical use was ever made of Mr. Field's invention though the original model of his device may still be seen in his laboratory at Stockbridge. Five different patents were granted to Mr. Field covering this idea, application for the first one, No. 433,128, being dated June 21, 1887, and for the last one, No. 496,513, being dated July 30, 1892. The expiration of the last patent was recorded in our columns May 16.

It is reported that Mr. Hans Knudsen a Danish inventor, has devised a new system of submarine cable telegraphy which, it is claimed, is also applicable to wireless telegraphy. The new invention is a keyboard printing system and the inventor states that it will quadruple the speed at which submarine cables may be worked.

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August 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Study of the Telegraph.

The plan which we have adopted of publishing in each issue a list of questions covering chapters in Jones' Diagrams has evoked expressions of approval from many sources. There is a strong desire among operators at the present time to secure a more extensive knowledge of telegraph principles and of the electrical reasons underlying the operation of the apparatus they are called upon to handle. It is generally conceded that Jones' Diagrams is one of the best textbooks on these subjects which has ever been written. Our plan enables the student to study intelligently and acquire a thorough grasp of the fundamental facts set forth in this book. When we have concluded the questions on this work we will, as previously announced, take up other standard works on telegraphy and treat them in the same manner. In this way our readers will have the opportunity to secure just the knowledge that they need to enable them to advance in their pro-

fession. A few of the results obtained by some of our agents will illustrate the appreciation of our plan of study by telegraphers.

Mr. W. L. Jones, agent of Telegraph and Telephone Age, in the office of the Postal Telegraph-Cable Company of Texas, at Dallas, Tex., writes: "You are to be congratulated upon the excellent idea of publishing questions based on Jones' Book of Diagrams. It was only necessary for me to call attention to this feature of the paper in order to secure fifteen subscriptions and get orders for eleven books of Diagrams, the other four new subscribers already having copies of the book."

Our Omaha, Western Union agent, Mr. W. W. Umsted, has sent us twenty-three yearly subscriptions most of which have no doubt been added to the list on account of these educational articles. Our Boston, Western Union agent, Mr. Allan Woodle, has also sent us eighteen names to be added to the list while our agents at many of the smaller places have added one to five additional names, all of which goes to prove that members of the profession are anxious to obtain all the technical information regarding the telegraph if it can be imparted in a simple manner and obtained at a reasonable cost.

Mr. S. M. English, president and general manager of the Postal Telegraph-Cable Company of Texas, of Dallas, Tex., in a circular letter recently issued to all employees of his company among other compliments paid our paper says: "Telegraph and Telephone Age is now running an educational column which is better for you than anything it has yet undertaken and you should take advantage of it."

A student in one of the electrical schools which have been formed among telegraph employees in various parts of the country stated that he had secured more information from one hour's study of Jones' Diagrams in connection with the questions which we have printed than he had from attending six lectures of the electrical school. This was probably not due to the fact that the lectures were not practical, but rather that they were somewhat in advance of the student and tried to cover too much ground at once.

These are a few indications of the general feeling in telegraph circles at the present time. Those operators who are taking advantage of the educational facilities which are thus brought within their reach will be among those who will direct our telegraph systems in the future. Never since we have been in the business has there been such a demand for electrical works as during the past few months and we have made large shipments to Washington, Boston, Pittsburg, Kansas City, St. Louis, and other important telegraph centres. The effect of these influences will be a general increase in the efficiency of the service as well as an individual benefit for each one who makes a diligent effort to increase his knowledge. There are among those working at the key, many whom we predict will in a few years be occupying official positions.

For the Welfare of Employees.

It is frequently asserted that large corporations have no regard for the welfare of their employes, their only care being to get the most work possible out of them at the minimum wage. This assertion may have been true with some concerns, but the great companies of the present are daily proving that such statements are unwarranted.

One of the most commendable movements in the direction of benefitting employes which has been brought to our attention in later years is an association organized by employes of the Postal Telegraph-Cable Company in New York, known as the Mutual Investment Association. This is a co-operative organization formed for the purpose of enabling its members to make systematic savings and to secure greater returns for the money invested than could be obtained through other sources.

Although this association is composed entirely of employes and is directed by them, it has been made possible by the sanction and co-operation of the officials of the company. Through this organization any employe in need of a typewriter can purchase one from any reliable dealer at the cash price and the typewriter will be paid for by the association. The employe in turn is permitted to repay the association in small weekly amounts taken from his wages, the association charging for the money advanced only at the legal rate of six per cent. interest per annum.

An employe can also buy his clothing, furniture, and all other household necessities, at certain stores with which the association has arrangements, paying for the same in small weekly installments. For this accommodation no interest charge is made; the employe securing his goods at straight cash prices. This arrangement makes it unnecessary for him to deal with installment houses at installment house prices.

The association also aims to assist those who, for one reason or another, have become indebted to a class of people who style themselves as loan brokers, but who are more fittingly described by the name of "Loan Sharks." The rate of interest charged by this class of brokers for small loans amounts, in many cases, to several hundred per cent., and the employe who once gets into the clutches of one of these vampires usually has an uphill fight ahead of him before he can secure his release. The Mutual Investment Association has started out by buying up all claims presented against its employes in New York, permitting them to pay back the money on easier terms without the imposition of any penalties or interest charges.

It is thought by giving every employe a fair start and by taking care of their urgent needs in times of emergency, that the loan brokers can be driven out of the Postal service.

If the movement which has been started among the Postal employes in New York is extended among other companies and through other cities,

the business of this one class of our "undesirable citizens" will be wiped out.

The typewriter proposition of the association mentioned enables an employe to secure his machine upon weekly payments of the same amount as heretofore he has paid for rental. In other words, he secures ownership in a machine upon rental terms, so that his small weekly payments represent a saving to him.

The arrangement for the purchase of clothing and other necessities upon the installment plan at strictly cash prices is a boon to those employes who heretofore found it necessary to buy from installment houses at fancy prices for inferior goods.

The association is also relieving the distress of the company's employes at New York by advancing cash loans for sickness and other special emergencies, and only charging the legal rate of six per cent. per annum, the interest charge being for the period taken to repay the loan.

It is to be hoped that the activities of this organization will be extended throughout the country and that similar organizations will be formed among the employes of other companies and thus put an end forever to the "Shylock" curse which has in the past absorbed so large an amount of the hard earned wages of telegraphers.

Proposed International Telegraph Tournament.

The announcement in our July 1 issue of the proposed international telegraph tournament to be held at Turin, Italy, in 1911, has aroused much interest among telegraphers in this country. Many have expressed the hope that means may be provided whereby some of our first class operators may represent the United States in the proposed contest. There is no doubt but that we have Morse operators in this country the equal, if not the superiors, of those in any other country in the world. As the use of Morse sending and receiving is more highly developed in this country than anywhere else it is but natural that this should be the case. It will be a pity if this opportunity to demonstrate to the representatives of all the other great nations the proficiency of American operators is lost and we trust that a movement will be started in the near future to select one or more representatives from this country to participate in the coming international event.

Mr. J. A. Cahoe, of the Louisville, Ky., office of the Postal Telegraph-Cable Company was a recent visitor at Chataqua Lake, N. Y.

Mr. W. A. L. Tarr, agent and operator on the Santa Fe System at Manuelito, N. M., having reached the age of sixty, has been granted a pension. Mr. Tarr has been employed by the Santa Fe for the past twenty-four years, and represented this journal in that section of the country for a long time.

Some Notes on a Trip to the North American Continent.*

BY MAJOR W. A. J. O'MEARA, C.M.G.
Chief Engineer of the British Post Office.

The varied character of my past experience has enabled me to realize that very similar undertakings are managed in widely different ways, and this has naturally led me to make a somewhat close study of organization. In this wise I have come to the conclusion, rightly or wrongly, that mediocrity can, by means of an efficient organization, command success, whereas the most brilliant men, in the absence of organization, can only expect to meet with failure. The success of the American in engineering and commercial enterprises is widely acknowledged, and I therefore endeavored to ascertain during my hurried journey through the United States and Canada to what this success could be fairly ascribed. I have no hesitation in stating that from September 16, the day I investigated the organization of the New England Telephone Company in Boston, and the methods adopted by its officers in handling telephone propositions, to December 21, that last day which I spent at the offices of the American Telephone and Telegraph Company in New York, with Mr. J. J. Carty, I was struck by nothing more than the broad-mindedness of the officials engaged in the telephone and telegraph industries of the New World, and the orderliness in the management of those undertakings behind the scenes of which I was, through generosity and kindliness, allowed to penetrate. I propose therefore to sketch briefly the organization which the largest single telephone interest, viz., the Bell, has adopted in recent years.

On the North American continent the telephone and telegraph systems are ranked among the engineering enterprises of the land, and it is therefore not surprising to find the prominent position which is accorded to the engineering department in the organization of the American Telephone and Telegraph Company. In the words of Mr. Theodore N. Vail, the president of this company: "The engineering department takes all new ideas, suggestions, and inventions, and studies, develops, and passes comments upon them. It has under continuous observation and study all traffic methods and troubles, improving or remedying them. It studies all construction, future development, and extension schemes, makes plans and specifications for the same, and gives, when desired, general supervision and advice."

While I was in New York I had many opportunities of closely watching the working of the great deliberative machine so ably presided over by Mr. Vail, and so well managed by Mr. H. B. Thayer—one of the vice-presidents of the company. The first thing which naturally attracted attention was the complete absence of the huge files of correspondence

so familiar to those who work in Government offices. The functions of the various departments of the American Telephone and Telegraph Company are very clearly laid down, and since decentralization exists in its completest form, the business of the company is transacted by the heads of departments in personal interviews with the president and vice-president. It is this procedure which accounts for the absence of the files of correspondence to which attention has been drawn, and to it is also due the fact that the staff attached to the offices of the president and vice-president are reduced to microscopical proportions. In the case of the American Telephone and Telegraph Company I understand that about half a dozen stenographers comprise the whole of what would constitute the administrative section in a large British public department. Another point which came under my observation was the close personal relationship which exists between Mr. Carty and the chief engineer of the Western Electric Company—Mr. C. E. Scribner. When one considers the character of the problems which telephone and telegraph engineers have to handle nowadays it is not difficult to realize how great must be the advantages which cannot fail to result from the close personal intercourse of the chief engineers of the manufacturing and operating departments of the American Telephone and Telegraph Company.

Both Mr. Carty and Mr. Scribner were good enough to give up a considerable amount of their time to discuss telephone matters, and it is hardly necessary to state that the discussions were not only interesting but most instructive. As Mr. Carty's mission is to provide for the handling of telephone traffic in an efficient manner, it naturally follows that one important subdivision of his department devotes itself to the study of traffic questions. A second subdivision deals with questions relating to equipment, etc., by means of which the traffic must be handled. The work of these two sub-divisions is closely associated, as the problems of the one interact on those of the other. In order to produce the highest efficiency with the greatest possible economy it is absolutely necessary to consider the traffic problems in relation to the design of equipment and vice versa. Mr. Carty put it well when he informed me that his responsibilities "covered the design of the guns and ammunition, and also the manner in which the ammunition was to be used and the guns fired." But he further impressed upon me the fact that his responsibilities did not end here. For, if a telephone undertaking is to be a commercial success, it is a further duty of the engineer to follow carefully every change in the commercial policy of the company with which he is associated, since matters relating to tariffs, concessions, etc., all in turn produce reactions both on the internal equipment and external plant, and such reactions often demand important modifications in the engineering plant to meet the altered traffic requirements arising from a change in policy.

The associated companies possess complete local

*Abstract of an article in the Post Office Electrical Engineer's Journal.

autonomy, but the services of the experts of the parent company are at all times at their disposal; further, the Western Electric Company stands in the same relation to the licensee companies as the stores department does to the engineering department of the Post Office. To these circumstances is due the fact that throughout the United States a high degree of standardization and uniformity has been reached by the telephone companies which compose the Bell interest.

The licensee Bell companies have in recent times devoted considerable attention to the subject of organization, and, having carefully weighed the advantages and disadvantages of the so-called territorial and functional methods, have, I think wisely, concluded that the latter arrangement is best suited to the modern-day requirements of a complex business such as their own. This organization certainly provides that officers having specific kinds of experience and corresponding mental faculties shall supervise directly only work which they are competent to judge and with reference to which they can make helpful constructive suggestions to their subordinates, which is one of the most important considerations to be borne in mind in framing any organization. So far as the telephone undertaking is concerned, there are three very distinct kinds of responsibility to provide for. Before any business can be started a market must be found for its wares, and a sufficient number of the public have to be tempted to purchase these wares. The telephone industry is no exception to the rule; and we find, therefore, that in America a commercial department has been instituted for selling telephone service. Secondly, in order to enable the telephone companies to fulfill their part of the contract after the bargain for the service has been entered into, the necessary equipment and plant have to be designed, installed, and maintained; the responsibility for this work is provided for by the plant department, i. e., the engineering department as known in our service. Finally, when the equipment and plant are in position it necessarily follows that measures have to be adopted for bringing them into service, and the responsibility for this work is placed upon the traffic department. A feature of this organization which struck me as admirable lies in the fact that the heads of these three departments have the same title, viz., that of superintendent, that is to say, they are on the same level as to rank, and thus human sentiment is very largely cared for. It is safe to say that with such an organization business getting will be much more effectively organized and carried on; the equipment and plant will be better designed and constructed, and maintained at lower cost, and the operating will be of higher quality and exhibit greater efficiency. The concentration of effort, the conserving of special skill, the co-ordination and co-operation within each functional department, will also tend naturally to the acquisition of the greatest efficiency in each department of work.

In my young days it was frequently impressed upon me that the best results would always follow if subordinates, however lowly in rank, were given an opportunity to do at least one thing on their own responsibility. This idea has been made a principal feature in the functional organization in the form in which it has been introduced in America. I found that every effort is made to push responsibility down the line, and hence it is that in every grade officials know that there are always certain things in which no further authority than their own judgment is required for the execution of prescribed works. I could not help noticing the spirit of enthusiasm which is thus engendered, and I readily believe that this results in work of so superior an order that the cost of the mistakes which may be made from time to time is paid for many times over by the greatly increased output of work of every official in the great telephone organization of the Bell interest. Such an arrangement also has the merit of developing the most useful attributes of a man, and hence there is no lack of the proper material for filling the highest administrative posts. It is in environment of this kind that the qualities of broad-mindedness are formed, and that high administrative talent is developed to perfection.

At every centre I visited I found that decentralization in administration had been as completely effected at the headquarters of every associated licensee company as I have already described as existing at Dey Street, New York—the headquarters of the American Telephone and Telegraph Company. The absence of files of correspondence on the tables of the general managers and the superintendents of the several operating departments would have led one to believe that these gentlemen had practically no work to do, but the production of their annual budgets told a different tale. This state of affairs is due to the fact that the personal staff of the general managers consists usually of three or four stenographers, who are also available for attending to any correspondence which the directors of the company may have to deal with. I may here remark that each department has to budget in advance for its own needs for a complete financial year, and the directors raise capital and arrange their programme on the basis of the estimates thus prepared for their guidance. Considerable attention has been paid to accounting matters by Mr. C. G. DuBois, comptroller of the American Telephone and Telegraph Company, and, in consequence, a suitable scheme of standard telephone accounts has been introduced for adoption by all the licensee Bell companies. It is hardly necessary to say that the accounting system is primarily designed for, and adapted to suit, the functional form of organization. This system of accounts will teach heads of departments, and even individual employes, the value of their work, and I understand that it is expected that it will not only throw light on the efficiency of administration of each department alone, but that the

relative efficiency of individuals will also be ascertained by its means. I have long held the view that the practical limits of the administrative checks which can be introduced by a suitable system of accounts has not yet been reached by a long way.

Before leaving the subject of organization, it may be useful to draw attention to the scheme introduced by the Manitoba Government in connection with the management of its recently acquired telephone system. An order in council provides that the control and management of the Manitoba Government telephones shall be vested in a commission of three members, one of whom must be a professional engineer, and, in consequence, a Commission, consisting of a chairman, commissioner engineer, and commissioner auditor, has been appointed and is doing all things necessary for the successful conduct of the telephone undertaking. It will not be a matter of surprise to learn that the commission has adopted an organization which is in its main features identical with that already described as existing in the United States in connection with the Bell companies. The territory under the jurisdiction of the commission is extensive but the undertaking itself is not at present one of very great magnitude, and certainly does not justify the appointment of highly-paid heads of the three departments. The commission acts in a deliberative capacity only, and it has decided that the commissioner engineer shall directly administer the three departments.

It seems hardly necessary for me to say much on the technical side of telephone engineering. We know how thorough our American cousins are in all they put their hands to. Their success is entirely due, in my opinion, to the scientific spirit in which they approach a subject. No changes are introduced until a complete investigation into each aspect of the situation has first been made. A novelty has to be "tested out" and "proved in" before it has any chance of acceptance. So far as service by means of the multiple switchboard is concerned, not much room for improvement has been left for some years past. However, American telephone engineers have not been content to rest on their oars, and many improved features of a minor character have been introduced into the service; for example, the study of traffic conditions has resulted in the introduction of the auxiliary jack, which provides for calls appearing at two or more positions, and thus facilitates team working.

The American engineers fully realize that in connection with the long-distance service it is not only the quality of the telephone service from the point of view of distinctness of speech which tells with the public, but also its availability at the very moment when it is required. The second of these requirements can certainly be met by the provision of a sufficient number of circuits in every case, but commercial considerations demand that the whole of the plant installed shall provide an adequate revenue to pay all expenses and to earn a profit besides. This clearly points to the necessity of effecting some com-

promise between an instantaneous service and a service involving unreasonable delays in providing the use of lines. The subject appears to have been approached in a very commendable spirit by both the telephone companies and the public. The provision of trunk circuits is based on the assumption that the public will tolerate a longer delay in connection with places very distant from one another than in the case of places close together, while, on the other hand, it is even admitted that in certain cases an almost instantaneous service may justly be demanded. In order to guide the administration in the provision of additional circuits between important centres, schedules have been prepared laying down the file and start time for the various circuits. In other words the file and start time is the maximum delay which it is expected that the public will, as a rule, submit to, or, in scientific terms, it is the "modulus of elasticity of the patience of the public." Should delays habitually exceed the scheduled times the question of the provision of additional circuits is at once taken in hand by the engineers. A study of this nature led to the provision of an underground cable between New York and Philadelphia, and the number of circuits provided is so ample that an almost instantaneous service between these centres is now being given.

As was to be expected, a very complete study has been made of "loading" problems, and practical trials are being made over "loaded" aerial circuits. Many difficulties have been successfully overcome, and during my stay in New York an opportunity was afforded me of talking with Chicago on a "loaded" aerial circuit. The distance is about 1,000 miles and the conductors are 420 pounds copper to the mile. Even under the adverse atmospheric conditions which prevailed it was quite possible to understand my correspondent in Chicago.

Thanks to the courtesy of Colonel R. C. Clowry, president of the Western Union Telegraph Company, and Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company, I was afforded every facility for looking into the details of their organizations, and for inspecting the methods adopted in handling traffic at all the centres visited by me. The circuits of both companies are in the main equipped with sounders. The use of batteries for telegraph purposes has been almost completely abandoned; at all the offices I visited the current for the telegraph circuits was being drawn direct from the lighting mains, or was furnished at the voltages required from motor dynamos which obtained their power from the lighting mains. Typewriters were in practically universal use for recording the messages as they came in, and the almost leisurely manner in which the operators were able to strike the keys of the typewriters when receiving messages conveyed the impression that the use of this machine must enormously decrease the strain of handling telegraphic despatches. As the time at my disposal was all too short to cover a wide range

of investigation, I directed my attention particularly to the examination of the performances of the Rowland and Barclay printing machines.

When I first arrived in the United States the Postal Telegraph-Cable Company had a certain number of their circuits equipped with the Rowland machine, and I therefore had an opportunity of watching the apparatus in operation, while Mr. M. M. Davis, electrical engineer of the company, and his officers, kindly furnished me with all the explanations I required. I could not help being struck with the complicated nature of the local circuit arrangements and the large number of selecting relays (eleven in all) necessary to effect the transmission of signals. The operation of the key-board sends the current impulses direct to the line, and the messages are printed direct on blanks or message forms. Frequently I observed that much delay was caused, as when parts of a message had been wrongly signaled the "blank" had to be removed and the message sent again. Waste of two kinds was thus occasioned, viz., line-time and stationery, and I was not surprised to learn that the annual value of the stationery spoiled was quite an appreciable sum. When all things are going well the Rowland Octoplex has certainly a great carrying capacity. I was informed that 2,000 to 2,500 telegrams, of thirty words each, can be comfortably handled per day on such circuits, and at times of pressure about 4,000 messages have been handled in a day. Unfortunately the apparatus is not sufficiently reliable, and after a trial extending over two years and a half, the Postal Telegraph Company has discontinued the use of the Rowland machines. This company has now under trial a new invention—the Wright Printing Telegraph, and I understand that satisfactory results are being obtained with this apparatus on a circuit between New York and Washington; a circuit between New York and Boston was being similarly equipped during the last few days of my stay in New York.

The Western Union Telegraph Company has equipped a considerable number of its circuits with the Barclay Printing Telegraph machine, which operates on the polar duplex principle, and being a non-synchronous system, it has a wide range in line current values. In this system the messages are prepared on tape for transmission; experience has shown that the output of two perforators can quite easily feed a transmitter, and in consequence, the staff employed at the transmitting end of a simplex circuit consists of two operators for perforating tape on key-board machines, and one attendant for the transmitter. The operators' tables are placed adjacent to the right and left of the transmitter-attendant's seat, so that the tapes can be readily passed to the latter. The messages are typed direct on "blanks." I have been informed that on the day I sailed for England a test was made on one of the New York-Chicago circuits, 1,000 miles in length, and that by means of duplex working, 1,019 messages were sent from New York to Chicago during a period of nine hours fifteen minutes and 814

messages were sent at the same time from Chicago to New York during a period of eight hours thirty-five minutes. The test was made under ordinary working conditions, and the messages were of average length. The staff at each end of the duplex circuit consisted of one printer-clerk, one transmitter-clerk, and two punchers.

A comparison of the working of these two types of printing telegraph machines affords, I think, convincing proof of the advantages of tape transmission over the direct signaling to line. Theoretically, the former appears to involve a loss of time in handling individual messages, but in practice, the saving of time in the case of direct transmission can only occur if everything works with smoothness and the staff is so skilled as never to make a mistake of any kind. In practice I fear such conditions will never prevail, and it is for this reason that the tape transmission exhibits its superiority. The correctness of the tape can be verified as it is prepared, and all errors can thus be eliminated before the tape passes through the transmitter, while the loss of line time can be reduced to an absolute minimum. This is satisfactory, as, after all, it is the line (except in the case of the shortest circuits) that is responsible for the bulk of the annual costs in telegraph systems. Many other interesting features were shown to me in the telegraph offices which I visited, but I regret that I must omit reference to them for the present.

As I travelled through America I was astonished at the very large number of masts and antennæ which I saw. I was anxious to get into touch with the "wireless" situation, and I made frequent inquiries concerning the ownership, etc., of the aforesaid masts, but I invariably received the reply that the masts represented a "stock proposition," and that my thirst for technical knowledge could not be satisfied, as the only work these stations performed consisted in the radiation of the money of gullible investors. I did, however, have the good fortune to meet Professor R. A. Fessenden in New York, and at his invitation I visited Brant Rock at the beginning of December last. Unfortunately, just at that time the Nicaraguan imbroglio was a prominent question in the international situation of the New World, and all the operators had been withdrawn from Brant Rock to equip the American fleet. In the neighborhood of the 400-foot mast, Professor Fessenden has erected a much smaller mast for experimental purposes, and I was able to get some idea of the nature of the reception of uttered words by means of the "wireless" telephone. The articulation is certainly very good. The great hindrance to wireless telephony mainly arises from the difficulty of eliminating atmospheric disturbances, but I understand Professor Fessenden has succeeded to a large extent in overcoming difficulties of this nature.

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American Telegraph Engineering—Notes on History and Practice.*

BY WILLIAM MAVER, JR., AND DONALD McNICOL.

(Continued from page 489, July 16 issue.)

Since the discontinuance of the American Rapid and the Leggo systems there has been no extensive employment of automatic chemical telegraphs in this country or elsewhere although workers in this field like Anderson and Delany have devised certain features designed to be conducive to greater reliability of operation and speed of translation of the received characters, notably perhaps the Anderson page method of recording the message which enables the attendant to observe the condition of the incoming signals as they arrive, and simplifies the reading of the characters by the copyist. It also lends itself readily to means for drying the paper speedily as received, thus obviating, or minimizing an objection to "wet" strip, namely the tearing of the strip.

The well known Wheatstone system of automatic telegraphy was introduced on certain circuits of the Western Union Telegraph Company in 1883, and its use was continued thereon up to a comparatively recent period when it was to a considerable extent displaced by the Buckingham-Barclay printer. Further reference will subsequently be made to this subject.

As previously stated the employment of duplex telegraphy began about the year 1868, and on short lines was practiced with a certain degree of success without any device to compensate for the static discharge from the main line. Stearns, however, applied the condenser to the artificial line for this purpose in 1872, whereupon the general use of the duplex ensued. Subsequently in 1873-74 the Edison quadruplex was placed in operation on the Western Union Telegraph Company's lines and after numerous modifications of apparatus and circuits finally reached its maximum efficiency about 1884. In the year 1886 there were about two hundred quadruplex sets in operation in the United States, these, it was estimated, providing additional, or "phantom" wire facilities equivalent to 150,000 miles of line wire, the value of which was approximately eleven million dollars.

Much of the success of the quadruplex system between the years 1885-1895 is no doubt properly ascribed to the extensive employment of hard drawn copper wire for telegraph purposes, beginning in 1885. The period indicated was also prior to the advent of high tension power transmission lines in proximity to telegraph circuits, the inductive disturbances from which undoubtedly have had a very detrimental effect upon quadruplex operation, and to which subject also further reference will be made.

As an instance of the extent to which duplex and quadruplex operation has been utilized in this country in proportion to existing wire mileage, it may be noted that in the case of the Baltimore and Ohio Telegraph Company which had a total of 50,978 miles of wire in operation in 1887, (reaching from Portland, Maine, to Galveston, Texas, via New York, Washington, Chicago, St. Louis, etc.) 23,482 miles thereof were assigned to the aforesaid duplex and quadruplex service, producing 56,553 miles of phantom circuits. Of the total miles of wire mentioned there were approximately 4,655 miles of No. 12 and 3,605 miles of No. 14 hard drawn copper¹, 12,726 miles of No. 6 iron, 25,345 miles of No. 8 iron, 3,944 miles of No. 9 iron, and 252 miles of No. 12 iron wire.

In the years 1885-86 the Delany synchronous multiplex system was in experimental operation on a circuit of the Baltimore and Ohio Telegraph Company's lines. On short lines this system gave the equivalent of six transmissions simultaneously, but owing largely to difficulties introduced by the static capacity of the line, its employment on long lines was not available at that time.

SOURCES OF ELECTROMOTIVE FORCE IN TELEGRAPHY.

As already noted herein gravity batteries as a source of e.m.f. for telegraph service have been almost entirely displaced in this country by machine generators. The type of generators used and the arrangement of equipment vary according to the local requirements.

In some instances the generators are driven by gas or steam power developed on the premises, but as a rule public service mains are utilized to operate the machines, either as motor-generators, or by means of separate electric motors. At points where the only commercial current available is alternating, it is customary to operate from this source an induction motor-driven direct-

¹This was doubtless the first extensive employment of hard drawn copper wire in telegraphy. At this time quite conflicting views were held as to the utility of this metal for overhead telegraph circuits. The advocates of silicon-bronze and phosphor-bronze wire claiming superiority for those materials. The experience of twenty-five years has, however, fully justified the favorable opinions of the pioneer users of hard drawn copper wire regarding its many advantages.

It may be further noted as an interesting item of telegraph history that owing to the expiration in 1880, through inadvertence of the Canadian patent No. 4608, of April 10, 1875, covering the Edison quadruplex, that system was unprotected by patents in this country after the first mentioned date. A legal contest was, however, waged by the Western Union Company against the Baltimore and Ohio Telegraph Company for infringement of Stearns' patent No. 126,847, of 1872, covering the application of the condenser to duplex and quadruplex telegraphy. An injunction pendente lite was denied by the courts on the ground that the original Stearns patent had been so broadened by successive reissues as to raise reasonable doubt as to its validity. The matter was still in litigation when the defendant company was merged with the Western Union Company in October, 1887.

*A paper presented at the Twenty-seventh Annual Convention of the American Institute of Electrical Engineers, Jefferson, N. H., June 28-July 1, 1910.

current generator which in turn furnishes power for the operation of direct-current motor-generators. In numerous cases where driving power to operate the motor generators is derived from public service mains, emergency gas or gasoline engines are installed to insure continuity of service in the event of prolonged interruption of the commercial power circuits. One method of arranging these machines in large terminal offices consists in connecting a certain number of them of equal voltage in series, thereby furnishing a range of e.m.f. from, say 40 to 400 volts, the machines being tapped by the various main line or local wires as required, the local and single wires taking from 40 to 150 volts, respectively, the duplex circuits taking current at 200 volts and the quadruplex circuits at about 350 volts. As currents of both polarities are used in these systems, two sets or gangs of machines in series, as stated, are employed. Another method of arranging dynamos in terminal offices is to employ from seven to fourteen machines which deliver e.m.f.s. ranging from 40 to 400 volts the lower voltage supplying current for the operation of sounder circuits, automatic repeaters, duplex and quadruplex pole changers, transmitters, etc., an e.m.f. of 125 volts is used for main line simplex operation, generally way wires having a number of offices on the circuit. Machines supplying respectively 200 volts of positive and negative polarity are allotted to duplex operation, while 385 volt machines of positive and negative polarity, respectively, provide current for quadruplex circuit operation.

Storage batteries also have been utilized quite largely in telegraph service as sources of current for the operation of main line and local circuits. In general these batteries are charged from public service direct-current mains, or by locally operated direct-current motor-generators. The comparatively large loss in transformation of power, from the mains to, and in the storage battery itself, together with the cost of attendance and maintenance of the motor-generators and the battery have acted as a deterrent to its extensive use in telegraph work, notwithstanding certain advantages in the way of constancy and reliability of current that such batteries may possess. The engineering departments of the commercial telegraph companies and of the larger railroad telegraph companies have therefore followed closely those developments in the electrical art which aim to procure equally efficient and more economical transformation of electric power for telegraphic purposes, and the claimed advantages of various alternating-current rectifiers—vapor, electro-mechanical, and electrolytic—have been considered and tested. At the present time, for example, quite an extensive application of the electrolytic rectifier is being made by the telegraph companies here, in order to determine what dependance may be placed upon these methods of

obtaining practically constant direct-current potentials from alternating-current sources. One of these rectifiers (the "Hickley") consists of a solution of electrolyte, say, phosphate of soda, and electrodes of carbon and aluminum, contained in a vessel, to which are attached radiator loops which permit circulation of the solution (necessary on account of the heat developed in the electrolytic cell) thereby preventing the weakening of any portion of the electrolyte more than another. The direct current supplied by the rectifier is, of course, pulsating, but owing to the condenser effect of the cells whereby a portion of the negative current is recovered, currents are derived which are sufficiently steady for average telegraph requirements. With this rectifier 80 volts direct current are procurable from 110 volt alternating current mains. The durability of the solution and electrodes of this rectifier depends largely upon the amount of energy delivered, but if not overworked the rectifier will not require renewal oftener than once each year; assuming daily operations of the device. A suitable transformer is utilized to give either higher or lower voltage than that supplied by the available alternating-current mains, the rectifier being constructed to supply e.m.f.s. ranging from 6 to 1,000 volts. It may be noted also that some use is being made of small step down transformers of the bell-ringing type for the purpose of obtaining low voltages to operate call circuits, etc., operated in connection with telegraph systems.

TELEGRAPH PRINTERS.

It has long been recognized by telegraph authorities, that an ideal system of telegraphy would be a simple and reliable page printer, capable of transmitting and receiving say from 600 to 1,000 words per minute on circuits of from 200 to 1,000 miles in length. To the inventor of such a system will ensue wealth and fame. It is hardly conceivable, however, that a telegraph printer can be devised that will not possess a number of prominent defects that will act against its general employment; for example, the necessity of preparation of the message for transmission, and its comparative expensiveness and complexity. The first defect would preclude its use on hundreds of stock exchanges and "broker" circuits; the second would debar it from thousands of small way wires. These disadvantages are inherent also in all automatic machine telegraph systems, electro-magnetic or electro-chemical. The superiority of the Morse manual system above all other systems in the foregoing respects is universally admitted.

Reference has already been made in the opening remarks of this paper to the "House" printer. This printer was followed in America by the so-called "Combination" printer, and by the Phelps printer, and in Europe by the Hughes and the Baudot systems, all of which retain the objection-

able features of printing the received characters on a strip of paper. Moreover these systems are comparatively slow in operation, not attaining a speed of more than sixty words per minute in one direction, or in each direction if duplexed, although the Baudot system when operated on the synchronous multiplex plan increases quite materially the carrying capacity of a circuit. For some time past in America efforts have been made to obtain higher speed page printing telegraph systems; that is, systems by which the received message will be printed on a regulation telegraph blank ready for delivery. Several different systems of this kind have been recently placed in operation in the United States, namely the Buckingham-Barclay printer on the lines of the Western Union Telegraph Company, the Rowland multiplex printer, experimentally on some of the lines of the Postal Telegraph-Cable Company and the Wright printer, to be briefly described presently. The capacity of the Buckingham-Barclay printer is about one hundred words per minute in each direction on a circuit 1,000 miles in length with repeaters midway. The capacity of the Rowland printer worked octoplex would be about two hundred and eighty words per minute on a circuit of moderate length, say 250 miles. The Buckingham-Barclay printer is quite extensively used at present and has been shown to possess marked advantages over its predecessors in printing telegraphy, and as previously noted has supplanted quite largely the Wheatstone automatic system in this country. It is possible, however, that a critical analysis now under way of the respective merits of these systems as regards rapidity, reliability, accuracy, and economy of operation may disclose results somewhat favorable to the Wheatstone system. It is not unlikely that, for the handling of the increased business due to public appreciation of the night "letter-gram" service recently inaugurated by the large telegraph companies in this country, resort may be had to the Wheatstone system or to one or other of the freely available rapid automatic telegraph systems mentioned herein, or to others that may be developed. The merits of the Wheatstone system for service of this general nature have long been recognized in Europe especially in the British Postal Telegraph department where it has attained a speed of from four hundred to six hundred words per minute on the shorter circuits.

One notable advantage over printing telegraph systems possessed by the Wheatstone or other automatic systems, in which the received messages are translated by a copyist (in common with the Morse manual method, but not by any means to the same degree), is that signals mutilated in transmission that would be beyond recognition in the printed record, may often be deciphered correctly from the tape by an expert copyist. Another important advantage of the Wheatstone system is that its main line apparatus is adaptable

either to manual Morse or to high speed transmission by the simple movement of a small switch.

It must be noted, however, that the conditions now surrounding telegraph circuits (referred to elsewhere in this paper), such as high-tension inductive disturbance, and excessive retardation due to the presence of stretches of underground cable, were non-existent when the high speed automatic systems referred to were in practical operation, and these conditions, it may be anticipated, will reduce the speed efficiency in at least direct proportion to the sensitiveness of the respective systems. The night operation of such circuits, would, however, have the advantage of a minimum disturbance from parallel circuits, the exciting cause of which, except the stretches of underground cables, would be less in evidence. Unfortunately this does not apply to static inductive disturbances from adjacent high-potential transmission lines, which are in constant operation.

The Wright printer, due to Mr. John E. Wright, may be operated by ordinary typists unfamiliar with the Morse code as the transmitter is equipped with a standard typewriter keyboard which may be operated at typewriter speed, and the depression of a key of which selects a combination of positive and negative impulses, which, passing to line select a corresponding letter for printing at the distant receiving typewriter. The electro-mechanism of the transmitter prints a tell tale duplicate of the outgoing message in page form. The transmitting potential is 385 volts of each polarity. The line instrument is a polar relay of the duplex type that operates locally a magnet which in response to given combinations of incoming currents is designed to control the movements of a type-wheel, capable in operation of selecting and printing a given letter, of revolving around its axis, moving perpendicularly in the line of its axis, and laterally across the message blank at right angles to its axis, all of which movements are reversible. The receiving typewriter prints directly in message form the received telegram, the blanks being fed to the machine by an attendant who watches the copy during the printing to guard against errors. The disposition of the letters of the alphabet, the numerals and punctuation marks on the periphery of the type-wheel is such that in practice it is found that regardless of the position of the wheel any letter may be selected and printed with an average of three and one-half current impulses from the transmitter. The speed of this printer in operation on lines up to 300 miles in length is about forty words per minute in each direction.

(To be continued.)

There is much for telegraph operators to learn respecting their calling which can be readily obtained by reading *Telegraph and Telephone Age*—\$2 a year.

The Military Telegrapher in the Civil War.

PART XLIV.

Mr. D. Wilmot Smith, who was employed in telegraphic circles in New York and elsewhere in the fifties and sixties, was, during the latter part of the War, a member of the United States Military Telegraph Corps. A few years after the close of that conflict he went to Breckenridge, Minn., for the benefit of his health and lived there the remainder of his life. In 1878, writing from that point to Colonel William R. Plum, historian of the United States Military Telegraph Corps, he gave the following account of his military service. Mr. Ransom Phelps, whom he frequently mentions, in the story, is still living at Breckenridge.

"About the end of October, 1863, I received an invitation from the signal service to come to Washington and be examined for a commission in that branch of the army. On my arrival there I learned that it was proposed to try and have the military telegraph combined with the signal service and placed under its control and direction. It was proposed if I passed the examination that a number of operators throughout the country should be carefully selected, examined, commissioned and a military telegraph organized as part of the signal service. I had been telegraphing since 1850 and had, for several years, been superintendent of lines, had been engaged in construction work and was extensively acquainted with operators throughout the country. I was to receive the first commission, and thereupon begin the organization of the department and invite operators of known ability to join.

"Other interests had, up to this time, controlled the military telegraph system and it was to be expected they would not willingly loosen their grasp. I passed the examination and my commission received President Lincoln's signature and got as far as Secretary of War Stanton's office. But there it disappeared. The other interests had got wind of what was planned and as their officers at the war department were in close and confidential relations with Stanton no ingenuity of the signal officers was equal to getting that commission from his office. After waiting a few weeks, I became satisfied we were not going to take the military telegraph into the signal service, and, being tired of inaction while such stirring scenes were going on around me, I offered my services to the government and on December 12, 1863, I found myself on board the steamer 'Star of the South,' at Alexandria, Va., bound for Port Royal, near Charleston, S. C. The boat was loaded with army horses, the only passengers being Mr. J. R. Dunlap, another operator, and myself. On December 17, we anchored off Hilton Head, S. C. The small-pox had broken out among the hostlers in the hold, but Mr. Dunlap and myself were allowed to land. We had only time to reach the telegraph office, deliver our credentials and begin to congratulate ourselves upon our arrival when

a provost guard filed in with orders to return us to the steamer, a special tug being provided for that purpose. We went of course but hoped to be allowed to land again in a day or two, especially as the authorities had sent some twenty men from shore to the steamer to assist in unloading the horses and forage, the latter having been the bed for the small-pox patients. Horses, forage and stevedores were permitted to land, but Dunlap and myself were forbidden. The steamer was ordered to New York and a few days later, we were at quarantine in New York Bay off Staten Island. We were permitted to go to the city under orders to report daily for two weeks to a doctor there.

"While waiting thus, Captain L. F. Sheldon, who had charge of military telegraphs in the department of the south came to New York and made arrangements for Mr. Ransom Phelps and myself to go south on the Steamer 'Argo,' January 7, 1864, Captain Sheldon and Mr. Dunlap sailing on another vessel a few days earlier. On January 11, Mr. Phelps and myself landed at Hilton Head, Mr. Phelps was placed in charge of the Beaufort, S. C., office, and I was ordered to General Tenny's headquarters on Folly Island, off Charleston, where I remained until spring. Of the operators who were there at that time, I remember the names of Edward McGinty, A. Chamberlain, Paul Haven and Mortimer Andrews.

"The cable between the islands gave out and a new one was ordered from the north; before it arrived, however, I had repaired the old one. I buried the new cable, which was about a mile in length, in a moist spot on Folly Island, placing plank under, around and over it. I presume it is still there today as good as ever. I had a squad of soldiers detailed to do the work and as I was the only person beside the soldiers who knew where it was buried, it may lay there for ages, to ultimately be discovered and wondered over.

"The line running across Morris Island especially between Fort Wagner and Battery Gregg at the head of the island opposite Fort Sumter, was liable to be broken by the Confederate shells. I have known a shell to break off a pole while two of our repairers were fixing the wire at the top of adjacent poles and thus jerk the boys from their perches to the soft sand below. Battery Gregg was an extremely unpleasant station; it being nearest to Fort Sumter and so frequently pounding away at that stone pile, the Confederates paid it marked attention from their batteries and McGinty, who was operator there, had to spend a large portion of his time in the bomb proofs. My horse, which, in spite of unlimited oats, was such a marvellous combination of bone, arches and curves that his name, 'Gothic,' seemed peculiarly appropriate, was an old campaigner, who had fixed ideas of his own upon military proprieties, some of which caused me considerable dissatis-

faction. My duties frequently taking me the length of both islands, I rode upon the hard beach. Occasionally when so engaged the Confederate batteries would begin shelling. No amount of urging at such times could induce 'Gothic' to increase his speed above a dignified parade canter. If I insisted that discretion was the better part of valor and that we must get along at a faster gait, he would go through a series of gymnastics upon one spot with an agility that if expended in a direct line would have taken him out of danger. I was accordingly obliged to ride out of the storm at the pace he thought best for our reputation, my only consolation being that to others I must have appeared unnecessarily cool and indifferent. Toward spring I was taken ill with an attack of acute dysentery brought on by my exposure to malaria in repairing cables and other duties. I was taken to Beaufort, where, after being given up to die, the kind nursing of my kinsman and fellow operator, Mr. Ransom Phelps, caused me to rally and I was placed on a steamer accompanied by Mr. Phelps with the comforting assurance of the doctors that I would probably not live to reach the north.

"In May, when we reached New York, I was enabled to proceed to the Catskill Mountains, where I passed the summer and in the fall I entered the American Telegraph Company's office at 145 Broadway, New York. Mr. Phelps was also employed in the same office and when General Butler was sent to New York to take command during the presidential campaign preceding Lincoln's second election we were detailed to take charge of the telegraph at his headquarters at the Hoffman House. Being strongly prejudiced against the General, I tried hard to be exempted from this duty, but failed, and from being bitterly prejudiced against him, my opportunities for knowing and measuring him during that time made me an enthusiastic admirer of him many excellent personal traits of character, as well as his commanding ability.

"During this time my commission in the signal corps had been obtained from the war office and sent to me at Hilton Head, thence to New York. As I was satisfied the telegraph could not be incorporated with the signal service during the war and as I had no taste for an army officer's life, I returned the commission with thanks. My final connection with the war terminated with the impeachment trial of President Andrew Jackson. Mr. Phelps was detailed as an operator in the senate gallery during that trial and I having left the service, attended the same as a spectator."

Andrew Carnegie's First Employment in the Telegraph Service.

It is surprising how many people were responsible for the success of some of our captains of industry. Every month or two we receive marked copies of some publication announcing the death of someone who gave Andrew Carnegie

his start in life. The latest of these stories reads as follows:

"Robert Irwin, who gave Andrew Carnegie his first job as a telegraph messenger boy more than fifty years ago, died July 9, at his home in Pittsburgh, in his eighty-eighth year. He encouraged young Carnegie to learn to be an operator, and watched the rise of the young man to high railroad positions before entering the steel and oil business."

As we had never before heard of Mr. Irwin in this connection we made a careful investigation to learn if this item was correct. In response to our inquiry Colonel William Bender Wilson, of Holmesburg, Philadelphia, Pa., has given us the following statement in regard to Mr. Carnegie's first employment in the telegraph service:

"I was familiar with the Pittsburgh operators as far back as 1852, and never even heard of Mr. Irwin. He may have had some subordinate position in the office, however. Reid doesn't mention him in his history. The late David Brooks, who was manager of the office in 1849, when Carnegie entered as messenger, was fond of telling the story that one night he was playing checkers with Carnegie's father when the subject of the boy's future came up, and he suggested a telegraphic career and offered to enter him in the service as messenger. Mr. Carnegie accepted the offer, and the next day Andrew reported and Mr. Brooks placed him at work. In these later days when Andrew Carnegie is one of our foremost citizens, it is astonishing how many sponsors for him are turning up in the face of the fact that he was his own sponsor and won his successes by the force of his own character; and would have won them if he had never carried messages as a boy."

A Telautograph Exchange.

What is claimed to be the first telewriter or telautograph exchange in the world was placed in service in London on July 1. At present about fifty subscribers are connected, but facilities have been provided for seven hundred and fifty. At the central office a switchboard similar to a telephone switchboard is provided and connection is made in the same manner as on a telephone board, the subscriber telling the operator the number desired by means of a telephone, which operates over the same line as the telautograph. An important feature of the system used is that messages may be delivered in the absence of the addressee and read on his return. The paper is automatically fed forward so that any number of messages may be written during the subscriber's absence. Arrangements have been made whereby subscribers of this system may send their telegrams to the central telegraph office by this means.

"Pocket Edition of Diagrams," etc., the latest revised edition, 334 pages and 160 illustrations, published by Telegraph & Telephone Age, contains just the information every telegrapher requires.

Recent Developments in Telegraphy and Telephony.*

BY SIR JOHN GAVEY, C.B.

We may select the ordinary Morse circuit as our starting point. With the simple form of this circuit the speed of working is limited by the skill of the operator, and rarely exceeds thirty words a minute. For many years this simple form of apparatus or its equivalents served the requirements of most countries, but as the telegraph service grew and the traffic rendered it imperative to erect long lines directly connecting distant cities, the problem of obtaining a greater revenue from the large capital expenditure involved became pressing, and progress was made broadly on three distinct lines of development. In the first, means were designed for the transmission of several messages simultaneously over the same conductor; in the second, the use of suitable mechanical and electrical devices, the actual speed of transmission was raised in overhead wires to ten or twelve times that possible by manual operating, and, finally, type printing and writing systems were invented with varying degrees of success.

SIMULTANEOUS TRANSMISSION.

In the duplex system, which admits of the simultaneous transmission of two messages in opposite directions over the same wire, at each end of the circuit is a differential receiver which comprises two equally-balanced electromagnetic coils, one of which is connected at its further end to the line wire and the other to an artificial line, which, in its electrical resistance and capacity, is as nearly as possible the equivalent to the actual line. The two inner ends of the magnet coils are connected together, so that when a current is sent from the point of junction it divides equally between the actual and the artificial lines, and the magnetic effect of one coil being neutralized by the magnetic effect of the other, the signals originating at either end pass through the home apparatus without affecting it. At the far end, however, the current passes through one coil alone of the receiving apparatus and the signal is recorded. When both keys are depressed simultaneously, if the batteries are so connected that they aid each other, then the current which circulates through the line wire and through both of the magnet coils connected thereto is doubled; but as the current which circulates through the magnet coils at each station connected to the respective artificial lines is unaltered a signal is recorded, because the balance at either end is destroyed by the action of the other operator.

The transition from duplex to quadruplex working—viz., the sending of four messages simultaneously over one wire—involved but a step. A single current key is connected to a powerful battery which is intended to work a non-polarized magnet, but the connections are led through a

reversing key, which latter is designed to actuate a polarized magnet. When the single-current key is depressed the powerful current that circulates through the apparatus actuates the non-polarized relay at the far end, leaving the polarized relay unmoved. When the reversing key alone is depressed, a weak current circulates which actuates the polarized magnet, but is too weak to act on the non-polarized instrument. If both are depressed simultaneously the powerful current from the single current key is reversed by the depression of the double-key, and both instruments at the far end are affected. The receiving apparatus at each end is arranged differently, as in the duplex system, so that the outgoing currents have no effect on either of the receivers at the home end. This arrangement admits of four operators sending four messages simultaneously over one wire.

Another method, based on entirely different principles, which in theory admits of sending as many as twelve simultaneous messages in one direction, or double that number if duplexed, depends on the superposition of musical vibrations on a telegraphic circuit at one end of a line. To effect this result a number of electrically-driven tuning forks, arranged to vibrate at different frequencies, are connected through telegraphic keys to a line wire, so that on depressing any one key a series of electrical vibrations of the frequency of its companion tuning fork are sent through the line. At the far end the receivers are of a type that will respond to musical vibrations only, and each receiver is constructed or adjusted to respond to the vibrations of one of the distant tuning forks alone and to no others. This system originated in America, but it has been developed and improved by Mercadier, in France, where it is said to have given good results recently. In the modern apparatus the receivers consist of so-called mono-telephones, each of which is so made and adjusted as to respond to only one frequency.

A method of multiplex telegraphy, based on entirely different principles, is the following: A large number of insulated metallic segments are arranged in a circle at each end of the line and divided into groups, say, of eight each. No. 1 of the first group is metallically connected with No. 1 of all the other groups, and, through the transmitting key, with No. 1 instrument, No. 2 with No. 2 series of contacts and instruments, and so on. Centrally-pivoted arms, provided with metallic brushes which ride over the segments, are joined one to each extremity of the line wire, and it is obvious that if both these arms, starting simultaneously from No. 1, revolve at precisely the same speed, then each segment with its instrument at one end is for a brief period placed in connection with its corresponding segment of the instrument at the distant end. If the sending key of No. 1 instrument is depressed, a brief current is transmitted to its corresponding instrument when the revolving arm reaches No. 1 contact of any group.

* Abstract from a lecture delivered before the Institution of Civil Engineers, London.

to be repeated when the arm reaches No. 1 of the next group, and so on throughout the series. Instead, therefore, of a dot being represented by a single current of continuous duration, it is replaced by three or four shorter impulses spread over the same period of time, and a dash by three times the number of impulses. By this means it is possible, under favorable conditions, to transmit eight messages simultaneously over one wire. This system, invented by Delany, was developed to some extent in this country, but owing to various causes it has recently been abandoned. It is, however, referred to here as the principle of revolving commutators is in use in other forms of apparatus to be dealt with later. The second method of increasing the output of telegraphic wires is the automatic or machine-transmitting instrument, which is typified by the Wheatstone apparatus adopted and perfected by the Post Office in Great Britain. In all instruments of this character a long paper ribbon is perforated by a suitable machine in an arbitrary manner, and the transmitting and receiving apparatus is so designed as to transcribe these perforations at the distant end into Morse signals, into similar perforations, into type printed messages, or even into written characters.

There are three rows of perforations in the tape, or slip, of the Wheatstone system. The centre row is continuous, as it is used for drawing the slip through the transmitter at the speed at which the latter is running, the upper and lower holes cause the transmitting key to send electrical signals, dots when these rows are vertical, dashes when diagonal. The actual apparatus which effects this object is comparatively simple. Two small vertical plungers, to which an up-and-down motion is imparted by the clockwork of the apparatus, are pivoted to two bent levers connected by horizontal rods with a small vertical transmitting key, which in one position sends a positive and in the other a negative current to line. When no slip is in the machine, the plungers as they rise and fall move the key to and fro and send reversals, which are received as dots at the far end. When the slip is inserted, if the plungers meet a series of vertical perforations they pass through at each movement and dots are still transmitted, but if they meet diagonal perforations the movements of the plungers are arrested by the unperforated portion of the paper slip, and the transmitting key is not drawn back until one of the plungers enters the lower diagonal hole of the slip, and withdraws the key from its sending position, thus recording a dash.

This Wheatstone system has been very fully developed in the United Kingdom. It is capable of dealing with traffic at a maximum rate of 450 words per minute, and it is invaluable for the transmission of news. Thus, in the central office in London, items of news may have to be transmitted to 50 or more towns simultaneously. Cir-

cuits are made up for news transmission, each providing for a number of towns, some of the circuits being of a permanent character and some formed temporarily to meet special requirements. As many as eight Wheatstone slips can be punched simultaneously in one operation, and each length of slip is run through the necessary transmitters at the highest speed considered judicious.

For ordinary public message traffic, on lines of moderate length, where each individual message is short, the Wheatstone has certain disadvantages—namely, the initial delay in perforating the slip, its distribution, and finally the re-distribution of the received slip among the writing telegraphers; for it is obvious that at the high speed at which Wheatstone is worked several operators are required at each end of the line to keep pace with the apparatus. In practice in this country, for circuits of moderate length, it is generally considered preferable to provide direct Morse apparatus worked simplex, duplex or quadruplex as circumstances may dictate.

With overhead lines the limit of speed in automatic working is that imposed by the receiving apparatus, which, owing to its self-induction, obstructs the reception of Morse signals at a higher speed than that named. This difficulty has been overcome by substituting a chemical for an electromagnetic receiver. In this form the current at the received end passes through a long paper ribbon saturated with a solution which is decomposed by a positive current. The Morse signals appear in blue lines on the received slip. It is said that with this method a maximum speed of 1,000 to 1,200 words is possible under favorable conditions, but the difficulty in working at such high speeds, where characters are received in Morse code, and have to be transcribed manually, is the division and distribution of the slips among the large number of writers necessary to keep abreast of the work, the precautions needed to avoid loss of messages, the injurious effect of brief contacts caused by workmen which result in the loss of several words, and last, but not least, the difficulty and delay in obtaining repetitions where errors, false signals or missing words render this necessary.

All the foregoing methods increase the carrying capacity of the wires; in other words, they reduce the capital expenditure per message, but none of these increase the output per operator, nor do they diminish the working cost in the instrument room; in fact, with high-speed automatic transmission this cost may be higher than with other methods described. The initial preparation of the transmitting slip will always, of course, be necessary in all automatic systems; but inventors have turned their attention to increasing the speed and reducing the cost of transcription at the received end, in the case of manual as well as automatic sending, by the substitution of typing apparatus worked mechanically or electrically for the manual

transcription. One of the earliest of such instruments, which has met with permanent success, and by means of which a very large proportion of the work in Europe, and nearly the whole of the trans-Continental work, is dealt with, is the well-known Hughes type-printing instrument. This consists of a disc, on the periphery of which are embossed the letters of the alphabet, numbers and other signals that have to be transmitted; a piano-like keyboard and a horizontal plate with a series of slots arranged in a circle. Enclosed in each of these slots, and connected with one of the sending keys, is a movable plunger, which is raised when the key is depressed, but which normally lies flush with the surface of the plate. An arm carried on a vertical shaft in the centre of the plate is caused to revolve above it by the motive power which drives the instrument, and when a key is depressed this arm is arrested momentarily by the protruding plunger, and a current is sent to the distant station. The printing disc and the revolving arms at both sending and receiving stations move in unison, this being effected mainly by the action of a governor, any slight want of coincidence being corrected mechanically each time a letter is printed.

The Hughes method of transmission has many advantages. It provides a clearly-typed message for delivery instead of a written one; it removes a possible source of error in transcription, and it increases the speed of working as compared with Morse by about twenty-five per cent. It can be duplexed, and it is used by the Post Office on all its Continental wires. It has, however, the disadvantage that a considerable interval of time elapses between the transmission of two consecutive signals, owing to the revolving arm having to traverse all the intervening letters. Baudot has obviated this waste of time by adopting the multiple system of telegraphy. He entirely abandons the Hughes method of transmission, and forms an arbitrary signal code, in which, by means of five consecutive currents, some plus some minus, in combination, he represents each letter of the alphabet, figures and other signals. By his method he can provide four or six channels simultaneously on one wire, each being worked manually. The translation of these arbitrary code signals into printed letters is effected in the following very ingenious manner: At each receiving instrument two discs, firmly fastened together, have on their peripheries a series of serrations, corresponding with the arbitrary code, which, in certain defined positions, represent the various letters of the alphabet. Riding on the periphery of one of them are five levers termed selectors, each of these levers being so pivoted as to be susceptible of a slight to-and-fro movement on its axle, and also of a transverse movement in the line of the axle. When all the electromagnets have their armatures raised the selectors rest on the inner disc, but if a certain number of the armatures are depressed, then, through the action of intermediate levers, the

corresponding selectors are shifted to the second disc. As the two discs revolve together the combined selectors at some point drop simultaneously, and for a brief interval, into the series of serrations which correspond with the letter code signaled from the far end, and this movement and the rapid jerk out of the serrations as the discs revolve cause the letter to be printed from a type wheel which revolves at the same speed as the discs. The uniform revolution of the contact arms, the coded discs and the type wheels is maintained by a clever adaptation of governors and brakes, partly electrical, partly mechanical. The Baudot system admits of the transmission of a much larger number of messages over each wire than the Hughes. It is also more flexible, inasmuch as the various channels it provides can be divided among an equal number of towns. It is largely used in France and has been introduced into this country.

Murray has devised a system which has undergone lengthy trials both at home and abroad. His slip has one row of perforations which gears into the moving mechanism of the transmitter, and below this a second series of perforations which represent his artificial signaling code, which is of the Baudot type. The transmitting and receiving apparatus are arranged to run synchronously. When the vertical plunger of the transmitter passes through a perforation a positive current is sent over the circuit, and when the plunger is stopped by the paper a negative current circulates. The result at the receiving apparatus is that an exact counterpart of the transmitted slip with its perforations is reproduced, and this perforated slip is passed through and actuates an automatic typewriter which prints the message. The typing machine is fitted with five horizontal plungers, which are prolongations of an equal number of slotted combs, to which in action a to-and-fro motion is imparted. The perforated slip acts on the principle of the Jacquard loom, and when at a given moment a series of perforations appear the corresponding plungers move forward and the remainder are arrested by the unperforated part of the paper. The slotted combs are at the moment so grouped that the one letter indicated by the code is actuated by the controlling motive power, and it is accordingly printed, and the combs restored to their normal position, ready for the next letter. The message is typed in page form.

(To be continued.)

"The Practical Management of Dynamos and Motors," by F. B. Crocker and S. S. Wheeler, as indicated by its title, affords a clear understanding of the use, care and operation of these important adjuncts of the well equipped modern telegraph office. There is a constant demand for this book, for telegraphers find it an invaluable addition to their working library. There are 206 pages, and 99 illustrations; price, \$1. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Train Despatching in the Philippines.

Good things developed to improve railroad service in the United States soon travel far beyond these shores. The telegraph discovered and improved in this country now is found almost wherever civilized men are found. The latest device for handling the movement of trains, the telephone, has been developed gradually in this country until now its perfection is realized by all railroad men and it is being adopted as fast as circumstances will permit.



Despatcher's Office, Philippine Railway, Iloilo.

In preparing for the handling of trains on the newly built Panay Island division of the Philippine Railroad, the telephone was installed along with other modern railway equipment. The despatcher has a call box and Sandwich selectors are used at the sub-stations. This road has an advantage over American roads in that one wire only is needed for the telephone. There is no disturb-

this division. The island is only partially developed for agriculture. The natives are still content to load an ox cart, climb in, light a cigarette, go to sleep and let the oxen do as they please, advance probably a mile in half a day, rather than pay the charges or go to the trouble of loading their freight on the trains.

The villages consist of native huts with thatched roofs, built on stilts three feet above ground. The best, and in fact the only house in many villages is the depot, which is also the agent's residence. The design is of the American bungalow type, with windows of small squares of pearl instead of glass—this is in order to keep out the sun and make the interior as cool as possible. To look out it is only necessary to slide the window open. It would seem strange to a despatcher in the United States to have no view of the track from the operator's chair.

Many natives speak English, hence they can qualify as operators.



Section Houses, Philippine Railway.

The telephone service has proven very satisfactory, and an extension of the line will make on this division a total of eighty miles with sixteen stations, the despatcher being at the south end, Iloilo, which is division headquarters.

Mr. L. G. Jackson, trainmaster, has furnished us with this interesting information regarding the line. He has become quite a "joy rider" with a gasoline speeder.

In whatever direction they turn telegraph officials seem to find trouble. The government prosecutes the companies for supplying alleged bucket shops with wires. As soon as the wire service is cut off those concerns turn around and sue the company which furnished the service and the courts compel the company to restore the connection. At the time of the Jeffries-Johnson prize fight, it was decided that it would be best not to furnish bulletins of the progress of the fight. Now the companies have to defend suits brought against them by newspapers for failure to supply those bulletins.



Sub-station Philippine Railway, Iloilo.

ing element to make two transposed wires necessary, no telegraph or electric light, and the earth currents are so slight that this grounded line is as quiet as our best transposed metallic lines.

Passenger travel forms the heaviest traffic on



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Insulated Wires and Cables

KERITE has back of it an unequalled record of half a century of successful service under the most adverse conditions. It improves instead of deteriorating with age.

Efficiency and safety in electrical installations depend chiefly on insulation. For fifty years KERITE insulation has been the standard of excellence.

Results count. KERITE wires and cables installed half a century ago are in service to-day. The wonderful durability of KERITE insures the highest safety and economy.

Initial tests determine the properties of an insulation only at the time they are made. They do not determine how well it will do its work years afterward.

The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

Experience of others should be useful to you. Insure your service by using KERITE.

KERITE INSULATED WIRE AND CABLE COMPANY

INCORPORATED BY W. R. BRIKEY

Sole Manufacturer

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Western Representative

WATSON INSULATED WIRE CO.

Railway Exchange, CHICAGO, ILL.



The Railroad.

The installation of telephone despatching equipment on the Great Northern Railroad has progressed to such an extent that trains are now handled by telephone from St. Paul to Seattle. Mr. E. J. Little is superintendent of telegraph.

The Continental Telegraph Company, which is the telegraph department of the Chicago, Milwaukee and St. Paul and the Chicago, Milwaukee and Puget Sound Railways now has 130 offices open for commercial business along the line of the latter road.

Mr. U. J. Fry, superintendent of telegraph of the Chicago Milwaukee and St. Paul and of the Chicago Milwaukee and Puget Sound Railways, Milwaukee, accompanied by Mr. A. C. Adams, chief clerk in his department, was a recent New York business visitor.

The Missouri, Kansas and Texas Railroad is installing a telephone despatching circuit on its Trinity division between Trinity and Colmesneil, Texas, a distance of sixty-six miles. This is the first telephone circuit to be installed on the "Katy" system.

The superintendents of telegraph who attended the Los Angeles convention have returned to their duties much pleased with the results of that gathering. Many of them are already introducing improvements in their services as a result of information which they obtained from the papers read and the discussions which followed.

Ira G. Rawn, president of the Monon Railroad, died July 20, aged fifty-five years. He entered the railway service in 1870 as a telegraph operator on what is now part of the Big Four system. He afterward became despatcher and trainmaster on the same road. Previous to becoming president of the Monon last November he had served as assistant general manager, general manager and vice-president of the Illinois Central.

L. M. Jones, Superintendent of Telegraph, Santa Fe Railroad.

Mr. Luther M. Jones, whose appointment as superintendent of telegraph of the Atchison, Topeka and Santa Fe Railroad, was announced briefly in our July 16 issue, has been connected with the telegraph department of that system for the past twenty years. He was born at Creighton, Mo., January 23, 1870. His first employment in the railroad service was as station agent's helper at his birthplace in 1888. He soon qualified as an operator, his first appointment as such being in August, 1888, at Columbus, Kan., on the Kansas City, Fort Scott and Memphis Railway, now a part of the St. Louis and San Francisco system. In November, 1890, he transferred his services to the Santa Fe as operator at Neosho Rapids, Kansas. He next went to the despatcher's office at Arkansas City, Kansas, remaining there until April 30, 1891, at which time he accepted an appointment as a clerk in the office of the superintendent of telegraph at Topeka. Ambli-

tious to qualify and master the larger problems in the development of the telegraph and telephone service he acquired a thorough knowledge of technical telegraph and telephone engineering. He became chief clerk in the office four years later, and was appointed assistant superintendent



L. M. JONES,
Superintendent of Telegraph of the Atchison, Topeka and Santa Fe Railroad, Topeka, Kan.

of telegraph of the entire system in August, 1902, which position he has filled with ability and credit. His close touch with the details of the service, his wide experience and knowledge of the system qualifies him for the larger duties he now assumes.

That Mr. Jones has been a valuable assistant to Mr. C. H. Gaunt, who now retires, in building up one of the greatest railroad systems of telegraph and telephone service in the world is recognized by all, particularly by the management in selecting him to carry out the further improvements and development of the Atchison property.

Mr. E. A. Smith Honored.

Edgar A. Smith, assistant superintendent of the Fitchburg division of the Boston and Maine railroad and a well known old time telegrapher, was the guest of honor at a dinner given at Boston, July 12, to mark the forty-fifth anniversary of his entering the railroad service. Forty-five of his friends, railroad men and others, were present, C. E. Lee, general superintendent of the Boston and Maine, acted as toastmaster of the occasion.

F. O. Melcher, vice-president of the Chicago, Rock Island and Pacific railroad, formerly superintendent of the Fitchburg division of the Boston and Maine, was the first speaker and told in glowing terms of his years of association with Mr. Smith.

He was followed by George W. Bishop, railroad commissioner, who, in former years, served with Mr. Smith on the old Vermont and Massachusetts railroad. He described Mr. Smith's gradual rise

from his first position as telegrapher at Athol on that road.

Mr. Smith, he said, became in turn the Fitchburg telegrapher, clerk to the superintendent and train despatcher. After the Vermont and Massachusetts was absorbed by the Boston and Fitchburg he became chief train despatcher, superintendent of telegraphs and passenger trainmaster. In 1909, when the road was leased by the Boston and Maine, he was made assistant superintendent of the Fitchburg division.

Others who spoke in praise of Mr. Smith were Albert W. Martin, superintendent of the terminal division of the New York, New Haven and Hartford railroad; A. S. Cheever, superintendent of the Fitchburg division, and J. F. Chevalier. Telegrams of congratulation were read from C. N. Chevalier, purchasing agent of the Fitchburg division and C. A. Goodenow, assistant to the president of the Chicago, Milwaukee and St. Paul railroad, who was taught telegraphy by Mr. Smith.

Mr. Smith replied to the many congratulations in a well turned speech of thanks, and at the conclusion of the dinner was presented a gold watch by Mr. Lee in the name of his friends present.

The company was composed largely of officials of the Boston and Maine. In addition to those already named, there were present H. E. Folsom, superintendent of the Passumpsic division; W. F. Ray, superintendent of the Concord division; William Merritt, superintendent of the Portland division; G. L. R. French, superintendent of the terminal division; C. M. Burt, general passenger agent; S. A. D. Forristall, superintendent of telegraph of the Boston and Maine, and L. C. Todd, master mechanic. Others were County Commissioner E. B. Blake, of Greenfield, George Blodgett and F. C. Mayo, of St. Johnsbury, Vt., G. W. Cree of Lyndonville, Vt., F. C. Parby, John F. Muldoon and I. W. Copeland, manager of the Western Union Telegraph Company, Troy, N. Y.

Canadian Notes.

Mr. J. T. Phelan, superintendent of the Northern British Columbia and Yukon government telegraph service, has returned to his headquarters at Vancouver after an extended trip of inspection through a part of his territory where he has been locating a route for some new lines which will give telegraph service to a large district not reached at present. Mr. Phelan reports extensive growth in the business in his territory as the population is increasing very rapidly.

The differences between the Canadian Pacific Railway and its commercial operators have been settled by a Board of Conciliation. The majority of the telegraphers receive an increase of from five to ten dollars per month. The Company was represented before the Board of Conciliation by Messrs. J. Kent, manager of telegraphs; W. J. Camp, electrical engineer; B. S. Jenkins, general superintendent of western lines; J. F. Richardson, superinten-

dent eastern division, and W. Marshall, superintendent Ontario division. The operators were represented by Messrs. Konenkamp, Hill, Haralson, Mackay and Mergens. It is provided in the agreement that right of promotion is to be governed by merit and ability. In case of reduction of staff, the junior telegrapher will be dispensed with. Any telegrapher in good standing laid off in staff reduction is to be given preference.

If a telegrapher is taken off his work for any cause, he shall have the right of appeal to the general officers of the company. Current rules regarding holidays will continue. Where four or more telegraphers are employed, except repeater offices, nine hours shall constitute straight day duty, eight and one-half hours early morning duty, commencing between six and eight, seven and one-half hours early night duty, seven hours late night duty. At repeater stations nine hours shall constitute day duty; seven all night duty. The average minimum performance is to be thirty messages per hour, allowing thirty words to the average message. A long schedule of wages gives the prevailing and the new rates at each division from coast to coast. For Montreal the new rates are as follows:

- 15 per cent. of employees, \$85.
- 10 per cent. of employees, \$80.
- 15 per cent. of employees, \$75.
- 15 per cent. of employees, \$70.
- 10 per cent. of employees, \$65.
- 10 per cent. of employees, \$60.
- 5 per cent. of employees, \$55.
- 20 per cent. optional with the company.

Similar schedules are in force in other cities, the maximum figure at Vancouver, Calgary and Winnipeg being \$95, at Winnipeg station \$90, and at Toronto \$85. Managers, chiefs and assistants are not scheduled, but are taken care of individually by the company.

In other cities and towns there is a corresponding increase, averaging about \$5 per month. All telegraphers now employed in Vancouver, Calgary, Winnipeg, Toronto and Montreal shall receive an increase of not less than \$5 per month. This does not apply to those entering the service since June 30, 1910. The schedule is to remain in force for one year, and thereafter is subject to thirty days' notice from either party. The board was composed of Mr. F. H. McGuigan, for the company, Mr. D. Campbell, for the men, and Mr. J. E. Duval, chairman.

The Telepost Company has extended its system from Indianapolis to Louisville, and opened an office at the latter place.

According to their latest annual report the Indian government telegraph system now comprises 69,708 miles of line and 277,731 miles of wire. The number of messages handled during the year was 13,000,000 and gross receipts were about \$4,200,000, and net earnings \$450,000.

Radio-Telegraphy.

A wireless station having a range of 400 miles has been established at Durban. This is said to be the first wireless station in South Africa.

There are now nine wireless telegraph stations established in India in connection with the government telegraph system.

It is reported that the Russian Government is preparing to erect wireless stations at Libau, on an island in the Gulf of Riga and at the mouth of the Dwina River.

According to consular reports from Singapore steamship companies in the far east are equipping many of their vessels with wireless apparatus. The chief drawback to its more rapid extension seems to be the lack of shore stations.

Dr. Lee De Forest, while in Los Angeles, recently making preparations for establishing a wireless telegraph and telephone station in that city delivered an interesting address on the wireless telephone and telegraph before the Los Angeles Y. M. C. A.

Experiments with wireless telegraphy from an aeroplane have been in progress for some time at Fort Sam Houston, Tex. These experiments have been carried on by the army authorities, and have been under the direction of Lieutenant B. D. Foulois.

Poulsen wireless telegraph stations have been established at San Francisco, Stockton and Sacramento, Cal., and plans are under way for establishing similar stations at Seattle, Portland, Tacoma, Spokane, Eureka, Los Angeles and Fresno. During recent tests messages were received simultaneously at the San Francisco station from Stockton and Sacramento.

Preparatory to enforcing the Frye wireless bill recently passed by Congress the Bureau of Navigation has directed the collectors of customs to furnish a list of all vessels to which the act is applicable. At the same time they are to give particulars regarding those already equipped with wireless apparatus as to the system used, wave length, range, power, call letter, etc. It is estimated that about sixty per cent. of all vessels subject to the provisions of this act already have wireless installations.

The latest wireless plans of the Navy department call for the erection of four steel towers at Washington for wireless masts. These towers are to be four hundred feet high and will be located on the highest ground available in the District of Columbia. This scheme is now favored instead of the original plan of building one tower six hundred feet high. As a result of the exhaustive tests which have been conducted during the past year it is believed that with the apparatus which will be installed in the proposed station communication will be possible in the daytime with ships 1500 miles away and at night 3000 miles distant.

The Marconi Wireless Telegraph Company is installing wireless telegraph stations in both the New York and Philadelphia stores of John Wanamaker. When completed, it is announced, these stations will be opened to the public for commercial use for the transmission and reception of messages to and from ships at sea.

A bill has been introduced in the British House of Commons compelling all passenger vessels sailing from English ports to be equipped with wireless apparatus, capable of receiving and transmitting a distance of one hundred miles. A penalty of \$5,000 is provided for failure to comply with the law.

Book Review.

"Telegraphy for Beginners" by Willis H. Jones (Spon and Chamberlain, New York, 64 pages, 19 illustrations) is the latest addition to our literature on this subject. This is intended as a practical instruction book for beginners in learning the art of telegraphy or in wireless telegraphy. Among the subjects considered are: Introductory remarks and practical advice, order of study outlined, important rules to observe; the Morse alphabet and other characters; signals and abbreviations; examples of sporting events and market reports in tabulated form; the student's outfit and practice circuit; adjusting the instruments and putting up a line between two stations. The price of this book in cloth covers is 50 cents and in paper covers 25 cents. Copies will be sent to any address on receipt of price by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

A Secret Telegraph System.

Mr. Walter P. Phillips, of Bridgeport, Conn., has recently been granted a patent, No. 963,062 for a secret telegraph system. This is designed to enable an operator to receive a message transmitted in Morse and prevent any one else from overhearing the same. To accomplish this a telephone receiver is placed in parallel with the sounder or relay and one stop or contact of that instrument is made silent by substituting a stop of rubber or other suitable material, thus mutilating the signals. A switch is provided for cutting the telephone receiver out when not in use. When a station is called the operator can recognize his call, even though the signals are mutilated. He then throws his switch, cuts in the telephone receiver, cuts out the sounder and receives the message.

Mr. W. T. Salisbury, manager of the Postal Telegraph-Cable Company of Texas, Ardmore, Texas, in writing to one of his officials regarding this paper states: "I have read Telegraph and Telephone Age for a number of years and I get lots of horse sense from its editorials and much information from its columns that I consider beneficial to myself and perhaps to the service."

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Mavor and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XI.

Can maximum efficiency be obtained from a quadruplex by balancing in the same manner as the polar duplex?

What influence aside from the period of "no magnetism interferes with the evenness of the incoming signals produced by the distant battery?

How may this influence be produced?

How can this inequality of magnetic strength in the two coils of the neutral relay be overcome?

What is the objection to this method of compensating for such irregularities?

What are the successive steps to be taken in balancing a quadruplex set according to the method outlined by Mr. W. H. Jones?

What is a good guide to follow in adjusting contact points of transmitting apparatus?

What is the proper adjustment for armature springs?

What special precaution should be observed in adjusting the spring on a pole changer?

CHAPTER XII.

What are some of the troubles which multiplex apparatus is subject to?

What general test should be made in each case in adjusting for these troubles to determine that a satisfactory adjustment has been reached?

How may a polar duplex set which has apparently been balanced correctly fail to work properly under actual operating conditions?

What is the best position for the relay contact points when adjusting to eliminate the static kick?

Why is this the severest test that can be made?

Why will the sound of the kick disappear with a less amount of the static eliminated when the lever rests on the back stop than when on the contact point?

What is the effect of giving the relay armature a bias?

When this is done what are the conditions under which the apparatus is usually expected to operate?

Obituary.

Herbert R. Sackett, a member of the United States Military Telegraph Corps, died at Columbus, Ohio, July 3.

John A. Gross, for many years an employe of the Washington Bureau of the Associated Press, died in that city, July 19, aged fifty-seven years.

Alois Wirsching, an inventor of many electrical devices, including stock quotation telegraph and fire alarm telegraph apparatus, died in Brooklyn, July 14, aged seventy-nine years.

John Petry, Jr., formerly connected with the Western Union Telegraph Company and recently with the New York, New Haven and Hartford Railroad, died June 23 at his home in New York, aged thirty-eight years.

Robert H. Roland, manager of the general telegraph department of the Southern Railway at Washington, D. C., died in that city, June 5, aged thirty years. Mr. Roland entered the telegraph service of the Pennsylvania Railroad in 1896, and has been employed by the Southern Railway since 1903.

Trade Notes.

What is said to be the largest order for railway telephone selectors ever reported has just been placed by the Atchison, Topeka and Santa Fe Railroad with the Western Electric Company.

The order calls for over 600 of the new selectors recently developed by Western Electric engineers.

Mr. J. C. Murray, sales engineer of the Kellogg Switchboard and Supply Company, has left on a six months' business extension trip in South America. Mr. Murray expects to visit Kellogg Company, customers, agents and friends in all the more important cities, stopping at Bahia, Rio de Janeiro, Sao Paulo, Montevideo, Buenos Ayres, Santiago, Lima, Colon and other cities. Mr. Murray is a practical telephone man of long experience and is at the service of operating companies for information, specifications, etc. Mr. Murray has with him complete apparatus, samples and literature, including a Spanish bulletin, which describes in Spanish and illustrates clearly the various types of apparatus. He will push the sale of his company's railroad telephones and dispatching systems, mining telephones and special equipment.

French Cable Employees Outing.

The French Cable Company Employees' Association held its fourth annual outing at Witzels' Grove, College Point, L. I., July 10. A special boat left for the grounds at 9 a. m. and after breakfast had been served a baseball game was played by teams representing the clerks and the messengers, respectively. The clerks won by a score of 16 to 5. Following this there were numerous races. Mr. Louis A. Lurienne, manager of the company at New York, was honorary president of the day. The arrangement committee consisted of F. J. Sherry, chairman; P. N. Farissy, C. Limbrick, N. Weiss, S. Desnouee and J. Standinger. Judges of the athletic events were E. C. Sweeney, C. A. Ronne and C. E. Shafer. Races were won by Messrs.

Sullivan, Gallagher, Kane, Ture, Peterson, Diejnon, Storigois, Chambert, Lavoissiere, Brooks and Fox.

At the conclusion of the athletic program dinner was served and the party returned to New York in the evening, after a most enjoyable day.

Some Old Time Reminiscence.

Mr. James F. Gormley, who was a prominent printing telegrapher as long ago as in the early fifties, contributes the following details of telegraphic history in addition to the articles which he has written previously and which we published two years ago. Mr. Gormley, after over fifty years spent in the service, is now living in retirement at Boston.

"When I was in the Springfield, Mass., office with Mr. George B. Prescott as manager, he and I worked the principal circuit, namely, the New York main wire. The arrangement was that Mr. Prescott took charge of the wire at 8 a.m. on weekday mornings and I came on and relieved him at noon to allow him to go to dinner. At 5.30 I took charge until 'goodnight.'

"When James N. Ashley came to Springfield from Boston, he attended to A. A. Lovett's duties when that gentleman, who was superintendent, was absent from the city on other business. Mr. Lovett's office adjoined the operating room on the third floor of the Western Railroad building. Hartford, New Haven, Bridgeport and Port Chester, would transact their business with Springfield on the way wire. At New Haven, a Mr. Webster was manager and John B. Oltman, a young man from New York, was assistant. Mr. Oltman later returned to Gotham, acquired wealth and became a member of the Stock Exchange. He died about ten years ago. He was receiving clerk for a while after he went back to New York, and was later appointed receiver of the Franklin Telegraph Company, winding up the affairs of that concern. When the wire over the Western Railroad was constructed, offices were opened at Westfield, Chester and Pittsfield, from thence the line went to Chatham Four Corners, East Albany, Troy and thence to Albany.

"A branch line was run along the Housatonic Railroad to Great Barrington and that place produced three great electrical students and prominent figures in the telegraph field, the Pope brothers, Frank L., Henry W. and Ralph W. Before the line was built to Albany all western business from the East was sent to New York City and turned over to the House Buffalo line until the latter was consolidated with the New York, Albany and Buffalo Company. When the line was finished from Springfield to Troy and Albany, the western business was sent via that route and I went to Troy and afterwards to Albany. When Mr. James D. Reid, who was a very religious man, was superintendent, the offices of his company were not permitted to be opened on Sundays.

"After I left Albany Superintendent Lovett made me useful in Boston and vicinity as relief operator. I later went to New York. At this time there were in that city the National and Magnetic companies both running to New Orleans, but by different routes. The National went from New York to Philadelphia, Pittsburg, Cincinnati and Louisville and thence to New Orleans. The Magnetic ran from New York to Philadelphia, Baltimore, Washington, Richmond, through the Carolinas, and so on to New Orleans. I next found employment on the New York and Washington printing telegraph line which was then known as the greatest telegraph company in existence. It was doing more business, had better wires, and rendered a superior service in every way. Later the American Telegraph Company took over the property of the three companies mentioned. The Western Union running west from Buffalo had in the meantime absorbed the New York, Albany and Buffalo Company, bringing them into New York. In 1866 the Western Union absorbed the American Telegraph Company and subsequent telegraph history is, of course, familiar to the readers of this journal.

"The old Boston House Printing Telegraph Company started with offices at Boston, Providence, Springfield, Hartford, New Haven and New York. They afterward opened offices at Port Chester, Bridgeport, Middletown, South Bridge, North Attleboro and Charlestown. At some places where offices were opened a hotel keeper would ask the operator to invite operators from other places to come and enjoy a feast. No passes were required on railroads in those days, a telegraph blank being sufficient to carry a member of the craft from one place to another."

LETTERS FROM OUR AGENTS.

WASHINGTON, D. C., WESTERN UNION.

This office is undergoing a thorough renovating and being brought up-to-date in every particular. A new telephone switchboard is being installed and new booths being placed in service. The telegraph switchboard has been cleaned and polished so that it looks as good as new. The tables are also being cleaned and revarnished, and chief operator, J. W. Collins, expects the operating room will be one of the finest in the south when all of the improvements are completed. Mr. William Niemeyer is engineering the work.

New apartments have been rented on the fifth floor for retiring rooms for the lady employes and rest rooms for the men.

A lecture room has also been provided for the electrical class, which now has about seventy members and is well attended.

LOS ANGELES, CALIF., POSTAL:

Mr. F. H. Griffith has been appointed manager of the branch office presided over by Glen Hummer, who has resigned.

Mr. P. A. Stafford has been appointed manager of one of our most important branch offices, vice S. Welper resigned.

Mr. J. H. Thompson is filling the position of night chief operator while F. H. Merrill is on an extended leave of absence.

Mr. P. R. Moore has found it necessary to resign his position in this office on account of ill health.

Mr. G. A. Dodson has been appointed representative for Telegraph and Telephone Age in this office and vicinity and those having subscriptions and orders for electrical books to place are requested to hand the same to that gentleman, who will give such orders his prompt attention.

NEW YORK, WESTERN UNION.

Miss Mary F. Lynch, city chief and Miss E. Vate have returned from a two months' trip to Europe.

W. H. Hoyt, southern wire chief, is confined to his home by an attack of pneumonia.

Edward Mesler has, as usual, been detailed to take charge of the office at the military camp at Sea Girt, N. J.

Frank E. Bryant, an employe of the American District Telegraph Company of New Jersey at 195 Broadway, New York, died July 14, aged forty-seven years.

Charles McParlan, a machinist in the employ of the Western Union Telegraph Company, died at New York, June 16, aged twenty-three years. He was a son of James McParlan, who, for many years, has been marine chief of the Western Union.

OTHER NEW YORK NEWS.

Mr. Frank Kane, a well-known old time telegrapher of Washington, D. C., was in New York recently, calling on old friends.

Assessment No. 511 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Elbridge G. Wever, at Loving, N. M.; John H. Manwaring, at New Haven, Conn.; David C. Sullivan, at New York; Alfred F. Kelly, at Brooklyn, and David W. McAneeny, at Brooklyn.

William A. Plunkett, an operator employed in the brokerage office of S. B. Chapin and Company, New York, dropped dead at his key of heart failure, July 20. Mr. Plunkett was thirty-three years of age and well-known throughout the country as a first class operator. He was formerly in the Associated Press Service, previous to 1907, having been chief operator for that organization at Louisville, Ky.

Daniel C. Donohue, an operator connected with the New York Fire Alarm Bureau in the Borough of Richmond, died of typhoid pneumonia, July 9, aged twenty-three years. Mr. Donohue learned telegraphy in the Western Union office in New York. He was afterward employed by the Postal Telegraph-Cable Company as operator and later as stenographer in the claim department. While

holding the position of operator and stenographer to the eastern passenger agent of the Southern Railway he passed the civil service examination and was appointed to the position which he held at the time of his death. His father, also Daniel C. Donohue, has for many years, been attached to the fire alarm bureau at the New York headquarters of the fire department and was formerly for many years connected with the Western Union Telegraph Company in New York.

Among sound and reliable insurance organizations the Telegraphers' Mutual Benefit Association of 195 Broadway, New York, occupies a foremost place. Organized in 1867, it has paid to beneficiaries of deceased members \$1,500,000. Reserve Fund, \$317,000, the largest Reserve in proportion to liabilities that is held by any similar Association. All persons engaged in Telegraph or Telephone service between the ages of 18 and 45 are eligible for membership, no restrictions after admission as to change of occupation or residence. The lowest possible cost consistent with security offered. Write for blanks and further information.

The Serial Building Loan and Savings Institution, of 195 Broadway, New York, is under the jurisdiction of the State Banking Department, and the work which it is doing has been commended by the head of that department. On this account it is an absolutely safe depository for your savings. Write for particulars.

A rare chance for someone. An established "Telegraph School"; also a "Business Exchange" business for sale. Receipts \$150 monthly. Life time business. Easy hours. Price \$350. Address Newark Telegraph Institute, 92 Park Pl., Newark, N. J.

Advertising will be accepted to appear in this column at the rate of fifty cents a line, estimating eight words to the line.

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Columbia, Pa. R. F. D. No. 1



Telegraph and Telephone Age

No. 16.

NEW YORK, AUGUST 16, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons on Electrical Measurements.

PART VIII.

The preceding seven installments of this series of articles on electrical measurement give nearly every formula one in the telegraph service is likely to be required to learn. Each has been explained in language as simple and void of technical terms as the writer could possibly make it, yet no doubt there will be many who will find difficulty in memorizing the formulas.

There should really be no difficulty in this respect. If one understands a subject properly he is not likely to forget it soon. There is a knack in studying as there is in every other undertaking, but, unfortunately, comparatively few possess it.

In the writer's opinion the modern public school "short cut to graduation" method is much to blame for the so-called poor memory. The scholar is given a rule and a formula, from which he works out each example mechanically. Little or nothing is explained as to why he follows the directions.

For illustration, the modern method is somewhat like this:

Example: If apples cost two cents a piece, what will ten cost?

Formula: $2 \times 10 = 20$. Ans.

That's about all the information he gets, but he can work out all his examples quickly and progresses (?) rapidly. A year after he graduates he forgets nearly all the formulas and has to begin all over again if he has occasion to need the information.

In former days the scholar was required to stand up before the class and explain each example somewhat after this fashion:

"If one apple cost two cents, ten apples would cost twenty cents, because they would cost ten times as much as one apple."

No matter what the example was he would have to give the "because" properly, before the teacher would OK his slate. The result was that when he graduated the rule was a matter of small importance, because he understood the operation and could even afford to ignore the formula.

The expert is one who was never satisfied with one teacher's explanation, but turned to other text-books for the same version told in different words. Sometimes the alteration or substitution of but one word will make everything clear. Or the same idea expressed in altogether different words removes any perplexity that may exist.

For example, the conventional manner of explaining the phenomenon of an electric current is to say that it is due to different levels of electrical energy; that it flows from the higher to the lower level. Now this is true, but the words do not tell enough. In fact they do not express the full meaning. The words high and low suggest gravity, which in reality has nothing whatever to do with the flow of the current.

The student then turns to another author and reads, "A current of electricity will always flow in a conductor when the electrical pressure or e.m.f. is greater at one terminal than at the other and its direction will be from the greater to the lesser pressure."

Here he gets the full story. There is nothing suggested that might cause his mind to wander from the actual facts. He now readily understands why a current may flow up hill or down dale with equal facilities. The substitution of "pressure" for "high" and "low" makes everything plain and conveys an additional meaning. The habit of consulting different authors for information concerning any given subject cannot be too strongly urged. By so doing the student will almost invariably obtain additional enlightenment which will tend to produce a lasting impression.

Another helpful method of assisting memory to recall the definition of an electrical term or the significance of a formula, is to find some mechanical or other equivalent for it before passing on to another, and by such comparison minimize the tendency to forget.

To illustrate this point we will quote a question that the writer has actually been asked, not once, but several times, by obviously forgetful students, but which would probably never have been asked had they first compared the terms as suggested before leaving the subject. The question was: "How many amperes of current are there in a volt?" Of course the question is unintelligible. It is equivalent to asking, "How many apples can you buy for a dollar?"

Thus in the formula $\frac{E}{R} = C$ which covers the first question, had the student first compared each term with a financial transaction and thereby obtained a correct idea of the significance of the formula he would probably never have asked such a question.

The solution of both questions is the same. It is simply a matter of capital, price, and purchase, and the latter three terms should be paired with E, R and C, respectively. E in volts, in electrical problems, is always the equivalent of the capital to be invested, say the dollar; R, in ohms, represents the price, and C, in amperes, the purchase. If students will bear this fact in mind their problems will be greatly simplified. Nor should they stop with the formula mentioned. All other terms and formulas represent some similar equivalent with which they may be coupled and such comparison should be invariably sought.

(Concluded)

Recent Telegraph and Telephone Patents.

A patent, No. 964,513, for an intercommunicating telephone system, has been granted to W. W. Hawkins, of Cleveland, Ohio.

A patent, No. 964,622, for a telephone receiver, has been secured by W. W. Dean, of Elyria, Ohio.

A patent, No. 965,047, for a system and apparatus for measuring telephone service, has been awarded to Harold D. Stroud and Charles W. Mahon, of Chicago, Ill.

A patent, No. 965,417, for a telegraph instrument has been issued to Frank G. Slemmer, of Goldsboro, Md.

A patent, No. 965,453, for apparatus for measuring telephone service, has been taken out by Charles W. Greenslitt, of Cleveland, Ohio.

A patent, No. 965,748, for a combined telephone and telautograph exchange system, has been granted to Foster Ritchie, of Acton, England. A combined telautograph and telephone exchange system, comprising a local battery at each subscriber's station, circuit connections placing these local batteries normally in opposition and means operative when sending a written message whereby the polarity of the battery of the sender is reversed, substantially as described.

The following patents have expired:

Patent No. 501,472, for station apparatus for telephonic and telegraphic circuits, issued to Theodore Spencer, of Cambridge, Mass.

Patent No. 502,466, for a telephone circuit and apparatus, issued to James L. McQuarrie, of Boston, Mass.

Personal.

Mr. A. E. Littler recently resigned the management of the Western Union Telegraph Company at Reno, Nevada, to identify himself with the National Mining Company at National, Nevada.

Mr. Edwin I. Atkins, of Boston, has been elected president of the Westinghouse Electric and Manufacturing Company to succeed Mr. George Westinghouse. The retirement of Mr. Westinghouse marks the withdrawal from active participation in electrical affairs of one who has been a most prominent figure in the electrical field for the past thirty years.

Dr. W. D. Gentry, a well known forty-niner of the telegraph who at present occupies the pulpit of a Chicago church, accompanied by his wife, was a recent New York visitor and called on many of his old friends while in the city. Dr. Gentry, when in the service in New York fifty years ago, was one of the speediest and best operators in telegraphic harness.

We are in receipt from Mr. Theodore E. Moreland, of Pittsburg, of a card on which are mounted two pictures of himself, one taken in 1861, when he entered the United States Military Telegraph Corps, for active service in the field, and the second one taken in 1910. Although the latter picture was taken forty-nine years after the first, there is a close resemblance between the two showing how well Mr. Moreland has preserved his youth.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, is again at his desk, much refreshed by his vacation.

Mr. Charles P. Bruch, third vice-president of the company, is spending the month of August in the Adirondacks.

Mr. Leona Lemon, division superintendent, is filling the position of General Superintendent E. B. Pillsbury, while the latter official is enjoying a trip up the lakes from Buffalo to Duluth.

Mr. John F. Skirrow, associate electrical engineer, is on a vacation.

Mr. J. S. Creegan, manager of the Williams, Ariz., repeating station, accompanied by his wife and son was a recent New York visitor.

The company will during September add to its list many new offices in Florida along the Gulf coast.

J. B. Coggins, Manager, Postal Telegraph-Cable Company, San Francisco.

Mr. Jerome B. Coggins, manager of the Denver office of the Postal Telegraph-Cable Company, who has been appointed manager of the

San Francisco office is one of the rising men in the telegraph service, and the fact that he has had a training of fourteen years in Denver, from which place so many prominent telegraph officials have graduated, is proof that he is well qualified for the new position. Mr. Coggins was born at Flint, Mich., August 29, 1873. He entered the service as messenger in his native



J. B. COGGINS.
Manager Postal Telegraph-Cable Company,
San Francisco.

place on April 1, 1888. In August, 1890, he qualified as operator and from then until 1896 served as operator for both the Western Union and Postal Companies at Detroit and for the Postal at Jackson, Grand Rapids, Saginaw and Bay City, Mich. In January, 1896, he went to Denver and has worked continuously in that office since that time as operator, night chief, chief operator and manager.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. W. E. Athearn, engineer of equipment, has returned from a two weeks' vacation spent at Martha's Vineyard, Mass., his old home.

Mr. C. H. Gaunt, who, on July 15, assumed the general superintendency at San Francisco, has been making a tour of inspection of his division in order to become thoroughly familiar with the needs of the service in that part of the country. Mr. Gaunt was accompanied by Mr. I. N. Miller, Jr., assistant general superintendent; Mr. J. L. Ord, superintendent of construction, and Mr. H. F. Dodge, division commercial superintendent, all of San Francisco.

Mr. J. C. Smith, superintendent at Dallas, Tex., has been appointed division commercial superintendent at that point.

The supply department of the company has been divided into two parts. Mr. H. E. Roberts will continue as general purchasing agent, and Mr. W. G. Higgins, for many years identified with the Western Electric Company, has been appointed superintendent of supplies.

A dinner was given to Mr. T. P. Cummings, on August 3, by his telegraphic associates in New Orleans in honor of his elevation to the superintendency at that point. As Mr. Cummings will have to travel a great deal in the discharge of the duties of his new position his friends presented him with a handsome traveling bag.

Mr. W. A. Porteous has been appointed manager of the New Orleans office, vice T. P. Cummings promoted to the superintendency at that point. Mr. Porteous was formerly superintendent of the Postal Telegraph-Cable Company at New Orleans but retired from that position in 1908 and has since that time been practicing law in addition to his position as solicitor for this company.

Mr. J. E. Van Berschot, formerly assistant superintendent of supplies at Chicago, but who is now engaged in other business, has been in New York recently visiting Mr. H. E. Roberts, general purchasing agent.

Among recent executive office visitors were Mr. Donald McLain, of the Canso N. S. cable station, and Mr. Dennis F. Brown, of the Washington, D. C., office. Mr. Brown was formerly in the service in New York and took occasion while in the city to call on many of his old friends.

Mr. N. A. Buell, at one time manager of the Cleveland, O., office, was in New York a few days recently calling on old friends. Mr. Buell has been identified with the Cleveland office of the company for forty-six years, that being the only office in which he ever worked. He has now been retired on a pension.

Among other improvements which will be made in the main office at Chicago will be the establishing of an up-to-date restaurant and rest rooms for the women employees.

RESIGNATIONS AND APPOINTMENTS.

Mr. W. H. Spain, manager of the Akron, O., office, has been advanced to the managership of the Cleveland office vice Mr. J. W. Tillinghast, retired.

D. M. Therrell, Division Traffic Superintendent, Western Union, Atlanta.

Mr. Daniel M. Therrell who has been appointed division traffic superintendent of the southern division of the Western Union Telegraph Company with headquarters at Atlanta has had an extensive experience both in the telephone and telegraph fields which admirably fits him for the duties of the new position. Mr. Therrell was born at Bennettsville, S. C., in September, 1868, and entered the telegraph service at Laurinburg, N. C., at the age of eighteen. He held various positions with the Western Union from operator to manager until 1894 when he retired to engage in the business of consulting and contracting electrical engineer. In 1900 he joined the forces of the Southern Bell Telephone and Telegraph Company, being placed in

charge of the toll line department. Later he became special agent of the company and then manager at Charleston, S. C. He afterward served successively as superintendent of the South Carolina and Georgia divisions of the company. In 1908 when the present organization was put into effect by the Southern Bell, Mr. Therrell was appointed



D. M. THERRELL.

Division Traffic Superintendent, Western Union Telegraph Company, Atlanta, Ga.

assistant general traffic superintendent with headquarters at Atlanta, which position he held at the time of his recent transfer to the Western Union. Mr. Therrell, is regarded as one of the best telephone and telegraph engineers in the south. He has made a specialty of the subject of long distance transmission and has been a frequent contributor to the technical press.

**M. T. Cook, Division Commercial Superintendent
Western Union, Chicago.**

Mr. Morris T. Cook whose appointment as division commercial superintendent of the Western



M. T. COOK.

Division Commercial Superintendent, Western Union Telegraph Company, Chicago.

Union Telegraph Company with headquarters at Chicago, as announced in our issue of August 1, was born at St. Louis, Mo., June 29, 1879. He entered the telegraph service at Chicago, on April 1, 1902, as secretary to his father Theodore P. Cook, general superintendent of the western division. He occupied this position until April 1, 1909, when he became general agent at Chicago of both the Western Union Telegraph Company and the American District Telegraph Company. In this position he has given special supervision to the service, revenues and expenses of the Western Union and to the messenger department of the American District. Mr. Cook's training in the telegraph field has thus been of a nature which admirably fits him for the duties of the important executive position to which he has now been appointed and his many friends predict that his administration of the new post will be a success.

**M. H. Clapp, Division Plant Superintendent,
Western Union, Chicago.**

Mr. Martin H. Clapp, whose appointment as division plant superintendent of the Western Union Telegraph Company at Chicago was briefly announced in our August 1 issue, was born at Montague, Mass., August 9, 1874. He entered the employ of the American Telephone and Telegraph Company in 1896 at New York. After a short time in the service of that company at New York he was transferred to the west and has since had his headquarters at various times at Cincinnati, St. Louis and Chicago. He has held the positions of equipment man, district inspector, special agent, supervisor of maintenance and division superintendent of plant, which office he filled at the time of his recent transfer to the Western Union service. Mr. Clapp's fourteen years' of experience in the plant department of the American Telephone and Telegraph Company have admirably fitted him for the duties of the new position which he has now assumed, and he will undoubtedly bring the telegraph company's plant in the territory over which he has jurisdiction up to the high standard which is maintained by the American Telephone and Telegraph Company.

**H. F. Dodge, Division Commercial Superintendent,
Western Union, San Francisco.**

Mr. H. F. Dodge, who has been appointed division commercial superintendent of the Western Union Telegraph Company at San Francisco, as announced briefly in our August 1 issue, was born in New York in 1863. He entered the telegraph service in 1883 as operator on the West Shore Railroad at New York. He later transferred his services to the Baltimore and Ohio Telegraph Company, serving successively as operator, quadruplex chief and assistant to the electrician of that company in New York. In 1886 he was appointed chief operator for the Baltimore and Ohio at Boston. The following year he spent several months in the employ of the Thom-

son-Houston Electric Company at Lynn, Mass., but in 1888 went to Denver to become manager of the Union Pacific Railroad's telegraph office at that point. In 1889 he accepted a position as chief operator of the Helena office of the Northern Pacific Railroad. Between 1900 and 1904, inclusive, he served as manager of the telegraph offices of that railroad at Tacoma and St. Paul. In

of the office of the Postal Telegraph-Cable Company at that place but the following year returned to Western Union employ as manager of the Greenville, Miss., office. In 1900 he returned to Jackson as manager. In November, 1902, he was transferred to the management of the important New Orleans office. There his record has been such that when it was decided to make the State of



H. F. DODGE,
Division Commercial Superintendent,
Western Union Telegraph Company,
San Francisco.

1895 Mr. Dodge left the telegraph service to become court reporter at San Francisco. The following year he was appointed clerk of the Committee on Post Offices and Post Roads in the House of Representatives at Washington. This position he held until 1903 and from 1900 to 1904 he acted as secretary and reporter of various congressional investigations. Since 1904 he has served as official reporter to committees of the House of Representatives. Mr. Dodge has thus had a wide telegraph experience as well as a close acquaintance with affairs of State. The combination of these two qualifications render him especially well fitted to discharge the duties of his new position.

T. P. Cummings, Western Union Superintendent at New Orleans.

Among the many promotions which have been made recently in the service of the Western Union Telegraph Company, one of the most popular and well deserved is that of Mr. T. P. Cummings, manager at New Orleans to be superintendent at that point. Mr. Cummings is another one of the large body of southern telegraphers who have attained prominence in the profession. He was born in New Orleans, October 25, 1868 and entered the service as messenger at Jackson, Miss., November 3, 1883. While thus employed he mastered the art of telegraphy and in 1886 qualified as operator at Jackson. In January, 1891, he became manager



T. P. CUMMINGS,
Superintendent, Western Union Telegraph
Company, New Orleans.

Louisiana a district, Mr. Cummings was the natural choice for the new superintendency thus created.

A. R. Lingafelt, Western Union Superintendent, Oklahoma City.

Arthur Robeson Lingafelt, whose advancement to the superintendency of the Western Union Tele-



A. R. LINGAFELT,
Superintendent, Western Union Telegraph
Company, Oklahoma City, Okla.

graph Company at Oklahoma City, was briefly announced in our August 1st issue was born at Davenport, Iowa, August 6, 1860. He became a messen-

ger in the Western Union service in 1873 and by close application to his work with the idea of thoroughly learning the business he soon advanced in the profession becoming successively clerk, bookkeeper, operator, wire chief and chief operator. After fifteen years in the commercial service he received the appointment of assistant superintendent of telegraph of the Chicago, Rock Island and Pacific Railway with headquarters at Topeka, Kan. This position he retained until November 4, 1902, when he returned to the commercial field as inspector for the Western Union at Chicago. February 1, 1905, he was appointed assistant superintendent at that point being afterward transferred to Oklahoma City where he was located at the time of his present advancement.

E. Boening, Western Union Superintendent, at Seattle.

Mr. Edward Boening who has recently been appointed superintendent of the Western Union Telegraph Company at Seattle is one of the younger men in the telegraph service who have succeeded in attaining prominent positions by reason of perseverance and hard work. He was born at Rolla, Mo., November 28, 1874 and became a messenger at Chicago for the Western Union Telegraph Com-



E. BOENING.
Superintendent, Western Union Telegraph
Company, Seattle, Wash.

pany, when only twelve years of age. From that branch of the service, he advanced to the delivery and bookkeeping departments and in 1899 was attached to the office of Superintendent F. H. Tubbs at Chicago. While there he held the claim, estimate and requisition clerkships thus gaining a valuable executive experience.

On March 1, 1903, he was appointed chief clerk in the office of Superintendent C. F. Ames at Boston, March 1, 1905, he became an inspector of the company and on December 1, 1906 was advanced to the assistant superintendency at Boston.

On August 1, 1909, he was transferred to the Pacific Coast as assistant to the General Superintendent at San Francisco which position he held at the time of his present advancement.

Canadian Notes.

Mr. E. Pope, superintendent of the Great North Western Telegraph Company at Quebec has retired from the service and the position of superintendent at that place has been abolished. Mr. C. E. Lillie, inspector at Toronto has been appointed manager of the Quebec office. Mr. J. Beauchamp has been made chief inspector at Quebec and Mr. R. G. Morean has been appointed assistant inspector at that point. Mr. W. G. Barber has been appointed inspector at Toronto. These changes were effective August 1.

Mr. James Wilson who recently resigned as superintendent of the Canadian Pacific Railway's Telegraph at Vancouver has gone to California and other southern points in hope of recovering from rheumatism from which he has been a sufferer for some time. Mr. Wilson had been superintendent for the Canadian Pacific at Vancouver for the past twenty-five years and previous to that was for over ten years superintendent of the Canadian Government telegraphs in British Columbia.

Mr. E. Paterson has received the permanent appointment of manager of the Vancouver, B. C. office of the Canadian Pacific Railway's Telegraph vice M. T. Quigley, deceased. Mr. Fred Swift has been appointed chief operator vice Mr. J. Fletcher promoted to the superintendency, Mr. Evan Goodfellow has been appointed assistant chief operator; Mr. Allan Clark night chief and Mr. W. Jamieson, all night chief. There are now thirty operators employed in the Vancouver office and the extensive use of the night letter service together with the natural increase of business of the past few years keeps the force busy all the time.

Municipal Electricians.

Mr. W. Y. Ellett, superintendent of fire telegraph at Elmira, N. Y., was a recent New York visitor.

Extensive improvements have been made in the fire alarm service of Denver, Col., ten new circuits having been installed.

The contract for a new fire alarm telegraph system at San Antonio, Texas has been awarded to the Gamewell Fire Alarm Telegraph Company.

Mr. John C. Rennard has been appointed electrical engineer of the New York Fire Department. Mr. Rennard was formerly connected with the New York Telephone Company.

The city electrician of Council Bluffs, Ia., has been engaged for some time past in overhauling the fire alarm system of that city. Considerable difficulty is experienced in its operation owing to the fact that the system is composed of three different types of apparatus.

The contract has been awarded for the construction of a fire-proof building at Oakland, Cal., for the headquarters of the police telegraph and fire alarm system. The new structure will cost about \$45,000.

The annual report of the Commissioner of Public Safety of Toledo, O., for 1909, contains the complete report of Mr. J. T. Greene, superintendent of police and fire alarm telegraph. This embraces much interesting information in regard to the police and fire alarm telegraph systems of Toledo and shows that both of them are being operated and maintained at a high state of efficiency.

The Cable.

Mr. P. W. Rieb has been appointed assistant superintendent of the Rye Beach station of the Direct United States Cable Company.

The revenue of the associated cable companies for all of the South African traffic during the year 1909 amounted to £283,054. This was an increase of about seventeen per cent. over the preceding year.

A patent, No. 965,368, for submarine-cable telegraphy, has been granted to Sidney Geo. Brown, of London, England. In a system for receiving signals from a cable in cable code the combination with a receiving instrument of means for enabling the discharge currents to be utilized to give amplitude to the signals and a suitably adjusted reaction circuit for modifying such signals to receive increased definition.

It is reported that the German cable between Emden and Valentia, Ireland, which was thrown out of service when the first German cable to the United States was laid, will be utilized for the proposed connection between Emden and Brest, which will be established as a result of the recent Franco-German cable agreement. The portion of the present cable which will be used will be that leading from Emden to the mouth of the English channel, from which point France will make the connection to Brest.

The report of the Direct United States Cable Company for the first six months of 1910 shows a gross revenue of £58,556, an increase of £2,111 over the corresponding period last year. During the same period the net earnings amounted to £33,279. The work of diverting the trans-Atlantic cable of the company landing the same at Harbor Grace, Newfoundland, is now under way and will soon be completed.

The Council of the Empire Press Union, of Great Britain, in its first report, notes the concessions that have been secured in press rates since the formation of the Union, but considers that further reductions are necessary. In regard to the Marconi trans-Atlantic service, which offers a rate of three and one-half pence per word, the report states that but only a limited amount of press work can at present be accepted, and that the speed of transmission is slower than that of the cable.

The Western Union Telegraph Company is now laying a new trans-Atlantic cable from Penzance, Eng., to Bay Roberts, N. F., from which point it will be extended to New York. The new cable which is of 700-pound copper per mile and 350 pounds of gutta-percha insulation per mile has been made by the Telegraph Construction and Maintenance Company of London, and the cable ship "Colonia" is now engaged in laying the trans-Atlantic section. The new cable will be the largest in the North Atlantic service. When the Colonia has finished laying the trans-Atlantic section, which will be about August 18, she will go to London and take on board the Newfoundland-New York section and proceed with the laying of that. It is expected that the work will be completed to New York about November 1.

Semi-Annual Report of Anglo-American Telegraph Company.

At the semi-annual meeting of the Anglo-American Telegraph Company held in London recently, Mr. Robert H. Benson in moving the adoption of the report said that he would like, in view of recent events to recapitulate the strategic position of the Atlantic cables. There were sixteen cables laid between Europe and America controlled by four different parties. Seven of the sixteen cables, including four which they owned, were in partnership for the purpose of mutual assistance and better service to the public. One of their partners was the Direct United States Cable Company, who owned one cable and the Western Union, who possessed two cables, and had besides 1,140,000 miles of land lines in North America. The Commercial Cable Company who owned five cables, had 330,000 land miles, which reached most important cities, and controlled the Postal Telegraph-Cable Company. In England, as they were aware, the land cables were the property of the Government, who distributed its favors impartially to all parties. In America, however, the cables were owned by private enterprise, and in addition to the Western Union and Postal Companies, which were telegraph companies only, there had grown up a still more powerful company—the American Telephone and Telegraph Company with over £100,000,000 capital, and which paid eight per cent. on some £50,000,000 or £60,000,000 of ordinary capital. Last winter this concern became financially interested in one of their partners—the Western Union. It happened that the president of the American Telephone and Telegraph Company was in England in May, and they were glad of the opportunity to make his acquaintance, not only because he pursued the same kind of business, but because of the ability he showed in the directing of his own affairs. While he was here that gentleman gave an order for the laying of another cable in the Atlantic and they were glad to find that it was done with no idea of introducing competition into the ocean business, and in fact, the order given by the presi-

dent of the Telephone Company was given with the intention of using it on behalf of the Western Union, and in anticipation of their coming to terms.

It was possible if they succeeded in identifying themselves with the American Telephone and Telegraph Company, that they might participate more largely henceforth in the growth of the cable business. The board were unanimous in desiring an agreement on the basis of not jeopardizing the dividends and of securing a fair share of whatever increase in the cable business the arrangements might bring about. They also wanted more unanimity of management—complete harmony of the component parts in the organic whole. If they gave the public better facilities, he had no doubt they would respond by giving them more messages to carry. They had arrived at an agreement with the American Telephone and Telegraph Company on principle, but the details have yet to be settled. There remained a lot to be done. Their agreement with the Western Union and the Direct Company had to run another ten years, and it could not be modified without the consent of everybody concerned. If they succeeded in carrying this to an agreement, it would immediately be put in print and submitted to the shareholders.

A Telegraph Circuit Closer.

Mr. Frank G. Slemmer, of Goldsboro, Maryland, has recently been granted a patent, No. 965,417, for a unique device for closing a telegraph circuit where a key has carelessly been left open by the operator. To accomplish this a contact is provided at the back end of the key lever which contact, when the key is left open, closes the circuit of a small motor. This motor upon revolving, by means of a combination of gears and contact springs, closes a shunt circuit around the key, thus closing the line. The motor required is operated by a few cells of local battery and the device is so arranged that the motor has to make several revolutions before it will close the circuit. It is also, by means of a coiled spring, caused to return to its normal position as soon as the key is closed and the motor circuit thus opened. The ordinary opening and closing of the key in the operation of a wire consequently has no effect on the shunt circuit.

Night Messages and Word Counters.

When an operator has to receive a night message containing from fifty to possibly several hundred words the attachment of a word counter upon his typewriter is a great time saver. Many do not appreciate this, but, instead, when through receiving will take the time to count each word in checking up with the sender. This is wasted effort, as, in most cases, if he had a word counter on his machine he could check as soon as the sender had finished. In view of this fact, it seems strange that more operators are not provided with these useful devices. The Hudson word register is simple in operation, can be provided with attachment for any standard typewriter and is ab-

solutely accurate. There is no limit to the continuous forward movement of this device. It registers up to 1,500 and then automatically begins counting again from 1 upwards. The additional tension placed on the space key to operate the counter is so slight as to be scarcely noticeable. The price of this useful adjunct to a telegrapher's equipment has been reduced from \$5.00 to \$3.00, and orders may be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York. All orders should state the make of typewriter for which the counter is desired, as attachments differ.

An Electrical Book for Practical Men.

"Lessons in Practical Electricity," by C. Walton Swoope, which has been selected as an official text book by the electrical schools organized among the employes of the eastern division of the Western Union Telegraph Company, is, as its name signifies, an elementary text book for the practical worker. It contains nearly five hundred pages and has over four hundred illustrations. It is divided into thirty-one chapters dealing with magnetism, batteries, electrolysis, current measurement, resistance, Ohm's law; circuits, galvanometers, electromagnets, measuring instruments, electrodynamics, induction coils, dynamos, motors, electric lighting and alternating currents. At the end of each chapter, there are given several questions for the student to answer and practical problems for him to solve. Numerous interesting experiments are also described, which can be performed by the aid of simple apparatus. The book was written especially for the use of evening classes in practical electricity and is admirably adapted to that purpose. This work, together with Jones' "Diagrams," Maver and Davis' "Quadruplex" and Thom and Jones' "Telegraphic Connections" seems to meet all of the requirements of the student who desires to acquire a thorough knowledge of the principles underlying the operation of the telegraph system. The prices of these books are: Swoope's "Lessons in Practical Electricity," \$2.00; Jones' "Diagrams," \$1.50; Maver and Davis' "Quadruplex," \$1.50; Thom and Jones' "Telegraphic Connections," \$1.50. Any of these books will be sent, carrying charges prepaid, upon receipt of price by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.

The Postmaster General of England is urging that the telephone be used in that country for the delivery and collection of messages. Some experiments along this line are now being carried out.

A demonstration was given in London recently of the new system of rapid cable telegraphy devised by Mr. Hans Knudsen, the Danish inventor. By this system only one impulse is required per letter, the identity of the letter being established by the distance of each dot on a recording tape from the preceding dot.

The Underground Conduit System of Baltimore.

The underground conduit system which is constructed and operated by the City of Baltimore was provided for by ordinances of the Mayor and City Council, adopted in August, 1898. These ordinances were based upon an authorization by the State Legislature to create such work, passed in the legislative session of 1892, and subsequently passage of additional legislation in 1896 authorizing the City of Baltimore to borrow an amount not exceeding one million dollars for the purpose of carrying out the provisions of the act passed in 1892.

This authorization by the Legislature required ratification by vote of the people which was done at the election in November, 1897. Subsequent authorizations have been made by the State Legislature and similarly approved by vote of the people until at this writing the total amount of loans authorized for the sole purpose of providing underground conduits is three million dollars.

These acts of the Legislature and ratifications by vote of the people are provisions of the Constitution of the State of Maryland making them conditions precedent to the pledging of the credit of any municipality in the State.

The Electrical Commission was organized in October, 1898, and started actual construction in March, 1899, which work has been conducted uninterruptedly to the present time.

During the interim mentioned, that is, from the time of the original authorization by the Legislature in 1892 down to the organization of the Commission in 1898, there was much opposition from the interested public service corporations. Many times progress was interrupted and on more than one occasion the project seemed doomed to be defeated. Through consistent and sturdy advocacy by the friends of the measure all opposition was finally overcome; the technical objections raised by the corporations were met and successfully answered; the claim that it meant bankruptcy for the city, which seemed to be the argument of the opposition which secured the greatest amount of support, it was agreed could only be answered through experience.

Even after the organization and beginning of the work the opposition to making it effective still existed and delayed, to a considerable extent, the benefits which were ultimately secured to the public.

After the first installations of underground cables by the several corporations and their experience gained in the use of the city's underground system, particularly in the design of the manholes where they found that their property was amply safeguarded, the former opposition completely vanished and the relations between the Electrical Commission representing the city on the one hand, and the public service corporations who were required to use the system on the other, came upon a more co-operative footing, so that it is safe to say that in the past five or six years

the corporations have been not only willing, but eager to follow the plans of the Commission. On numerous occasions the Commission has extended its conduit system at the instance of the corporations and in all its more recent history there has been that complete co-operation between the two interests which has resulted in the maximum of advantage to each.

By this is meant that the City of Baltimore has secured removal of poles and overhead wires from practically all the important streets and districts in the built-up section of the city and at the same time in such a manner that the system is self-supporting; that is, that it takes care of its operating expenses, maintenance, and fixed charges with something over for safety and on the other hand the corporations have secured underground accommodations at a minimum of expense to them in the way of rentals and installation, consistent with the permanence necessary in this class of installation.

A summary of the operations of the Electrical Commission up to December 31, 1909, given herewith, will, at a glance, show the results which have been attained: total length of duct, 1595 miles; lineal feet of conduit, 129 miles; number of trunk manholes, 823; number of junction and service boxes for house to house distribution, 2404; number of separate buildings served entirely by underground connections, 5624.

The net cost of construction to that date was \$2,164,180.

The total length of cable installed of all classes was 1,967,320 feet. This was divided as follows: For electric light and power, 1,393,090 feet; for telephone and telegraph and low tension signaling services, 574,230 feet.

The cables for electric light and power embrace those used for transmission and distribution, transmission being by alternating current at 13,000 volts, 25 cycles, and distribution by alternating current at 2,300 volts and direct current 250 volts.

The first report of the chief engineer of the Baltimore Electrical Commission, Mr. C. E. Phelps, Jr., made in 1900, together with the succeeding annual reports furnishes much valuable information in regard to the preparation of the plans for the underground system.

The scheme adopted comprises two general classes of conduits, main and distributing, the former being laid in the street for the use of main cables only and the latter being laid as near the building lines as possible, with openings at frequent intervals for making house service connections. Both of these classes of construction provide for all kinds of wires. The upper part of manholes in the main distributing system is reserved for electric light and power cables while the lower part is given over to telegraph, telephone and signal wires.

The construction work was done so carefully and well that after the great fire in Baltimore in 1904 it was found that all underground cables

had escaped injury. The main office of the Postal Telegraph-Cable Company was burned, but the next day after the fire was under control, by means of a new underground connection outside of the burned district all of their transmission lines were restored to service. This was accomplished without stringing any temporary overhead wires. This fire was about the severest test which an underground conduit system was ever called upon to meet and the fact that the Baltimore system withstood the trial successfully proves that such a method of distribution of wires in large cities is without doubt the most reliable that can be devised.

The revenue which the city receives from the rental of conduits is steadily increasing, amounting in 1909 to \$91,870. The rentals are figured on the basis of paying operating expenses of the system, interest on the bonds issued for construction and providing a sinking fund for the retirement of the bonds at the end of twenty-five years. In addition to paying these charges the city derives a revenue from the system. The rental paid, however, is so low that it is probable that it would cost any one of the companies using the system much more to maintain a system of its own.

Annual Convention of International Association of Municipal Electricians.

Judging from the program which has been arranged for the fifteenth annual convention of the International Association of Municipal Electricians which meets in Rochester September 6, 7, 8 and 9, the coming gathering will be one of the best ever held by the association. On the first day the visitors will be welcomed to the city by Mayor H. H. Edgerton and the usual routine business will be disposed of. The fire alarm telegraph system of Rochester which is one of the best in the country will also be inspected. The morning of the second day will be devoted to the reading of papers and discussion of the same. In the afternoon an automobile ride around the parks of Rochester will be enjoyed. Two sessions on Thursday and one on Friday will be devoted to the reading and discussing of papers, Friday afternoon being left for the transaction of general convention business and the selection of a place for the next meeting. After the business of the convention has been concluded those present will take a trolley ride of several miles along Lake Ontario to one of the lake resorts where dinner will be served. The Powers Hotel has been selected as headquarters and anyone desiring reservations at that or any other hotel, may secure the same by notifying Mr. Joseph B. Smith, superintendent of police telegraph, Rochester, N. Y. Ample space has been provided for exhibitors and Mr. Frank P. Foster of Corning, N. Y., secretary of the association announces that the exhibits will be up to the usual standard both in quantity and quality.

New Plan of Organization of Western Union Telegraph Company.

Generally speaking, the plan for reorganizing the Western Union Telegraph Company as now arrived at is a modified form of what is known as the three column organization, that is: it will be adapted to giving expression to the company's functional activities relating to the plant, traffic, and commercial departments respectively.

It is purposed that the accounting shall follow the organization. This is a natural procedure inasmuch as it is an elementary principle that the accounts must fit the business, and not the business the accounts.

The accounting organization is, at the present time, in a formative condition, and many details have still to be worked out. It is intended, however, that inasmuch as the plant, traffic, and commercial departments are responsible for the transactions relating to the company's business which they respectively supervise, that they shall also be responsible for the basic accounting represented for the most part by reports which give reflection to these transactions.

This is particularly prescribed to the end that: Economy may be exercised, and departments may be given every opportunity of proper supervision of their affairs, and not be allowed to relieve themselves of responsibility therefor.

In the course of time the auditor of the company, Mr. E. Y. Gallaher, will appoint division auditors who will report directly to him, and who will bear the same relative position towards the general superintendents of division as the auditor does at New York to the general manager of the company. These division auditors will each be furnished with an adequate staff of traveling auditors, and will carry such accounts as will enable them to centralize under their supervision all accounting matters relating to the company's business in the division, and also to prepare monthly statements to be forwarded to New York which will be in such shape as to admit of being combined with the other division statements, and the accounts kept at the home office, thus by combination of statements an account of the whole company's business can be arrived at.

Mr. Floyd Wilson, a telegraph operator on the Chicago, Milwaukee and Puget Sound Railway, in Idaho, recently shot a four hundred pound black bear, which, a few days previously, had treed him near his station and compelled him to remain there several hours until the despatcher sent a relief.

It is always a good idea for the recipient to examine a telegraph message before dismissing the messenger. In several Western cities it is reported that people have been victimized by a boy delivering telegrams marked collect. After they have paid the charges and the boy has left the victim opens the supposed message and finds that it is a "fake."

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August 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Major Walter A. J. O'Meara on American Telephones and Telegraphs.

Major Walter A. J. O'Meara, chief engineer of the British Post Office, who spent several months in this country last year in an inspection of our telegraph and telephone systems, in his report which is now made public and an abstract of which appeared in our August 1 issue, states that the chief thing which attracted his attention in the management of the business of the Bell Telephone Company and which distinguishes it from the administration of the government owned systems in England was the absence of red tape letters.

Major O'Meara was surprised to find down in the Dey Street headquarters of the company in New York, an absence of the huge stacks of letters and reports that are so conspicuous in all English Government offices. Commenting on this Major O'Meara says:

"The functions of the various departments of the American Telephone and Telegraph Com-

pany are very clearly laid down, and since decentralization exists in its completest form the business of the company is transacted by the heads of departments in personal interviews with the president and vice-president. It is this procedure which accounts for the absence of the files of correspondence, and to it is also due the fact that the staff attached to the offices of the president and vice-president are reduced to microscopical proportions. In the case of the American Telephone and Telegraph Company I understand that about half a dozen stenographers comprise the whole of what would constitute the administrative section in a large British public department."

The observations of Major O'Meara are of particular interest at the present time, owing to the fact that the same plan of organization which he has described as prevailing with the American Telephone and Telegraph Company is being adopted to a certain extent by the Western Union Telegraph Company. The present is an age of specialists and the functional form of organization is one which is rapidly being adopted by large corporations as being the most efficient. In the telegraph field however, up to the present time the efforts of our telegraph administrations have been chiefly directed toward building up the most economical system possible and still give good service. The introduction of the functional organization means the addition of a large number of comparatively high salaried officials to the staff of the company and it has not before been thought that the increase in efficiency to be gained by the adoption of such a system would compensate for the additional expense involved. Hence the results obtained by the new system now being introduced will be watched with interest by those closely connected with telegraphic affairs. Among other things in his report Major O'Meara commends heartily the American system of placing responsibility on all employees, no matter how humble their positions. He believes the system develops the most useful attributes in men and women and produces plenty of able candidates for promotion to the higher executive posts.

He also admired the American system of keeping tabs on delays in making telephonic connections. Londoners hope he will induce the officials there to copy that system, for now they often have annoying delays in getting connections.

In England no telegraph operator uses the typewriter in receiving messages, either commercial or press, nor is there any code like the Phillips code in use for increasing the capacity of a wire by using abbreviations of words and phrases in common use. Major O'Meara praises the use of the typewriter in American telegraphic offices and comments on the expedition and legibility it imparts to messages received and the reduction of fatigue to the receiving operator.

It is apparent that Major O'Meara thinks that the American telephone and telegraph systems are far in advance of those in England.

What Constitutes a First-Class Operator?

This is a question which is often asked and is one upon which many opinions have been given, scarcely any two of which would agree in all of the details. As we understand the meaning of the term, first-class indicates one of the best. There are many requirements which a telegrapher may be expected to fulfill at various times although comparatively few operators are ever called upon to meet all of these requirements. Among these we would mention the ability to use a typewriter with accuracy as well as to write copy which can be easily read. The ability to read copy quickly and accurately is also an essential. A first-class operator should be able to send or receive press report, baseball news, stock and grain quotations or Phillips' Code, in fact any matter that is habitually sent over the wires by means of Morse signals. Speed and accuracy in the performance of any of these functions is of course necessary as well as proficiency in adjustment of the apparatus generally used. Combined with these qualifications we would expect a man of more than average intelligence and of strong enough physique to be able to work continuously if necessary for ten hours without excessive bodily fatigue.

It may be argued that these requirements are rather severe and that there are few who can meet all of them. This is probably true but at the same time it will be admitted that there are men in the service who possess all of these qualifications. This being the case it seems but right that the man who possesses them all should be given a higher classification than the man who is lacking in one important particular. Take for example a man who can meet all of the other conditions but is unable to produce legible copy. Ordinarily a typewriter is available on which he can receive and he will render first class service, but in case a man is wanted to fill an important place hurriedly where a typewriter can not be used he is not available and has to give way to the man who possesses the ability to write copy which can be read.

To sum up the situation it would seem that a really first-class operator is one who is always available to fill satisfactorily any position in the operating line in which a telegrapher might be placed. Those who lack only one of the qualifications which we have mentioned might be denominated second-class operators, those lacking two qualifications, third-class, etc. By following out this plan the telegraph operating force might be divided into as many classes as desired.

Annual Reunion of Old Time and Military Telegraphers.

As the time approaches for the twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, which meets in Chicago, September 8, 9 and 10, the plans for the

gathering are rapidly being perfected and from present indications the coming reunion will be one of the best attended of any in the series. Mr. A. C. Murphy of the Western Union Telegraph Company, Chicago, who is chairman of the hotel committee announces the following rates for the Hotel La Salle in addition to the other hotel rates which are given in our July 1 issue: One person, room without bath, \$2.00 to \$3.00 per day, with bath, \$3.00 to \$5.00 per day. Two persons, room without bath, \$3.00 to \$5.00, with bath \$5.00 to \$8.00 per day.

Those who contemplate attending this gathering should make their hotel reservations through Mr. Murphy at once in order that they may be sure of securing satisfactory accommodations. Colonel William Bender Wilson of Holmesburg, Philadelphia, Pa., president of the Society of the United States Military Telegraph Corps expects that the coming reunion will be a banner one in attendance for the military telegraphers, owing to the fact that Chicago is so centrally located. He has already received assurances from a large number of the survivors of the military corps that they will make special efforts to attend this gathering. Mr. William J. Lloyd, division traffic superintendent of the Western Union Telegraph Company, Chicago, and president of the Old Time Telegraphers and Historical Association has also been notified by many old timers throughout the country of their intention to be present so that he is confident of an extra large attendance. The program of entertainment arranged for the visitors is an elaborate one. Any one desiring further information should communicate with Mr. F. J. Scherrer, assistant secretary of the Western Union Telegraph Company, New York, who is secretary of the Old Timer's Association, or David Homer Bates, 658 Broadway, New York, secretary of the Military Telegrapher's Society.

In the July number of the *Journal Télégraphique* of Berne, Switzerland, there appears the first installment of a very interesting illustrated article by Mr. A. Ebeling, on the Pupin system of loading telephone circuits as applied to aerial lines. This paper describes the experiments which have been conducted by the German Government in this direction and which have been very successful. The *Journal Télégraphique* being published by the International Bureau of the Telegraphic Union is the official journal of all of the government telegraph administrations. One feature of this paper which is of especial value to engineers is a list printed monthly of all articles relating to telegraphs and telephones which have appeared in the technical press of the world during the preceding month, including *Telegraph and Telephone Age*.

Telegraph and Telephone Age is headquarters for electrical, telephone and telegraph books. Write for catalogue.

American Telegraph Engineering—Notes on History and Practice.*

BY WILLIAM MAVER, JR., AND DONALD McNICOL.

(Continued from page 525, August 1 issue.)

It may be noted that in America, telegraph operators during recent years have adopted extensively a keyboard, and other semi-automatic devices for the transmission of the Morse alphabet, which devices quite largely increase the rapidity and facility of transmission over the regulation key method. American operators have also very generally adopted the typewriter for transcribing received messages. Primarily these instruments were adopted as labor saving devices, greatly reducing the mental and physical strain on the operator, and making it possible for operators who had "lost their grip" of key or pen, to return to the ranks of first class operators. The public appreciation of the typewritten copy was such also that the telegraph companies encouraged the use of the machine by increasing the compensation of type writer telegraphers. Further, the use of the typewriter in combination with the marvelous abbreviations employed in the transmissions of press matter, by code considerably diminished the demand for rapid automatic or printing telegraphs, at least for that service, by bringing the performance of Morse working well up to what might be expected from printing telegraph systems. The semi-automatic transmitting key termed the *mecograph* or modifications thereof is used by perhaps four-fifths of the operators of this country. It consists of a vibrating rod or pendulum which when moved to one side manually by the operator makes a dash, and when moved to the other side automatically vibrates (until stopped by the operator) in the act of so doing making any desired number of dots. It is estimated that sixty per cent more movements are required in sending by the ordinary Morse key than by this device.

DIRECT POINT REPEATERS

During recent years a demand has grown up for fast duplex telegraph service, in order to provide direct communication between large centers remotely separated. For instance, a vast amount of traffic which arrives at, and which originates at the large eastern cities of this country destined for China, Japan, the Philippines and other Asiatic countries requires that these cities shall have direct communication with the Pacific cable office in San Francisco. Formerly the arrangement of apparatus used in repeating from one multiplex set into another was that whereby the receiving relay controlled the sending transmitter through local connections, but the mechanical inertia of these instruments and the increased number of local contact points through which the operation was controlled did not conduce to high efficiency. The duplex repeater now used on both the Western Union and on

the Postal Telegraph lines is known as the "direct point" repeater, and is similar in operation to the Wheatstone duplex repeater. It is now customary to wire up polar duplex and the polar side of quadruplex sets so that this efficient method of repeating may be utilized. Inasmuch as the local contact points of the polar relays are in this case employed to deliver line currents, special devices are provided to control local circuits for operating the reading sounders. For instance, in the Western Union type of duplex repeater the polar relays are equipped with double armatures, mechanically jointed together, but separated electrically, one contact controlling the line potentials, and the other the local circuit. The method employed by the Postal Telegraph Company is the well known "leak" arrangement. A single tap is taken off the armature contact of each polar relay and led to ground through a polar relay and a 20,000-ohm coil. Another method of accomplishing the same result is to substitute a 0.5 microfarad condenser for the 20,000-ohm coil thus obtaining the same response in the polar relay without any loss of current through the leak coil to ground. Indeed when the condenser is used in place of the leak resistance, the polar relay may be done away with, the circuit leading directly from condenser through a sounder and to ground. In this latter case the armature and stop adjustments of the sounder are set so that the signals are all made on the upper stop screw.

The type of duplex telegraphy now universally employed in this country is that in which the well known double-current principle is employed, and by means of the direct repeating relays mentioned, very long distances are spanned, for instance across the continent from New York to San Francisco, by many diverse routes. Ordinarily from four to six repeaters are used in these transcontinental circuits and the speed of transmission is at least equal to the ability of the operator to manipulate the key. Ordinarily the differentially-wound polarized relay is employed.

SUPERIMPOSED SYSTEMS. "PHANTOPLEX" AND VAN RYSELBERGHE.

Since Varley there have been many workers whose aim it has been to increase the capacity of a single wire or a wire already in operation as duplex or a quadruplex by superimposing thereon one or more pulsatory phantom circuits.

By one such arrangement of a "phantoplex" circuit on a quadruplex circuit that is in actual operation in many places in this country a sextuplex is obtained.

In many cases Morse duplex circuits or portions of them are used simultaneously as telephone circuits, the wires of two such duplex telegraph circuits being employed as one metallic circuit for telephonic purposes.

Composite circuits (originally the Van Rysselberghe simultaneous telegraph and telephone system) are employed in this country and Canada very extensively; notably by the American Tele-

*A paper presented at the Twenty-seventh Annual Convention of the American Institute of Electrical Engineers, Jefferson, N. H., June 28-July 1, 1910.

phone and Telegraph Company, also by the telegraph departments of large railway systems. Between New York and Boston alone at least fifty leased telegraph wires are in daily operation on long distance telephone circuits, and this dual use of circuits is being rapidly extended in telegraph practice, all new line construction being designed with this end in view as noted elsewhere herein, the increased earning capacity of the wires gained thereby being the obvious incentive thereto.

INDUCTIVE DISTURBANCES ON TELEGRAPH CIRCUITS

In the pioneer days of telegraphy when routes were being sought for pole lines, the rights-of-way of the existing steam railroads were utilized wherever possible for the obvious reason that, as the proper movement of trains required the constant use of the telegraph, the questions of construction, maintenance, and prompt repairs were thus solved to the best advantage of the railroad and the telegraph companies. The growth of telegraph traffic was however, rapid, and between the larger centers, at least, duplicate pole lines on highways were soon required to carry the constantly increasing number of wires, and thereby one of the advantages of railroad routes for commercial telegraph lines was largely diminished. In the course of events also the time arrived when the displacement of the steam locomotive by the trolley car and electric locomotive for train haulage, introduced the high-tension transmission circuit, which, being naturally erected along the railroad tracks, at once menaced the value of a railroad right-of-way for telegraph purposes. It developed, also, that long distance transmission lines carrying high-tension alternating currents in numerous instances began to parallel the railroad rights-of-way as generally affording the most direct and favorable routes between cities, thereby adding another disturbing factor to telegraph lines following the same routes.

Apart, however, from the serious inductive disturbances due to the close proximity of high-tension lines, the subject of inductive disturbances on telegraph lines is not a new one, for mutual inductive disturbances between telegraph circuits were encountered as remotely as 1876 in the dry climate of some of the western states, on lines operated as simplex Morse circuits extending from Omaha, Nebraska, to Salt Lake City, Utah. Upon the introduction of the quadruplex shortly thereafter mutual induction between parallel wires manifested itself as a disturbing factor at numerous points, due to the comparatively high e.m.f.s then used on quadruplex circuits, about 300 volts; and as in the ordinary operation of telegraphy single wires grounded at each end are employed, the well known method of transposing the wires at intervals to obviate mutual induction effects was not available as a remedy. Fortunately the reduction of efficiency due to this source of inductive disturbance was not very marked, and could, generally speaking, be overcome by an increase of e.m.f. at the terminal stations to 375 or 400 volts.

One of the first methods suggested to eliminate, or ameliorate the disturbances due to mutual induction was devised and tested by Mr. Chas. H. Wilson in 1876, in the western part of this country. The object of this arrangement is to set up by means of small transformers, currents in wire *A*, opposite to those induced in wire *A*, by wire *B*, and contrariwise. This arrangement was subsequently used on quadruplex lines between Chicago, Buffalo, and Pittsburg, but not very successfully owing to the lag caused by the employment of the transformers in the circuit which augmented the period of reversal to such an extent that the No. 2 side of the quadruplex systems was detrimentally affected thereby.

The continual extension of power transmission and other high potential circuits in close proximity to telegraph circuits however created inductive disturbances so inimical to the operation of the telegraph that further means were sought to effect a remedy, short of changing the route of the telegraph pole lines, and a number of corrective devices have been suggested some of which in practice have been fairly successful under certain conditions and in certain localities, but have not always met the requirements elsewhere.

One of these means of obviating harmful induction from high tension power circuits on single Morse wires is due to Mr. E. W. Applegate. In this scheme, a resistance, consisting of a carbon stick is connected across the main line contacts of the relay. By means of this shunt the rapid induced currents from neighboring alternating current circuits are given a path past the relay, and chattering of the armature is further avoided by increasing the tension of the retractile spring. It was found that these devices tended to impede the action of the armature to overcome which tendency an extra battery of six cells are added, which by partly magnetizing the relay cores when the armature is on its back stop, effects this result. This device which is termed a "static pick-up" has been successfully used on a number of telegraph circuits where metallic circuits had been resorted to owing to the inductive disturbances from a frequently unbalanced 60,000-volt three phase system that parallels the telegraph circuits for a distance of eleven miles. The employment of this arrangement made it possible to resume single wire operation.

A brief description will now be given of one of the more recent methods put into practice for the purpose of offsetting inductive disturbances on telegraph circuits due to the close proximity of high tension electric traction circuits resulting from the electrification of the New York, New Haven and Hartford Railway. To nullify electro-magnetic induction, current transformers with a 1:1 winding, are inserted in the telegraph lines at intervals of two miles. To neutralize electro-static induction the secondaries of potential transformers are used in connection with condensers. The

primaries of the transformer are placed in a special neutralizing wire or in the disturbing wire itself. By placing a number of secondary coils in multiple one neutralizing wire may suffice for a number of telegraph wires. As the neutralizing wire is subject to the same inductive effects as the telegraph wires, the currents developed in the former may be arranged to oppose those due to the disturbing wire.

It has been found in practice that the neutralizing of inductive effects by the foregoing arrangement is seriously interfered with by escapes from direct current trolley lines which enter and energize the transformers. Variations in load on the alternating current line, phase distortion, etc., also add materially in preventing anything more satisfactory than an amelioration of the harmful inductive effects. Furthermore, in this particular case, the slight improvement noted is obtained at the loss of three copper neutralizing wires, in addition to the first cost and maintenance of the additional apparatus required. In general it may be stated that the various devices offered hitherto as inductive disturbance correctors have been rather of a palliative than of a positive remedial nature, and inasmuch as the tendency is to increase the use and the potentials of high tension transmission circuits, it appears evident that to meet or evade this situation successfully constitutes the most serious problem now confronting telegraph engineers. The basis of a solution of the problem may possibly be found in subsequent remarks herein.

MAIN LINE RELAYS

The ohmic resistance of relays used in Morse telegraphy has undergone numerous variations during the past forty years in this country. Relays wound to 1200 and 1500 ohms were not uncommon. At one time the resistance of main line relays was calculated on the assumption that for the best results the total resistance of the relays in a circuit should be equal to the resistance of the line wire. Thus on a circuit 300 miles in length, measuring, say 15 ohms per mile, with fifteen stations on the line, the relays would be wound to 450 ohms. There was, however, little or no uniformity in the winding of the relays and but little supervision of the quality of the copper used in the winding of the relays and but little supervision of the quality of the copper used in the winding, which in the early sixties of the last century varied in commercial copper from 14 to 85 per cent. that of pure copper. Measuring instruments of accuracy were at the time referred to a rarity in this country and no proper methods of ascertaining the condition of the lines as regards electrical resistance and insulation were in vogue. In 1867 the late Mr. C. F. Varley, the well known English electrician, was retained by the Western Union Telegraph Company to visit the United States for the purpose of making a thorough investigation of

the electrical conditions of the lines and apparatus of that company.

Following a thorough study of the subject supplemented by hundreds of tests of the lines, insulators, relays, batteries, etc., Mr. Varley presented a voluminous report to Mr. William Orton, president of the company, December 20, 1867.

The report detailed in extenso, the condition of the equipment as disclosed by the tests, and made numerous recommendations for the improvement of the general service, among others, the making of soldered joints, a reduction in the resistance of the relays used, and their re-winding to a uniform resistance of 130 ohms, the wire used to be the best copper obtainable. He also recommended that fewer poles per mile be used in line construction and that a smaller number of wires be worked from one main battery—in fact that a separate battery be provided for each wire.

Prompt action was taken upon Mr. Varley's report and recommendations, and very marked improvements followed thereafter. Mr. Madison Buell, for instance, in an article on "Low Resistance Relays," recounts that on the important circuit on which the Atlantic cable traffic between New York and Plaister Cove, N. S., was transmitted the repeaters were found to have relays ranging in resistance from 500 to 1,500 ohms. The relay of the "Milliken" repeater at St. John, N. B., has a resistance of 1,500 ohms. The relays at Boston, Portland, and Bangor had an average resistance of 1,200 ohms. All of these relays were rewound to 80 ohms. Also, many improvements were made in wire jointing, insulators, and leading-in wires at all offices, with the result that whereas on this circuit before these changes were introduced six repeaters were necessary in bad weather and in clear weather three to four repeaters, after the aforesaid improvements were made but two repeaters were required in bad weather and only one in clear weather to operate the circuit at top speed.

(To be continued.)

A Valuable Telegraph Book.

"The Hughes and Baudot Telegraphs," by Arthur Crotch, of London, the well-known electrical engineer and author, is a book that everyone interested in printing telegraph systems should possess. The volume contains a very full description of the two mentioned type-printing telegraph systems used so generally in Europe, the Baudot in France and the Hughes elsewhere on the Continent. The illustrations are numerous and clear, and all together, the book furnishes a fund of carefully stated information valuable to the student and also of interest to the lay reader. This book may be obtained of J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, and will be sent to any address, carrying charges prepaid, on receipt of price, \$1.00.

Recent Developments in Telegraphy and Telephony.*

BY SIR JOHN GAVEY, C.B.

(Concluded from page 530, August 1 issue.)

Creed has worked in the same direction, but he uses the ordinary Wheatstone alphabet and Wheatstone transmitter. At the receiving end a perforated Wheatstone slip is reproduced by a punching machine, which, controlled by the reverse currents from the transmitter, and, using compressed air as a motive power, perforates the received slip at considerable speed. This slip is then passed through an automatic typewriter adapted to work with the Wheatstone alphabet, which types the message on a long slip, to be gummed on the telegraph form. In both these cases the received slip can be inserted in a second automatic transmitter and the message sent on to another town—an advantage in the transmission of news. Both these systems are in use in the British Post Office.

Siemens and Halske, in Berlin, have devised an automatic system in which, by means of suitable apparatus, the message is printed by the receiving apparatus direct by photographic methods, an electric spark momentarily illuminating the required letter. The alphabet is stencilled on a revolving disc, and the arrangements are such that the electric spark passes only when the letter corresponding with the arbitrary signal is in the right position for printing.

The Western Union Telegraph Company, in America, have introduced extensively a system known as the Barclay automatic type printing apparatus. At the sending end the code of electrical signals adopted consists of long and short intervals, either marking or spacing, representing the various letters of the alphabet. Every letter is represented by six current alternations, but the receiving apparatus is so designed that, although every current acts on an escape wheel that makes a momentary contact with certain selecting relays, only those of long duration effect any movement in the latter. There are thirty-two printing magnets which act as the keys of a typewriter, and cause the message to be printed direct on the receiving instrument.

Although any one of the systems described or referred to can be made to do excellent work, the actual selection of the apparatus best calculated to meet the requirements of any country depends entirely on local conditions. To what extent uniformity of practice is likely to arise in the future is a doubtful question, as each country is likely to progress on the lines which have been firmly established as best adapted to its wants.

Writing telegraphs, based on the fact that two ordinates at right angles to one another can be made to describe any curve, have been designed. The telewriter is well known. At the receiving

end two pivoted electromagnets, placed in a very powerful magnetic field, are deflected over arcs dependent on the strength of the current circulating at any moment. Two arms at right angles to one another are connected to the transcribing pen, one arm being pivoted to each magnet and the writer's movements are reproduced.

In the writing apparatus designed by Pollak and Virag a slip is perforated by suitable means with nine rows of holes of varying sizes. Suitable flexible brushes make contact through these holes between batteries and the line wires, and thus cause currents of different e.m.f.s and duration to circulate over the line, and to act on two telephone receivers at right angles to one another. Rays of light are reflected from one to the other and on to a photographic slip, and the written messages, which can be transmitted at 600 to 1,000 words a minute, appear developed and fixed on the sensitized paper, which emerges from the dark closet of the apparatus.

There are numerous type-printing instruments for the distribution of news, which, however, are so well known that further reference to them is unnecessary.

The effect of conductor-resistance, electrostatic capacity, self-induction and insulator-resistance (or its reciprocal leakance) was next discussed by the lecturer. Overhead wires, for many years almost exclusively used for telegraphy, and even now the only conductors that serve satisfactorily for really long-distance telephony, possess the advantages of low resistance, which can be diminished to any reasonable degree by the use of copper and by increasing the size of the conductor. Their electrostatic capacity is small, say from .013 to .014 microfarad per mile, and their self-induction is relatively great. Their use admits of attaining the maximum speed in telegraphy; and perhaps the most important limiting factor in this case is the self-induction of the receiving apparatus, which would be a useful factor if distributed over the line, but which tends to act as a choking coil when massed at the extremity. This self-induction in the case of the Wheatstone receiver amounts to as much as one henry, and its effect in prolonging the current, combined with that due to the capacity of the line, is neutralized to some extent by inserting a shunted condenser between the instrument and the earth.

Overhead telegraphs are subject to serious interruptions. But on the other hand, until recently, underground wires, owing to their capacity, which reached .3 microfarad per mile when insulated with gutta percha, and the great cost of the material, were only used in special cases where strategical or other imperative reasons rendered such a course necessary. The introduction of dry paper as an insulating material profoundly modified the situation. The electrostatic capacity of suitable paper is not very much greater than that of air, and wires wrapped with paper, cabled, thoroughly dried and enclosed in a lead sheath

* Abstract of a lecture delivered before the Institution of Civil Engineers, London.

are not only available for long underground telegraphs, but it is not too much to say that without them the modern development of the telephone would have been wholly impossible. The Post Office has within the last few years laid 138,000 miles of paper insulated wire underground for telegraph purposes alone, and to illustrate the bearing of this material on telephone progress it may be added that, between 1900 and 1902, before a single subscriber had been secured, the Post Office laid 24,000 miles of wire underground as the first step in the development of the London system. The mileage of underground wire laid by the Post Office in Great Britain for telephones is now increased to 521,000 miles. By no other known means could such a service have been provided, and these facts emphasize the connection between paper insulation and telephone development.

Submarine telegraphy is not susceptible of the many developments that have been possible with land-lines. The high electrostatic capacity, varying from .3 to .4 microfarad per mile, and the very long lengths that are necessary to connect the great continents of the world, rendering the use of any but the most delicate apparatus impossible on long cables. The receiving instruments originally invented by the late Lord Kelvin, then Sir William Thomson, are still the only apparatus available for the reception of messages on long transcontinental cables, and so far it has not been found possible materially to increase the speed of working except, of course, by increasing the dimensions and cost proportionately. Attention has been devoted to eliminating disturbing elements and perfecting the signals by the use of automatic transmission and by the use of curbing devices at the receiving end. The introduction of repeaters at intermediate points where cables land at suitable localities has recently become possible, and it may be that methods of distributed induction may ultimately be of some value.

In ordinary telegraphy when transmitting through an overhead line the frequency of the current alternations is only 180 per second for 450 words per minute, and the current has actuated the apparatus at the further end before the battery connection has ceased. Another condition, however, is introduced when a conductor is used for telephonic speech in which a maximum frequency of 1,800 to 2,000 vibrations per second has to be dealt with. In these cases the transmission from the telephone assumes complex wave-forms, and the effect of even a moderate capacity becomes far more marked than in the case of telegraphic transmission. If the capacity be sufficiently great and the line sufficiently long, the following wave overtakes the lagging tail of the previous one, they blend more or less together, and having lost their distinctive character they fail to impress on the receiving telephone the distinct character of the sound from which they emanate. A few years ago I had, in conjunction

with the Engineer-in-Chief of the National Company, Mr. Gill, to fix certain standards of speech which had to be maintained by the two administrations working the telephone system in this country. By endowing a circuit in which an electrical wave was in movement with sufficient self-induction to prevent the tailing and consequent distortion of the wave, the limit of speech would be materially increased, as the attenuation due to resistance alone would have to be provided for. The British Post Office has recently laid a cable with distributed inductance between England and France which will increase the range of speech about four times as compared with a similar type of unloaded cable.

The problem of connecting two subscribers' lines at an exchange is a very simple one when a small number of subscribers only are concerned. An electrical indicator of the shutter type to announce a call, flexible conductors to connect any two lines by means of plugs and spring jacks, electrical bells to call up subscribers, and the equipment is complete. The problem is a serious one, however, when, as is now the case, the number of telephone subscribers in a large city runs into five or frequently six figures, when the area covered, like that in London, amounts to 640 square miles, when it has to be served by sixty to one hundred separate exchanges, between all of which intercommunication must be provided with the minimum amount of delay. Add to this the interurban communications between all the principal cities in the country, and the fact that practically the major part of the business of the twenty-four hours is concentrated in about two and one-half hours in the morning and a similar period in the afternoon, and the difficulties to be solved become faintly apparent, even to the uninitiated.

Apart from minor improvements in the calling indicators and other details, each of which added its quota to the gradual perfection of the service, perhaps the most marked advance that was made, when exchanges grew in size, was the introduction of the so-called multiple switch. Before its introduction, each operator had the care of, say one hundred subscribers whose lines terminated in front of her. She could connect any two of these one hundred directly, but as soon as a connection had to be made to another position a subsidiary junction line had to be brought into use and the services of another operator invoked to complete the connections. To obviate this difficulty as the number of positions and subscribers increased, the multiple switch was designed. The lines of, say, one hundred subscribers are then terminated on one operator's position; but on a large panel above these local jacks the whole of the 10,000 or more lines are connected to a series of jacks within reach of the operator, and this is repeated at every operator's position, so that a line on any position can be directly connected with any of the other lines on the exchange by the operator who answers the call.

A further improvement was the common battery system. In this, the form of manual exchange equipment now considered the most satisfactory, the shutter indicators are replaced by glow-lamps placed immediately over the jacks. When a lamp lights it indicates a call, and the operator, without doubt, hesitation or delay, forthwith inserts the answering plug into the jack. At the subscriber's office no special calling apparatus is needed. The lifting of the telephone from the hook automatically lights the lamp. The electrical energy in common battery systems is provided by accumulators at the exchange, instead of by primary batteries at each subscriber's office, and not only is the cost of the exchange infinitely small as compared with the old system of providing separate batteries for each subscriber, but the further advantage follows that the full energy is always maintained and available on every circuit, a condition almost impossible to fulfill even under the best organization when thousands of primary cells scattered over a great city have to be looked after by linemen. Similar automatic arrangements are in use on the junction lines connecting the various exchanges necessary for the effective service of large cities.

In the period during which the ordinary telephone equipment has undergone the modifications mentioned, inventors have turned their attention to the design and perfection of an automatic telephone in which each subscriber, by a simple method of manipulation, may, without the intervention of an operator at the exchange, obtain direct access to any other subscriber connected with the service. In the principal automatic system in use each subscriber's line terminates on a line switch which forms part of a group of 100 switches. This switch is connected by ten circuits, the equivalent of the plugs and cords in a manual board, with a series of selectors each accommodating 100 junction lines. According to the size of the exchange there may be two or three sets of selectors connected similarly by means of junction circuits, and finally, there is a connector, a somewhat similar instrument, which makes the connection between the two subscribers. Each telephone has a dial with finger holes and numbers. On removing the telephone from the hook the procedure is as follows: If, say, No. 4852 is wanted the caller inserts his finger in hole 4 and revolves the dial up to the limiting stop. This actuates the line switch which causes a connecting plug to enter the springs of the first disengaged junction leading to the selector group of 4000. The same action follows in sequence with 8, 5 and 2, the final movement of the connector making the connection if the required subscriber is disengaged. If he be connected with another, a busy back signal (a vibratory current) is given. When the connection is made and the conversation is complete, the hanging up of the telephones restores the connections to the normal.

Time does not admit even of reference to many subjects of interest, such as combined telegraph and telephone working on the same wires, the use of repeaters to increase the speed of working on long lines, modern fire-alarm systems, railway signaling, etc., but I trust that what I have said will show that this, one of the earliest branches of electrical engineering, is not stagnant, but, on the other hand, is very much alive; it is served by some of the keenest and most advanced of electricians, and it is absorbing annually a large amount of capital which it is turning to good and profitable use.

How the Western Union Handled Telegraph Reports of the Reno Fight.

The handling of press specials and regular messages at Reno, Nevada, on July 4, and the two weeks preceding the Jeffries-Johnson fight, amounting to more than a million words, demonstrated the efficiency of the Western Union service under extraordinary conditions.

The regular plant at Reno consists mainly of repeaters on the through circuits, the only local circuits being with San Francisco, Salt Lake, Goldfield and way wires east and west, but when the company's officials received assurance that the fight would be held at Reno, equipment for automatic and Morse circuits were started for Reno by express from Chicago, San Francisco, Los Angeles and Seattle. Men experienced in the setting-up and operation of the various instruments were detailed from Chicago, Kansas City and San Francisco, and as fast as the different shipments were received, the instruments were placed on temporary tables ready for service.

The regular operating force of the Reno office consists of the manager, three repeater chiefs, nine operators, five clerks and six messengers, but as the Fourth of July approached, the Reno office saw an increase in the number of employees until on the day of the contest there were sixty-nine operators, sixteen clerks and eighteen messengers on duty.

A. H. May, district superintendent, and J. V. O'Brien, manager of the San Francisco office, were among the early arrivals, with the first of the newspaper correspondents. A few days later L. McKisick, assistant general superintendent of Chicago, arrived to supervise the installation of extra equipment, assisted by R. W. Gillette, electrician of the Pacific division, San Francisco. Superintendent of Construction Ord and General Foreman Quinn, of San Francisco, were on the ground early and had two cables strung to the arena several days before the contest.

Recognizing the inconvenience employees would experience if they were lodged in overcrowded hotels, the Company ordered two Pullman sleeping cars, with dining cars, placed in the yards at Reno for the accommodation of the force. The meals were superior to hotel fare, and nothing but

praise has been heard from the men for the provisions made.

There were about 150 correspondents in Reno, many papers of foreign countries having special representatives on the ground. These correspondents filed a total of 1,000,003 words during the two weeks, the filings on July 4 being 206,000 words, all of which was handled in such a manner that not one special reached its destination too late for publication in the edition for which it was intended.

In addition, there was a very heavy message business to be handled promptly, more than triple that of normal days. On Saturday and Sunday, July 2 and 3, hundreds of messages were received at Reno for city delivery, and several thousand were sent out.

On July 2, at noon, a complete change in the overland circuit arrangement went into operation, to be effective until the morning of July 5. This gave Reno twenty-eight circuits, of which three were Wheatstones.

In addition direct wires were assigned to the press associations, as follows: Reno to New York, three; Denver to San Francisco, one; Reno to Denver, one; Reno to San Francisco, two.

Riders were placed on all circuits at each repeating station; linemen stationed at intervals over the mountains between Reno and Sacramento and at important junction points to be close at hand in case of interruption to the circuits; and extra operators were on duty at test stations to insure perfection of service.

The popularity of the night letter service necessitated the placing of extra clerks at the office counter every afternoon and evening. So great was the crush that the public could not be accommodated inside of the office, so a shelf was placed outside the building on the sidewalk with two receiving clerks to accept messages from the crowds. The minute the decision in the contest was known, people began pouring into the office faster than ever to file messages to friends giving the result. This required sixteen receiving clerks to handle the business offered.

There were few interruptions to circuits, and those for the most part being from causes over which the company had no control and all being of short duration. A few were due to operators in the way stations cutting their Morse sets in on the long leased circuits from the ringside trying to get news of the progress of the fight.

There were seven circuits at the ringside, all of which were leased to press associations. No bulletin service was handled by the company, although Western Union wires were the only ones within the arena.

The furnishing of leased wires from the ringside to the four principal press associations greatly reduced the volume of separate press specials which would otherwise have been filed.

The Wheatstone played a very important part in the handling of press matter. While many wires pass through Reno, their general assignment is for handling Pacific Coast business, and being well filled with traffic under normal conditions there was no decline in that business prior to or during the contest. Three terminal and two repeater Wheatstone sets were available; also five automatic typewriter keyboard perforators and thirty mallet perforators were in readiness and in use a great part of the time. Practically all of the Chicago, Kansas City and San Francisco employes taken to Reno were combination Morse-Wheatstone operators.

In addition to the supervising officials already named, the assignment of the force was as follows:

Loops: Manager E. D. Edwards, Reno. Wire chiefs: L. B. Dobyns, T. A. Long, Reno. Repeaters: E. P. Hearn, C. R. Parkinson, Reno; E. A. Wood, R. O. Burke, Kansas City; A. W. Kirk, C. J. Killick, L. R. Gladdin, A. H. Iliohan, San Francisco. Wheatstone chief and assistants; J. J. McCormick, Fred Thomas, Chicago; T. J. McDonald, Los Angeles; T. McGuinness, San Francisco. Traffic chief and assistants: J. R. Pierce, Chicago; J. L. Pember, San Francisco; F. E. Wells, Reno. Solicitor: Herbert Brown, Chicago. Numbering clerk: R. J. Mullin, Chicago. Mechanician: H. C. Probst, Chicago.

Operators: F. M. Andrews, B. H. Dougherty, S. T. O'Connell, E. O. Hildebrand, Kansas City; H. W. Horstman, T. A. Egan, C. E. Willoughby, L. W. Head, C. Congdon, L. B. Landry, J. Guerin, Wm. F. Otto, Chicago; E. H. Graham, L. Barnes, Salt Lake; W. Goldberg, J. W. Biller, O. G. Morgan, R. S. Vallespin, E. J. LaSalle, G. L. Kirshmeier, H. J. Gallagher, H. Newlander, S. W. Brewer, S. T. Smith, J. O. Newman, A. Lughamer, A. J. Grassell, J. E. Whipple, W. Simpson, W. A. Smith, C. C. Christian, O. L. Holloway, W. H. Jackson, H. Marks, M. Charles, D. C. Paisley, San Francisco; Miss B. L. Stagner, C. Riley, Miss E. Stout, Matt Reilley, Mrs. M. Reilley, H. B. Richards, F. M. Conehay, Miss H. Youngman, C. V. Relyea, J. A. Busse, Reno.

Clerks: C. H. Ackerson, A. C. Gibbons, San Francisco; A. L. May, Homer Comstock, B. Weck, H. Pion, A. Axt, Mrs. E. D. Edwards, Miss Fanita Edwards, Mrs. Irma Sedgwick, J. G. Smith, Miss Mollie Hogan, W. F. Sedgwick, Roy Sedgwick, Ralph Hearn, J. J. McCabe, Reno.

Mr. Frank B. Knight, of the Southwestern Telegraph and Telephone Company, of Dallas, Texas, writes "I am glad to note the change of title of the paper, as well as the many items of telephone news, which you are publishing. The paper is a most welcome visitor and is always read with much pleasure, especially items pertaining to the old telegraph days and the men connected with the business in ancient times."

The Military Telegrapher in the Civil War.

PART XLV.

BY S. L. ROBINSON, HARBOR SPRINGS, MICH.

In the main the incidents, dates, etc., in this article are from memoranda made at the time and preserved by me. Of a necessity, however, much has been from memory and the passing of from forty-five to fifty years since the incidents related occurred, must be my excuse for errors.

My telegraph career began on the Michigan Central Railroad at Niles, Mich. in 1859. I was operator at New Buffalo, Mich. when Abraham Lincoln was first nominated for president and at Chelsea, Mich. when he was elected.

In September, 1861, I went to Detroit and enlisted as regimental drummer in the First Michigan Lancers.

I had just about learned to play on a drum when our band was mustered out. I then re-enlisted as bugler in Company A of the same regiment, serving as such until March 20, 1862, when for some reason unknown to us, our regiment was mustered out, never having left Detroit or that vicinity. I made several unsuccessful attempts to re-enlist, but was rejected on account of my height, being less than five feet. To pass the mustering officer when mustered in as bugler I stood on a brick in the rear rank in order to get in.

I then after a short stay at home started for Cairo, Illinois, and entered the military telegraph service as operator June 21, 1862. I was at Cairo until October when I was ordered to open an office at Union City, Tenn. In November I was sent to Kenton, a few miles south.

At that time a few companies of soldiers were located at stations between Columbus, Ky., and Corinth, Miss., to guard the Mobile and Ohio Railroad, our army depending on the railroad for supplies. At Kenton three companies of the One Hundred and Nineteenth Illinois were camped on the north side of the town while my office was quite a distance south of them. The first news of pending trouble was reported from Humboldt about twenty miles south of us. J. C. Holdridge the operator there reported that the line had been cut between Humboldt and Jackson and that firing could be heard south of Humboldt.

The next day J. S. Lyle, operator at Trenton said that the Confederates were coming and then the line opened. I told the officer in command at Kenton that I would stay at my office as long as the troops staid but if they started north to let me know in time to go along.

I remained until dark and then found that our troops had broken camp and started up the railroad some time before. Already the natives had perceived the situation and but for the darkness would probably have captured me. I took my telegraph instruments under my arm, covered by an old shawl and going around the little village

struck the railroad on the north side of town and started on a record walk down the tracks.

It was an hour before I caught up with the rear guard of our soldiers but before we reached Crocket I was in front and speaking my mind to the commander for leaving me behind. At Crocket I cut in at a pole, raised Columbus, Ky., and reported the condition of affairs between Kenton and Crocket. The railroad was built on trestle work for miles passing over swamps, so that the cavalry in order to reach Crocket would have to go a long distance around. The commanding officer at Columbus accordingly sent a train to meet us, we marching northward in the meanwhile. When we heard the whistle of the relief train it was about as sweet music to us as any ever heard.

I believe I was the only operator between Columbus and Jackson, who was not captured by Forrest, on this raid. I staid at Columbus from December 20 until January 2, when I was sent with a construction train to open up the railroad again.

As escort we had two regiments of infantry and a battery of artillery under command of Colonel Moore of the Twenty-second Missouri.

I first opened the office at Union City and by the ninth the railroad was passable to Crocket. On the sixteenth I walked to Kenton to see if any of my belongings had escaped capture.

I had taken my meals at Kenton with a Mrs. Chambers, whose husband was an officer under Forrest. At one time she was very sick with malaria and I tried to get some whiskey and quinine for her from our medical department, but the surgeon would not give me any. I then had our manager at Columbus send me a demijohn of whiskey and some quinine marked acid and material for battery purposes, and I gave this to Mrs. Chambers.

The whiskey, quinine or faith cured her. When I heard of General Forrest's coming I told that lady that I would leave my clothing and other things with her and, that if she could save them without getting herself into trouble I would appreciate it.

She had them all safe upon my return and I felt well repaid for the little trouble I had taken for her.

I then went on to Trenton and re-opened an office there, staying until orders came to abandon the Mobile and Ohio Railroad north of Jackson.

I left Trenton for Cairo on the last train, an engine and a flat-car with a field gun called a gun car. We narrowly escaped a wreck some one having partly cut the timbers of a bridge which we had to cross, but we passed over before the bridge went down.

I was next ordered to Memphis and from there to Corinth. After a few days at headquarters I went to Chewalla an outpost on the west, and remained there until June.

An experience I had at Chewalla one night is still fresh in my mind. A company from our post, which was out foraging were surrounded in a

swamp by a force of Confederate cavalry. One of our men made his way through their lines and reported the situation. Our colonel did not dare weaken his command by sending help, hence the only hope for relief was to call on General Dodge at Corinth to send a body of troops to their rescue.

It was during one of the most severe thunderstorms I ever saw. My office was fairly a mass of fire. I had cut out the instruments but regular fire balls jumped from the wires to the floor and seemed to chase each other around the room.

I put the glass tops of nigger head insulators on the bottom of the legs of a chair, and winding a silk handkerchief around my right hand and wrist, had a soldier push my chair with me in it to the table, I cut in, and was able to raise Corinth and get a message through. Our men held out, until the force from that place arrived and the Confederates were driven off. Ordinarily it would have looked like courting suicide to do as I did, but in those days and places we had to take all kinds of chances.

About the middle of June I was ordered to Memphis and on the twenty-third with Wayne Parsons and Edward Butler, started for Vicksburg on the steamer Luminary.

Our cargo consisted of ammunition for the army. As we rounded Cypress Bend the enemy opened fire on us, with a battery of artillery stationed on the bank of the river. All we could do was to put on steam and do our best to get out of range. Fortunately none of their shot injured the boat, but for an hour we were anything but comfortable for if a shot had struck the magazine or boiler it would have blown up the boat with all on board. We finally reached Chickasaw Landing, above Vicksburg at 9 a. m., June 26.

We arrived at General Grant's headquarters that afternoon. I was ordered to report to General Herron on our extreme left, where I staid until the surrender, going into Vicksburg July 5.

The day our army entered Vicksburg it was very hot and the dust in the roads was ankle deep. In looking about we found a large cistern under a porch which from appearances had recently been in use for drinking purposes. Finding a pole I brought up a pail of water and as it tasted all right and cool I drank a cup of it. As it went down it felt strange, however, so taking some out where there was more light I found that the water was fairly alive with wrigglers. Still history records that the Confederates in Vicksburg were without fresh meat of any kind.

On the ninth of July I started with Solomon Palmer and a crew to build a line to Jackson, Miss., to keep in touch with General Sherman's army then marching in that direction. By the eleventh the line was working to Edward's Station, by the twelfth to Boulton, the thirteenth to Clinton and the fourteenth to General Sherman's headquarters at Jackson.

After a few days I returned to Black River

Bridge taking charge of that office where I was stationed until May, 1864. The office at Black River was in the only house left standing.

General Grant realizing the importance of telegraphic communication gave us an order saying that the house was to be left entirely under our control for an office and operators' quarters.

During my stay there the command was changed a dozen times or more, after nearly every change I would be ordered to vacate the house for some more important party and I had some lively word battles with quartermasters, but no one in the west was of enough importance to countermand the order in my possession, General Grant having gone east as commander of the army.

In May I was ordered to Memphis where I remained part of the time in the main office and part at various headquarters. There was a lively lot of operators at Memphis. "Doc" Johnson, L. H. Korty and Dorsey Berry, stuttering Dorsey who kept us all in good humor. He could play the banjo, dance and sing and was always ready for any lark.

(To be continued.)

Some Early New York Telegraph Reminiscence.

BY JOHN K. CALVERT, LEONIA, N. J.

The Bain Chemical Telegraph Company had the honor of introducing me to the telegraph world. This momentous event in my career occurred in 1852, and the office of the company was at 29 Wall Street, New York.

Mr. Augustus Swan, to whom I made known my desire to push along things telegraphic, being no doubt impressed by the rakish tilt of my new Kossuth hat and its adorning ostrich feather (a very popular headgear in those days) and thinking I might do, engaged me as messenger to be placed among half a dozen others already in harness.

The operating room, which was on the first floor, back, measured about fifteen by twenty-five feet. This space was occupied by both the operating and delivery forces, and as I recall it, we got along peaceably and without much friction. The force consisted of Mr. Swan, manager, and operators: Messrs. William Porter (champion of the key in those days), Al. Reeves, Alfonso Prescott, and a Mr. Lumm, whose initials I have forgotten—a genial, young and gentlemanly set. Marshall Lefferts was president, and John McKinney, superintendent.

At my enlistment in the delivery corps, I found already there, and even then a veteran among the messengers, one who, like myself, took root—later becoming a permanent cog in the huge telegraph machinery. I refer to Thomas A. Davin who has but recently "closed his key" for, let us hope, a wireless rest of eternal bliss. Mr. Davin up to his death had been continuously employed as operator in a banking house in Boston for approximately thirty years, a record that speaks for itself.

Although it occurred nearly sixty years ago, many pleasing memories connected with my advent in the service linger. One little episode may not be out of place, and I give it as a specimen of wit from Mr. Swan which I, then a boy, thought very clever. In those days the term "bull" for an error had not yet come into use, "corn" was its predecessor; an error of whatever nature was commonly called a "corn." In the basement of our building was the office of N. L. Cobb and Company, brokers. One day their clerk brought in a message to be "rushed"; Mr. Swan himself rushed it. He had hardly finished "Sig" when the clerk reappeared in hot haste, saying there was a fatal mistake in the message and asked to have it recalled; this was easy and the message was "killed." On the retirement of the clerk, Swan turned to the force and, in quiet tones, exclaimed: "That, I think, was a 'corn' on Cobb!"

Our division of the Bain system worked two wires to Boston. I should have said worked two wires some of the time, one wire part of the time and no wire most of the time. The chronic condition, according to my memory, was "down." Down or up, the operators' salaries were stationary, but not so with the messengers, the stoppage of business stopped our income. On many such occasions Mr. Swan, no doubt to be rid of us for the time being, would give passes to Barnum's Museum (then located at the corner of Broadway and Ann Street) to half the delivery force, and though our earnings diminished, we spent many happy hours at that world-renowned caravansary.

The first uptown office was opened by Mr. Swan at the Astor House in 1851. He later took John W. Lewis as assistant. Together they made of the Astor House office the institution it is today. Death retired Mr. Swan a few years ago, when Mr. Lewis took charge and still holds command. Mr. Lewis has thus served fifty-six years in the same office and appears to be good for many years more.

The uptown march of the wires next reached, by way of the house-tops, the Metropolitan Hotel, at Broadway and Prince Street, a famous hotel in its day. This venture was financed by a Mr. Beatty, and though he was good enough to take me as his assistant, messenger, and general utility man, I find I can speak of him but vaguely. The enterprise not proving the immediate success anticipated, he found a purchaser and turned over the plant (together with the writer) to its new owners. With this change the House printing system was substituted for the Morse at the Metropolitan Hotel, and subsequently was installed in several other city offices opened later.

About this time, 1854 I think, the World's Fair opened at the Crystal Palace, on the site of the present Bryant Park, at Sixth Avenue and Forty-second Street. A space six by ten feet being secured, an office was therein opened and the House printing telegraph and myself shared the interest

and curiosity of the wonder seekers. Very little business being done (the visitors not paying fifty cents admission to the fair to telegraph), the attempt to make it a paying proposition was abandoned and I, after a few weeks' attendance, was called back to the Metropolitan Hotel, where S. C. Hendrickson was manager. Soon after my return Mr. Hendrickson was made superintendent of the City lines and I became manager of the office, retaining that position until 1862 when I was transferred to the main office at 145 Broadway and assigned to the Philadelphia printing circuit.

During my occupancy of the Metropolitan Hotel office many notable and some historical events occurred at that house. Conspicuous among them was the banquet in celebration of the successful laying of the first Atlantic cable, in 1857, at which Cyrus W. Field was the guest of honor. The feast was held in the large ball-room of the hotel, which was handsomely and appropriately decorated. Among the guests were the Governor of New York, the Governor of New Jersey, many United States senators, judges, members of Congress, the Mayor of New York, and a large number of other dignitaries. I may be pardoned if, being much in the lime-light on that occasion, I bring my own personality into this foreground. In the northwest corner of the room a generous space was roped off with a silken rope, and inside the enclosure the telegraph was temporarily established. The apparatus was of the printing pattern. Mr. Hendrickson superintended and I did the operating. Here, at intervals during the ceremonies, I was receiving, not only messages from our own country's high officials, but, as it was said, cable despatches of a congratulatory nature from kings, queens, and other potentates of European countries. Each message, when read by the toastmaster, was received with vociferous enthusiasm, and mutual felicitations were in evidence. Had the fact been known that these precious cables originated at 21 Wall Street the enthusiasm would, perhaps, have been less pronounced. The cable had broken down some time prior to the banquet, this I did not then know, but learned later.

That I was useful, in my modest way, in these proceedings, goes without saying, but that I was also ornamental was proven by the presence of a large structure of the confectionery man's art representing the Printing Telegraph machine, with the writer as its operator. This "piece de resistance," about three feet high, occupied the centre of the principal table and was, of course, much admired. I don't know that Mr. Field was envious, but certain it is that he failed to congratulate me on my saccharine and statuesque prominence at his jubilation.

In 1854 Commodore Perry, accompanied by a flotilla, made a ceremonious call on Japan, and after some hard knocking induced her to open her door. One of the results of this visit was a return call from Japan, in the form of an embassy.

sent to our government to effect a treaty between the two countries. This was the first embassy ever sent from Japan to a foreign power. On its way to Washington it stopped in New York as guests of the city staying at the Metropolitan Hotel. It numbered probably thirty members and was received with much honor and attention. Attired in their native dress, flowing silk and embroidered robes, drawn in at the waist by a broad sash, through which were thrust two swords, their appearance was unique.

The telegraph being to them a miraculous invention of the barbarian outsiders, they were much interested, and their curiosity brought me in frequent contact with many of their party. One in particular, called "Tommy," was so persistent in his search for telegraphic lore, that we became quite chummy. "Tommy" was a bright, sprightly lad, under twenty years of age, and for some unexplained reason had immediately jumped into popular favor; whenever the embassy was spoken of, "Tommy" held the centre of the stage. What his rank was no one seemed to know, but his popularity was remarkable.

In due course the City Line had become a big feeder and distributor. It was taken over by the American Telegraph Company and was included in the district over which J. C. Hinchman was superintendent. On one of Mr. Hinchman's frequent calls at my office he asked me how many messages I was handling in a day. I replied that the day before had been my best day, that I had sent and received ninety-three messages. He appeared pleased and said: "John, when you have reached one hundred, draw on me for a new hat." I wanted that hat; I knew it would be a good one when it came, and Genin's silk hats cost eight dollars in those times. The next few days I did some extra hustling. It was not long before I had reached my goal. I wired that fact to Mr. Hinchman asking to be favored with the address of his hatter. I never received the hat, however, or even the hatter's address.

I had better luck on another hat proposition. E. L. Davenport, the then eminent tragedian, was filling an engagement at Niblo's Garden, and one day had an important message for John T. Ford, at the Holliday Street Theatre, Baltimore. Mr. Davenport's many demands on the telegraph had brought us into friendly intimacy; this day he said: "Calvert, this message is very important to me. If you will rush it and get me an answer inside an hour I will buy you a new hat." It did not take long to inform the boys along the line of the status of things and secure their co-operation. Suffice to say Davenport got his reply within an hour—and I the hat.

An Invention Paid For Principally in Experience.

Mr. E. J. Edwards, writing recently, tells the following story of Thomas A. Edison's sale of his patents of the carbon telephone transmitter. In reply to the question as to whether he did not

receive a large amount of money for this patent which made the modern telephone possible, Mr. Edison said:

"I suppose I got paid in large part for that in experience. I had a good many things to learn about business in those days.

"You may remember that the Western Union Telegraph Company, after the telephone was demonstrated to be a practical invention—that was about 1876—planned adding a telephone system to its telegraph lines. To everyone it seemed certain that there was to be severe competition between the Western Union and the original telephone company for the telephonic business of the country. I don't remember much of the detail of this threatened competition, but I do know that at the time the transmitting apparatus of the telephone was by no means perfect, so I set to work to make a perfected telephone in this respect, a vital matter for the future of the invention. Well, after a good deal of hard work, I got what I was after. There it is."—and Mr. Edison pointed to the telephone which stood on his desk.

"With my carbon transmitter ready for a demonstration I went to the offices of the Western Union; I had previously sold that company my stock ticker invention and my quadruplex system of telegraphy, and quite naturally, I suppose, I gravitated to it with the transmitter. I saw the general manager and one or two other gentlemen, showed them the transmitter, and told them that I was pretty sure that, with my apparatus in their possession, they would have the bulge on the Bell instrument. I tell you, they were an interested lot of men, and as soon as I gave them a chance they asked for some kind of an option on the invention, and I gave it to them without further ado.

"It was only a little while later that they sent for me and made me a proposition to buy my apparatus outright. They said they were willing to pay me about a hundred thousand dollars in annual installments covering a rather lengthy period. I thought that was a lot of money, and how nice it would be to count with perfect certainty upon an income of several thousand dollars a year for quite a number of years, and, do you know, I let them have that invention on their own terms?"

"A few weeks later," he continued, "I heard that the Western Union had sold my improved transmitter to the Bell people for \$800,000, simply by proving to the latter that it had the bulge on them.

"But I have never regretted the deal I made with the Western Union people, or, rather, the deal they made with me. I gained a lot of experience in that transaction, and it was worth all it cost. I have never let anybody get the better of me since, and I am certain that the experience I got then has made me far more money than I lost through inexperience when I didn't dicker back and forth between the Western Union and the Bell people with my transmitter."

A New Improvement in the Belin Process of Picture Telegraphy.

BY DR. ALFRED GRADENWITZ.

Few problems of recent years have assumed the same degree of popularity as the telegraphic transmission of pictures and handwriting. Among the inventors concerned with the solution of this problem there are many who only consider it as a preparatory stage in the fulfillment of a task far more difficult, though incomparably more interesting, viz., the problem of electrical television, that is, a process enabling any kind of objects or animated scenes to be made visible at the other end of a telegraph or telephone line, which in spite of its undoubted attractiveness, possesses very limited practical possibilities. Tele-photography proper, however, is likely to prove of extraordinary value especially for the purposes of the illustrated press. As soon as a faithful picture of an event, in addition to the news itself, is transmitted to any distance without any loss of time worth speaking of, photographs will assume the same degree of actuality as the reports of newspaper men. The tele-photographic process invented by Professor Korn seems to be quite suitable for such purposes. In fact his apparatus has already been used occasionally for the telegraphic transmission of pictures.

It will be remembered that a French inventor, Mr. Edouard Belin of Paris, some time ago designed a new tele-photographic process. This has recently been brought to such a degree of perfection by the surprising sharpness and effectiveness of its reproduction as to excell anything so far done in the same line.

Already, in the first experimental apparatus, as well as in the second outfit constructed for use in transmission between Paris and Lyons, the vital organ of the Korn apparatus and the scheme of most other inventors, viz., the selenium cell, had been replaced by a variable rheostat arrangement.

A photographic print in bicromated gelatine, presenting a series of marked elevations and depressions (corresponding to the shades of the picture), was wound round a cylinder rotating in front of a tracing point carried by the short arm of a lever. The long arm of the lever carried a little wheel rolling upon a series of silver plates alternating with minute sheets of mica of an aggregate thickness of only one-tenth of an inch. By sliding on the elevations and depressions of the picture the double arm lever, with the wheel affixed to its end, thus inserted into the circuit a variable resistance depending upon the depth, and accordingly the shades of the various portions of the picture. The fluctuations in current intensity thus introduced into the circuit were transmitted over the telegraph or telephone line, in order to be reconverted at the receiving station into fluctuations of luminous intensity.

In spite of its relative accuracy and the richness of details obtained with a rheostat of sufficient

gradation, there still remained a certain hardness of shades in the reproductions obtained at the receiving station, because of the step-wise alteration in resistance on which the process was based. The inventor, therefore, replaces in his new apparatus, the graduated rheostat by a microphone of special construction.

The apparatus installed at the sending station outwardly resembles a phonograph. The picture to be transmitted is wound upon a rotating cylinder which, like a phonograph roller, at the same time performs a progressive motion in the direction of its axis. The microphone referred to is substituted for the phonograph membrane, converts those slight elevations and depressions in the photographic print (corresponding to the shades of the picture) into fluctuations of current intensity, which, like telephone currents, are transmitted over a line of electrical conductors, to the receiving station situated at any distance, in order there to be reconverted by a sensitive galvanometer (oscillograph) into fluctuations of luminous intensity. In fact, this galvanometer carries a mirror which, according to the intensity of the current flowing through it, undergoes a variable deflection, thus controlling, in conjunction with a scale of graded shades, the intensity of light acting upon the photographic film or paper. This is how, with an extraordinary sharpness, are reproduced in succession, all the various points of the picture, even the slightest shades being fully rendered without any abrupt transition.

The most interesting part of the apparatus, viz., the microphone, which also lends itself for use in long-distance telephone communication, is constructed as follows:

To a flat cylindrical box is fixed an insulated carbon bottom, and to this is attached another insulating plate, perforated with holes two millimeters in diameter, that are arranged at equal distances apart, on three concentric circles. Into each of the holes is tightly fitted a carefully shaped spherical carbon grain, and against these grains is applied a carbon membrane ninety millimeters in diameter, and seven hundredths of a millimeter in thickness. This membrane is substantially encased at the edges and communicates directly with the microphone box, to which one of the terminals of the circuit is connected, while the other terminal communicates with the bottom plate.

The exact position of the membrane is adjusted by properly tightening some paper rings on which it is resting. The system constituted by the bottom plate, the grains and the membrane, thus is conductive, and if the resistance of the contacts were nil, would short-circuit the two terminals. However, each grain obviously forms a shunting of the circuit, the internal resistance of the microphone being lower as the number of grains is more considerable. In actual practice Belin has found three grains to be quite sufficient, provided these grains be located at the three summits of an equilateral

triangle, but the sensitiveness of the system could obviously be increased or diminished at will by altering the number of grains and distributing them either over the three circles, or any one of them.

For the sake of its application to tele-photography, the microphone is so adjusted that the membrane will tighten the grains sufficiently to prevent any motion between them and the bottom plate. As soon, however, as any pressure is brought to bear upon the center, the flexibility of the membrane between the three summits of the triangle will enable it to give way without breaking.

The contacts between the grains and the membrane on the one hand and the grains and the bottom plate on the other, are the more perfect, as the pressure exerted on the membrane is more considerable, and their resistance, as well as the total resistance of the microphone, will be reduced in proportion.

Experience has shown this apparatus to resume with absolute safety its initial resistance as soon as the pressure is relieved; a given pressure always corresponds to a given variation in the resistance of the microphone. This can be ascertained by means of a micrometrical outfit similar to a spherometer, provided the external conditions be left unaltered.

The only difficulty to be overcome was that the microphone being in itself of very low resistance, any variations in its resistance are quite negligible as compared with the absolute resistance of the circuit. In telephone work this difficulty is avoided by using an induction coil, but such an apparatus could not be used in connection with tele-photography, lest the dark and light portions of the picture be mixed up.

Belin therefore devised the following arrangement:

The microphone was substituted for the resistance to be measured, in a Wheatstone bridge formed by the transmission line, the galvanometer being replaced by the receiving station. The three remaining branches of the system can be chosen at will; and by a proper regulation, allow the intensity and sensitiveness of the arrangement to be readily controlled. A very important advantage of this scheme is the fact that the receiving and transmitting apparatus are maintained in absolute agreement independently of the length of the intervening line.

On account of the extraordinary sensitiveness of the microphone, it is not only possible but it is indispensable to resort to extremely slight differences in relief. In fact, the best results are obtained with ordinary photographic carbon paper, the relief of which is perceptible neither to the eye nor to the touch.

The fluctuations in current intensity produced by variations in the microphone resistance (which in turn correspond to the different shades of the original photographs), are transmitted to the receiving station situated at any distance, in order there to be reconverted into fluctuations of light.

The receiving station is identical in principle with the arrangement used in the original apparatus, a Blondel oscillograph being used to produce this conversion.

The oscillograph, as is well known, mainly consists of a strong electro-magnet including between its pole pieces two extremely thin wires. These wires are connected together at one end, and constitute a loop closing the circuit. In their center is arranged a small mirror of about one square millimeter, which by the torsion of the wires, as produced by the passage of the current, is deflected more or less, according to the actual current intensity. On this mirror falls the converging beam from an intense lamp, the reflected rays being projected on the surface of the film on which the reproduction has to appear. By inserting an aplanatic lens, these rays are always concentrated in a given point, and by arranging a scale of light filters of regularly increasing transparency, the reflected rays are varied in intensity in proportion to the actual current intensity (and accordingly to the shades of the original picture), so that the rendering on the film gives a faithful reproduction of the last. Any diffraction is avoided by arranging an extremely thin opening one-sixth millimeter in diameter above the sensitive surface so as to be in immediate contact with the latter.

As the original photograph can be made ready within fifteen to twenty minutes, and as the time of transmission does not exceed three to four minutes (which is very much shorter than in connection with any other process), it may be said that the Belin process allows any event to be reproduced by a faithful photographic picture, twenty to twenty-five minutes after its occurrence, at a distance of up to 1,500 miles.

The same process obviously, is excellently adapted for the transmission of handwriting and drawings. The reproduction of a photograph as telegraphed by means of this apparatus frequently possesses even more strikingly artistic effects than the original itself, as the minute traces of indistinctness still left, will impart to the picture the very appearance of a painting.—*Scientific American*.

Weber's Handy Electrical Dictionary is a practical handbook of reference, containing definitions of every term or phrase used in the electrical industry. This vest pocket size indexed handbook contains over two hundred pages and over three thousand definitions. Notwithstanding the limitations of space, the work is so clear and lucid in its definitions, and so comprehensive in its scope, that it is not only an indispensable guide to the electrician in the intelligent performance and understanding of the duties of his profession, but is a work of the highest order of educational merit as well. Price, 50 cents. Address orders to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.



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The Railroad.

Mr. C. A. Parker, superintendent of telegraph of the Denver, Northwestern and Pacific Railroad has resigned.

Mr. J. H. Lindsey, formerly superintendent of telegraph of the Northern Railway of Costa Rica, at Port Limon, Costa Rica, is now associated with the Union Switch and Signal Company with headquarters at Springfield, Mo.

W. C. Muir, superintendent of the Canadian Northern Express Company and the Canadian Northern Telegraph Company at Winnipeg, Man., has been appointed general superintendent of both companies, with headquarters at Winnipeg.

Mr. J. L. Orbison, superintendent of telegraph of the Cincinnati, Hamilton and Dayton Railroad has been granted an indefinite leave of absence on account of ill health. Reports heretofore made to him will be made to the general superintendent.

Carlton Lewis Bretz, general manager of the Cumberland and Pennsylvania Railroad, died at Cumberland, Md., July 31, aged sixty-three years. Mr. Bretz began his railroad career as a telegraph operator on the Pennsylvania Railroad at Newport, Pa.

A patent, No. 965,017 for a selective signaling system, has been granted to H. O. Rugh, of Sandwich, Ill. For railways to call up selectively stations from the central office by means of step-by-step selectors at the sub-station with electromagnetic means for operating them.

Mr. M. W. Jones, formerly manager of the complaint bureau of the Western Union Telegraph Company at 195 Broadway, New York, but who for the past year has been secretary to Vice-President Stewart of the Guayaquil and Quito Railway at Ambato, Ecuador, has been appointed chief train despatcher of that road with headquarters at Huigra, Ecuador.

General Mention.

Mr. Martin Dauer who has represented our publication in the Syracuse, N. Y. office of the Western Union Telegraph Company for the past twenty years has retired from the service to engage in other business.

An experimental installation of the Murray Printing Telegraph, the invention of Mr. Donald Murray, of London, England, has been placed in service by the Norwegian Government between Christiana and Bergen.

The administration railway bill which places telegraph and telephone companies under the jurisdiction of the Inter-State Commerce Commission, goes into effect August 17. In accordance with the provisions of this act regulating the giving of franks the telegraph companies have issued notice of the cancellation of all franks held by persons not authorized to use them. A fine of not less than one hundred dollars or more than two thousand dollars is the penalty provided for giving or using a frank unlawfully.

Another claimant of the honor of first reading telegraph messages by sound has appeared in the person of Mr. William H. Phillips, of East Amherst, Mass. Mr. Phillips, who is now eighty years of age, learned the art of telegraphy when a boy at Bennington, Vt. He and George Harrington, of Troy, wishing to use the wire for personal communication to escape detection, were driven to adopt a scheme whereby they learned to read by sound. The fact that he could read messages that way was discovered by others, when in 1850, he read from the sounder the news of the death of President Zachary Taylor. As Mr. Alfred Weller, now of Laporte, Ind., as recorded on page 404 of our June 16 issue, took by sound the returns of the election of President Taylor, his achievement seems to antedate Mr. Phillip's by at least two years.

What Our Friends Say About This Publication.

Mr. R. H. Bohle, manager of the Western Union Telegraph Company, St. Louis, Mo., in renewing his subscription writes: "Telegraph and Telephone Age is the most welcome publication that comes to my home where I enjoy it hugely."

Mr. C. W. Casperson, superintendent of the government railway telegraphs, Queensland Railways, Brisbane, Australia, in a recent letter has this to say, among other things: "I am a constant and appreciative reader of Telegraph and Telephone Age, and find much of value in its columns regarding railroad management, etc."

Mr. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line, Wilmington, N. C., under date of July 14 writes: "I would enter a life subscription if it were not that by doing so I would miss the convenient opportunity of telling you, on the occasion of my annual renewal what pleasurable and profitable entertainment the Age affords. Your readers are to be congratulated upon the excellence of the journal you are placing before us. Personally, I thank you, and extend my sincere best wishes for continued increasing success and prosperity for the Age and yourself."

The following notice which has been sent by Mr. C. S. Rhoads, superintendent of telegraph, of the Cleveland, Cincinnati, Chicago and St. Louis Railroad, to all construction foremen and linemen in his department is an indication of the way in which our publication is regarded in the railway field.

"The advent of the telephone in train despatching and general railroad service together with the improvements in telegraph equipment means additional linemen trained to fit these new conditions. In order to keep abreast of the times, I want to suggest that every lineman should be a subscriber to Telegraph and Telephone Age, a sample copy of which will be sent you by the publisher. A valuable addition to this is a copy of Jones Pocket Edition of Diagrams, which also can be purchased of Telegraph and Telephone Age."

The Telephone.

Mr. Charles M. Nininger has been appointed district commercial manager of the Southern Bell Telephone Company at Atlanta, Ga.

Mr. W. G. Rauch of Atlanta, Ga., has been appointed division plant superintendent of the Southern Bell Telephone Company with headquarters at Charleston, W. Va.

Mr. W. A. Baker, division commercial manager of the New York division of the New York Telephone Company has been transferred to a similar position in the New Jersey division.

Mr. H. P. Storkerson, district manager of the Michigan State Telephone Company at Grand Rapids has been appointed superintendent of equipment with headquarters at Detroit.

At a recent meeting of the board of directors of the United States Telephone Company held in Ohio, Mr. F. H. McKnight of the firm of J. P. Morgan and Company, New York, was elected a director to succeed Mr. E. G. Tillotson, resigned.

Mr. W. C. Poage, of Houston, Texas, has been appointed division plant superintendent of the Southwestern Telegraph and Telephone Company with headquarters at Little Rock, Arkansas vice Mr. Fred Linnington, transferred to a similar position at Fort Worth, Tex.

Mr. R. W. Keeley has been appointed manager of the Southern Bell Telephone Company at Pensacola, Fla., vice Mr. A. C. Hobson, appointed district commercial manager at Columbus, S. C. Mr. Hobson in turn succeeds Mr. S. D. Lucas who has been appointed special agent at Charlotte, N. C.

At the annual meeting of the United River Plate Telephone Company, of Buenos Ayres, held in London July 19 it was voted to increase the capital stock from £1,000,000 to £1,500,000. This company now has 21,000 subscribers in Buenos Ayres and La Plata of which number 4,339 were added during the past year.

The Pacific Telephone and Telegraph Company has purchased the property of the Midway Telephone Company of Klamath Falls, Ore. The system of the Midway Company will be connected to that of the Pacific Company and extensive improvements made at Klamath Falls, and nearby towns.

The Wisconsin State Telephone Association has been organized at Madison, Wis., by representatives of a large number of telephone companies in that state. The object of the association is to advance the interests of telephone companies and to oppose the enactment of laws detrimental to the telephone business. The association as at present formed represents the interests of sub-licensee and Independent companies, but it is planned to carry the work forward on a strictly non-partisan plan, according to the announcement of the promoters. The officers are as follows: President, J. A. Pratt, Menominee Falls; vice-president, R. M. Richmond, Evansville; secretary, Paul J. Weirich, Monroe, and treasurer, W. F. Goodrich of La Crosse.

The Peruvian Telephone Company of Lima, Peru, has spent \$250,000 in the past two years in placing their wires underground and in adopting the common battery system. The company now has 1,600 subscribers in Lima.

The Minister of Posts and Telegraphs of Italy has recommended the expenditure of \$148,000 in improvements to the telephone system of that country, \$12,000 of this amount is for the purchase of apparatus for experimental purposes.

Tests made on the new loaded submarine telephone cable laid by the English Government across the English Channel have been very satisfactory proving that the new cable will fulfill the expectations of the engineers.

A new common battery telephone exchange has recently been opened in Hamburg, Germany in which seven other exchanges have been combined. The new exchange has 35,000 working lines at present and an ultimate capacity of 80,000, thus being, it is claimed, the largest telephone exchange in the world.

A conference of managers of the Rocky Mountain Bell Telephone Company for the good of the service was held recently at Salt Lake City. A feature of the meeting was the organization of what is known as the Ninety Club. The requirement for membership in this is that the manager shall have made a record of ninety per cent. or better in collections in his district.

During the six months ended June 30, the American Telephone and Telegraph Company and associated holding and operating companies earned \$80,634,614 gross, an increase of \$8,522,522 over the first half of 1909. Total expenses and appropriations were \$56,357,833, an increase of \$6,974,633, and net earnings, \$24,276,781, were an increase of \$1,547,859.

The city authorities of Los Angeles recently passed an ordinance fixing telephone rates in that city. This ordinance is being contested by both the Pacific Telephone and Telegraph Company and the Sunset Telephone Company. The city has accordingly appropriated \$15,000 for the purpose of making a thorough investigation of the properties of the two companies to determine whether the proposed rates are justifiable.

Mr. Bela Gati, engineer in chief of the Hungarian telegraphs and telephones is at present engaged in the development of telephone apparatus with the view of developing equipment which can be used successfully for speech transmission between London and Constantinople. He has produced a water cooled microphone which takes one ampere of current and which transmits speech experimentally with excellent results over 2,500 kilometers of line.

Telegraph operators in Asia Minor receive from \$12 to \$20 per month. Small as these wages may seem, they are one-third greater than the wages of five years ago.

Radio-Telegraphy.

The Chilian government is preparing to install a wireless station on the island of Juan Fernandez.

The Newfoundland government is planning to erect wireless telegraph stations at Fogo, Grey Islands, Belle Isle and along Labrador, to enable communication to be kept up with sealing steamers, and for general purposes.

It is reported that the Australian Government is planning the installation of wireless stations at Cape York and Port Moresby thus providing communication between British New Guinea and the mainland of Australia.

A patent, No. 965,960, for space telegraphy has been granted to C. D. Babcock of New York. An oscillation producer in which the discharge is muffled, having electrodes, one of which is provided with a plurality of points contained in a vessel holding gas under pressure. The electrode is rotated.

The United States Civil Service Commission will hold an examination August 24, to secure eligibles for appointment in the government wireless service. The only vacancy at present is in the position of assistant in wireless telephony in the signal service at large at a salary of \$1,080 per year.

The wireless operator of a Los Angeles paper was startled one day recently while receiving a message from Catalina Island to hear first the strains of music in his receiver and then a woman's voice. The message which he was receiving was interrupted several times in this way, much to his bewilderment. Inquiry afterward revealed the fact that at this time Dr. Lee De Forest was experimenting with his wireless telephone between Venice and Ocean Park, eighteen miles from Los Angeles.

An English inventor has recently produced a liquid microphone for use in connection with wireless telephony. In this device the high frequency telephone current is led through an electrolytic path of small dimensions, so arranged that its resistance is varied considerably by the vibrations of a diaphragm, the liquid being maintained in a state of continuous flow. The advantages claimed include absorption of energy, faithful speech reproduction, and constant normal resistance with facilities for adapting this to suit requirements. Models have proved capable of taking energies up to the value of five hundred watts.

Since wireless telegraphy came into general use on shipboard it has shown its utility for many purposes. The latest illustration of its value was brought to light recently when Dr. Hawley Crippen who was wanted in England for the murder of his wife succeeded in getting on board the steamer Montrose bound for Canada. By the aid of wireless telegraphy he was apprehended and arrested before he had a chance even to land on Canadian soil. Formerly if a criminal was fortunate enough to secure passage on a vessel bound for a foreign country his chances for evading the law were very good. Now however, it appears that he is just as likely to be apprehended on sea as he is on land.

It is stated that the Postmaster General of Argentina has submitted to his government a scheme for replacing the telegraph system of the country by wireless telegraphy, as he considers atmospheric conditions in that country most favorable for wireless operation.

Rear Admiral Schroeder, commander-in-chief of the Atlantic fleet of the United States Navy in his annual report recommends government control of all wireless plants. He says that the wireless operation on his flagship, which frequently took 200 messages a day, was often interrupted by commercial operators and amateurs.

The New Zealand Government has invited tenders for the construction of two high power wireless stations being a range of 1,250 miles and which can communicate with the high power stations being erected in Australia and the Fiji Islands. They will also erect three medium power stations with a range of 500 miles for local communication throughout the islands.

It is now proposed to equip all vessels of the U. S. Lighthouse Service which go out of sight of land with wireless telegraph outfits. There are at present about twenty tenders in the service which come under this classification and six lightships located thirteen miles or more from shore which are not already equipped. Four lightships have wireless apparatus and an outfit will soon be installed on the tender Kukui which is in service in Hawaiian waters.

Mr. J. R. Irwin, of the Marconi Wireless Telegraph Company, has been assigned to the Wellman dirigible balloon expedition, which expects to make an attempt to cross the Atlantic in September. The balloon will be fitted with a Marconi wireless outfit, and Mr. Irwin will have charge. His position on the steamer St. Louis has been filled by Mr. M. McIntyre, formerly at the Sea Gate, Coney Island, Marconi station. Mr. Irwin, it will be remembered, was the operator who was on duty at Siasconsett when the steamer Florida sank the Republic in January, 1909, and who received the first news of that disaster.

The Federal Grand Jury which has been investigating the affairs of the United Wireless Telegraph Company, on August 3 found indictments against seven officials of the company on separate charges of conspiracy to defraud and fraudulent use of the mails. The officials indicted are Christopher Columbus Wilson, president; Sam'l S. Bogart, vice-president; Wm. A. Diboll, treasurer; Francis X. Butler, director and general counsel; George H. Parker, director; Charles C. Galbraith, general manager, and William W. Tompkins, president of the New York Selling Agency. The indictment for conspiracy contained one count, while that for fraudulent use of the mails contained three.

Telegraph and Telephone Age contains much of interest to wireless operators. \$2.00 per year

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XIII.

In looking for faults in a quadruplex circuit how would you determine whether the line was open?

If in making this test your signals are broken up what does it indicate?

In this case how would you tell if the wire was simply grounded?

What condition of the apparatus would indicate a foreign current on the wire due to a cross with some other line?

How can you determine on which side of a repeating station, the wire is at fault?

What effect at the distant end of the circuit may be produced by an improperly adjusted pole-changer at the home station?

How may this trouble be eliminated?

Where would you first look for trouble if the distant station can not hear your signals on his neutral relay?

What will be the effect if the adjustment of the transmitter points is such as to prevent the tongue from being pulled away from the upper post when the transmitter is closed?

What will be the effect if the adjustment is such that the tongue remains in contact with the lower post when the transmitter is open?

In this case what will be the effect if the wire attached to the 900 ohm leak becomes broken?

What trouble would you suspect if the battery at the distant station interfered with the incoming signals at that point, one pole causing the signals to be light and the other pole having the opposite effect?

How would an open ground coil cause this trouble?

In case the fault can not be quickly repaired how would you proceed to balance the set?

What fault might indicate that one pole of your local battery was open or the current from it was not passing through the polechanger?

How would you determine quickly if this was the case?

If you can not restore the battery at once how can you adjust the apparatus so as to get a duplex out of it?

If after carefully adjusting a quadruplex set and balancing, it is found that the incoming signals on the neutral relay are still more or less interfered with when the distant office begins to send

on the polar side, at what point would you first look for the trouble?

If you should prove conclusively that the difficulty was not in the polechanger and was sure that the wire was clear, where would you look next for the trouble?

How may the proper battery proportions be destroyed?

How are the proper battery proportions obtained when current is supplied by a dynamo?

What is the effect on these proportions of extra resistance added by dirty transmitter points?

What would be the effect of a loose connection at the binding post of the leak coil?

How would you proceed to measure the battery of the distant office to determine if its proportions were incorrect?

What should be the approximate strength of the short end current?

How can you determine the presence of earth currents in a circuit?

How can you compensate for earth currents if they are steady and permanent?

How can you determine easily the number of cells of battery necessary for this purpose and how they should be connected?

What type of cells are best for this purpose?

Obituary.

G. W. Babbitt, chief train despatcher of the Michigan Central Railroad at St. Thomas, Ont., died July 12, aged sixty-seven years.

Charles E. Drew an employe of the Gold and Stock Telegraph Company died at Rockville Centre, L. I., July 26, aged fifty-three years.

Hugh H. Craig, a member of the United States Military Telegraph Corps, died at Tompkinsville, Staten Island, August 5.

Thomas Neilon, formerly an operator for the Postal Telegraph-Cable Company at Chicago, and other points, died July 14 at Tomah, Wisconsin, aged forty-six years.

John E. Payne died at Denver, Col., August 2, aged sixty-five years. Mr. Payne was identified with the Philadelphia office of the Western Union during the seventies.

James B. Watt, who for many years had been in the employ of the Associated Press as an operator died at Nashville, Tenn., August 4, aged sixty-two years.

Laurence F. Dowling, an old time telegrapher, who for many years was identified with the Western Union Telegraph Company at 195 Broadway, but who for the past fifteen years has been a warden in the Criminal Courts Building, New York, died July 28.

Joseph Landis, a member of the Old Time Telegrapher's and Historical Association and a veteran of the Civil War died at Mount Pleasant, Pa., July 21, aged seventy-five years. Mr. Landis, accompanied by his wife, was a well-known figure at the annual re-unions of the old timers.

Hints for Students.

A writer in "The Katipo," the official journal of the New Zealand Post and Telegraph Officer's Association, gives in a recent issue some very useful hints for the aid of students which, in part, are as follows:

"Every student knows, or should know, that it is necessary to understand his work before he attempts to memorize. To venture to memorize before understanding is being dishonest with oneself. The first and foremost object is to see that we understand that which we wish to memorize. What is understood is more easily remembered than that which is unintelligible. Never pass anything that is not clearly understood. Keep at it until you do understand it. If you should find it beyond you, go on to something else, but come back to the difficulty again and again until it becomes clear. Too great stress cannot be placed on this point. Many students try to memorize half-digested material, and find they do not get the results desired, that they are forgetting continually, and that no amount of application makes them perfect—and they wonder why. The reason is obvious—the memory has not been given a chance. We may well say, 'With all thy getting, get understanding.' Assume that we have our material properly prepared, that we understand thoroughly and clearly, that when we read the text-book we follow intelligently and understand without any trouble, and we also know exactly what we should commit to memory, what then? All this has to be learned. It must be clear that in the effort to understand and the constant endeavor of the mind to master what has been placed before it, that half the task has been accomplished. There only remains the fixing of such parts as slip out of the memory notwithstanding one's understanding them, and such parts as are mere facts that have to be learned as facts. One of the best and most effective means of memorizing is constant repetition, which means going over a fact or definition a hundred times every week, every day, even two or three times a day, if there is no other way. And when you have mastered it you must test yourself at intervals. The mode of testing may be either by repeating to oneself or to another, or by writing out the work. The latter is laborious, but it is the most effective in the long run. The fundamental principles of any subject must be so well understood that all a student has to do in the examination room is to write the answer to any question on these principles without any mental effort to speak of. This understanding can only be attained by persistent, steady effort always directed to the one end. Drudgery, you say. Well, drudgery pays. Drudgery is not ignoble if you drudge at the right thing in the right way with the right spirit.

"Many a student sits down and remains at his books for two or three hours and rises from his work with the impression that he is a good student. Does he sit and read in a cursory manner,

not bending all his mental energy to the understanding of his work, and reading aimlessly and vaguely? Or does he, under the pretext of thinking, every now and then fall into day-dreams, building castles in the air? Of all temptations that beset a student this dreaming is one of the greatest. It is one of the first essentials to a student that he should acquire the habit of fixing his mind on the work before him and keeping it there for a length of time.

"Every effort should be made by the student to cultivate this habit of steady concentration. This will come by application, and it is a mental power of the highest value. Frequently it means to men the difference between success and failure.

"In order to obtain the best results from any work the work must be systematically carried out. An hour every day, week in, week out, is of more value than three hours to-day, three hours on Friday, six hours next Wednesday, and so on. To have a regular time for working, to know how much time you have to spare, and stick rigidly to that, are matters of the highest importance. Having a fixed time for work helps one frequently to avoid the temptation to neglect work for pleasure.

"Economizing time is an art that should be cultivated to the utmost. System is the great time-saver and great labor-saver. Systematic arrangement of your time, systematic arrangement of your labor, giving a fair diversity without too much change, sorting out your work over a long period and endeavoring day by day to do your tale of work: these are the ways to get through your work. The secret of success may be expressed in various terms and in greater or less length, but in the end it will boil down to system and concentration."

Trade Notes.

Among the latest publications of the Western Electric Company is Bulletin No. 1004, describing their central energy non-multiple switchboards with lamp signals designed for use in exchanges of 500 lines or less.

The business of the Western Electric Company for the seven months ending June 30, indicates that the sales for the present fiscal year will amount to \$61,000,000, an increase of \$15,000,000 over the year ending December 1, 1909. The company now has 22,000 employes on its pay roll, an increase of nearly 4,000 since January 1. A new supply headquarters has recently been opened at Milwaukee on account of the rapidly increasing business in that locality.

The R. W. Martin Fund.

We have received from Mr. H. C. Richardson, of Metuchen, N. J., \$5.00 to be applied to the R. W. Martin fund and have turned the same over to Mrs. Martin. This makes a total of \$628.25 which has been collected on this account, all of which has been given to Mrs. Martin.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, WESTERN UNION.

Mr. E. V. McElroy is acting as assistant to Mr. M. G. Moyer, traffic manager.

Mr. Lewis A. Riley, of the operating department, and Miss Mabel G. Slattery, of the Barclay department, were married on August 10.

Henry Wobensmith, chief of the bookkeeping department in this office, died August 9, aged forty-two years. He is survived by a wife and two children.

Mr. Joseph Fendius, has been placed in charge of the bookkeeping department temporarily vice Mr. Wobensmith.

The telephone department has been moved from the first to the seventeenth floor and placed in charge of Miss Clara Grimley transferred from the operating room. Miss Agnes Johnson has been transferred from the Barclay department and added to the telephone department.

ST. LOUIS, WESTERN UNION.

Chief Operator W. E. Bellman is absent from his post of duty enjoying tent life upon the campus and among the brilliant faculty of the "Sheldon Summer School" at Libertyville, Ill.

Mr. H. G. Gosting, assistant chief operator, is filling the vacancy occasioned by Mr. Bellman's absence.

A number of official changes have taken place, among which are the following:

Mr. O. L. Turner, formerly chief clerk in Superintendent Chapman's office, has been appointed to a similar position in General Superintendent McKisick's office at Dallas, Texas. Mr. W. J. Armstrong, manager of the Missouri District Telegraph Company, has assumed the position vacated by Mr. Turner.

Mr. Geo. F. Stewart, house electrician in the main office, succeeds Mr. Armstrong as manager of the Missouri District Telegraph Company, with headquarters in the Fullerton Building.

Mr. W. H. Schroeder, formerly claim clerk in Superintendent Chapman's office, goes to Oklahoma City as chief clerk to Superintendent Lingafelt.

NEW YORK, WESTERN UNION.

Mr. E. T. Burrill, general traffic chief, has been appointed assistant day chief operator vice Mr. H. C. Worthen who has been attached to the office of the traffic engineer.

Mr. W. A. McAllister, day chief operator on the city lines, has been appointed general traffic chief to succeed Mr. Burrill.

The enormous amount of matter occasioned by the attempted assassination of Mayor Gaynor, on August 9, kept the force in this office unusually busy, but the large volume of traffic was handled without delay, the facilities being equal to the occasion.

OTHER NEW YORK NEWS.

The telegraph department of the New York Times is now one of the best equipped newspaper telegraph offices in the country. It has recently been moved to the fifteenth floor of the Times building and occupies commodious quarters on the Forty-third Street end of the building. Accommodations are provided for twenty-five operators and the facilities are ample for the large amount of business which is being handled daily in this office. Mr. George F. Hoyte is manager for the Western Union and Mr. Edward Byron is manager for the Postal.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, has for nearly half a century proclaimed the absolute necessity of life insurance and provided a safe and economical form of protection for the home and family within the means of every telegraph and telephone employee. A certificate of membership affording protection of \$500 or \$1,000, or both, is easily obtainable by every one in good health engaged in telegraph or telephone service, either commercial or railroad, between the ages of 18 and 45, and should be held by all employees not otherwise provided with adequate life protection.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, can provide you with a bank account and a home. If you are employed in the telegraph or telephone field let them do for you what they have done for more than a thousand others who now own homesteads free and clear. Write for information.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fit snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

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Telegraph and Telephone Age

No. 17.

NEW YORK, SEPTEMBER 1, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Study of Telegraph Apparatus.

PART I.

There is a passage in the Scriptures which says, "Ye have eyes to see, yet ye see not."

How true these words are may be readily seen by a close study of almost any instrument or telegraph apparatus an operator uses in his daily employment.

THE SOUNDER.

Take, for example, an ordinary sounder from which he copies incoming messages and press matter. He is so familiar with its general appearance that he could probably draw an accurate picture of it from memory if he possessed any knowledge of the art of drawing, yet probably ninety out of every hundred "see not." In other words they do not realize the significance and purpose of what they see.

A sounder seems like a very simple affair, yet it is constructed on strictly scientific principles and the very things the operator sees and yet "sees not" offer one of the most interesting and useful studies an electrical student can find.

No doubt the majority of operators understand that the crossbar armature over the magnet is invariably made of iron, because iron alone will carry

magnetic lines of force from one pole of the magnet to the other. But do they all understand that brass or some metal possessing similar properties is actually necessary for the binding post, and all the other parts of the sounder? Iron posts and levers would certainly be cheaper.

Brass or aluminum is used for the sole reason that these metals will not attract or carry any magnetic lines of force, yet are able to conduct a current of electricity. If the lever and other parts were made of iron, the lines of force would wander in useless directions and the number that would pass through the armature and thus attract it be greatly diminished. With a given magnet and current, the attractive strength of the magnet increases as the leakage decreases. Hence brass is used to prevent leakage.

Again, every iron armature placed across a properly constructed magnet is not only made the exact width of the diameter of the polepieces, but each end of it is rounded off in a semi-circle the exact size of the round core. Comparatively few, however, notice this fact, or at least wonder if there is any significance attached to this feature of the construction. Probably a still smaller number ever dreamed that the protruding ends of the polepieces are purposely extended beyond the windings for a really useful purpose, or that the rounding off of the edges of the ends of the magnet core was ordered for any other reason than that of creating a more artistic appearance. Yet there is a very good reason for the constructions described. In fact these details are absolutely necessary in order to obtain a magnet of maximum efficiency, as we shall presently see. Every thing that creates leakage should be eliminated.

When the magnetic lines of force flow through an iron core, on reaching the ends they concentrate most thickly wherever there is a sharp edge or corner, and leakage is always greater at such points. Hence, the polepieces used in sounders have the sharp edges of the ends smoothed off and made slightly convex, not only to prevent leakage, but to distribute the lines more uniformly through the armature above them.

For similar reasons the ends of the armature are rounded and fitted as described, in order to convey the lines of force which come out of one polepiece to its companion via the shortest possible route and this end can only be attained by clipping off all corners, extensions or lapovers that tend to divert the lines from the most direct course. The polepieces are made to protrude from the coils in order to remove their points of action from the influence of the current flowing through the last tier of the windings which would tend to diminish the total magnetic output through the armature on account

of leakage or conflict. Otherwise it would be better to wind close up to the ends with larger gauge wire. By this means the total resistance would be less, or, leaving the winding as it is and clipping off the protruding ends, we would get a quicker acting magnet.

Another feature, which may possibly not have been observed, is that in all magnets the thickness of the coil is never greater than the diameter of the iron core.

The explanation is that beyond that distance from the core, the outer layers and convolutions of wire wound thereon do not give returns in the way of magnetism in proportion to the additional energizing current expended.

Hence a rough rule for constructing an electromagnet is to use no greater length and thickness of iron for the core than is absolutely necessary to hold the amount of wire required to give the proper number of turns within the prescribed sphere permitted.

If with a given strength of current and gauge of wire for the windings a stronger magnet is desired, the core should be lengthened and more convolutions added, instead of adding another layer over the original winding.

A longer core, however, creates a slower acting magnet, and vice versa, a short core insures quick action. The explanation is that magnetic lines of force flowing through iron are governed largely by the same rule that applies to a current of electricity in its conductors, viz.: the longer the circuit, the slower the action; and the larger the conductor, the greater the output.

In measuring the current in a conductor, we have the formula $\frac{E}{R} = I$.* In a magnetic circuit practically the same rule applies, only the equivalent of the current is called magnetic flux and the magnetic resistance of the core is called "reluctance."

Thus we get the formula

$$\frac{\text{Magnetic force}}{\text{Reluctance}} = \text{magnetic flux}$$

The magnetic force is to the latter formula as E or volts is to the former, and is developed by the current flowing through the coils.

With a given strength of current and one turn of wire, the core will acquire a certain amount of magnetic flux, or magnetism, two turns will create twice as strong a magnet, while 10, 100, or 1,000 turns will increase its strength in the same relative manner.

The reluctance or resistance of the iron to the flow of the lines of force depends upon the size and quality of the metal.

A great deal more might be said concerning a magnet, but what has already been stated should

[*As I has been officially adopted by engineering societies throughout the world as the symbol to represent current, that letter will hereafter be used in all of Mr. Jones' articles where C has been used previously.]

suffice to show that students should study the construction of electrical apparatus closely, especially those which have certain uniform features common in different patterns.

(To be continued.)

Recent Telegraph and Telephone Patents.

Patent No. 965,876, for a telephone system, has been granted to O. C. Dennis, of Chicago, Ill.

Patent No. 965,973, for a telephone trunk circuit, has been secured by C. S. Winston, of Chicago, Ill.

Patent No. 965,976, for a telephone exchange system, has been awarded to J. L. Wright, of Washington, D. C.

Patent No. 966,013, for a telephone exchange system, has been issued to C. E. Hague, of Rochester, N. Y.

Patent No. 966,247, for a telephone receiver, has been taken out by E. Schwartz, of Antwerp, Belgium.

Patent No. 966,467, for a telephone receiver, has been granted to K. and I. Nichols, of Newark, N. J.

Patent No. 966,490, for a telegraph repeater, has been secured by R. H. Tudor, of Corinth, Miss. Telegraph relay including two relays of the standard type with connections so arranged that when the main line circuit on the one side of the repeater is broken a circuit through the other main line is maintained closed.

Patent No. 966,733, for a service meter circuit for telephone exchange systems, has been taken out by A. M. Bullard, of New York.

Patent No. 966,882, for an attachment of telegraph and similar wires to insulators, has been issued to W. E. Bandfield, of Wolverhampton, Eng. A clip having wire receiving leads on its terminals with retaining devices engaging the wire and a member coupling the devices together.

Patent No. 967,113, for a combined telephone and alarm or kindred service system, has been awarded to W. W. Dean, of Chicago, Ill.

The following patents have expired:

Patents Nos. 502,768, for a test-circuit for multiple switchboards; 502,769, for a lock-switch for electric switchboards; 502,770, for telephone-exchange apparatus; 502,771, for a transfer system for switchboards; 502,772, for a test signal for multiple switchboards; 502,773, for a testing system for multiple switchboards; 502,774, for a test-circuit for multiple switchboards; 502,775, for testing apparatus for multiple switchboards; 503,090, for a multiple switchboard system, issued to Charles E. Scribner, of Chicago, Ill.

Patent No. 503,252, for an electric switchboard signal, issued to Frank A. Pickernell, of Newark, N. J.

Patent No. 503,372, for telegraphic apparatus, issued to Albrecht Heil, of Frankisch Crumbach, Germany.

Personal.

Mr. B. E. Sunny, president of the Chicago Telephone Company was a recent New York visitor and while in the city secured the acceptance of ex-President Roosevelt to an invitation to make a Washington's birthday address in Chicago, February 22, 1911.

Mr. Louis Caspar, head of the department of telegraphy of Port Arthur Business College, Port Arthur, Texas, accompanied by his sons is visiting in New York. Mr. Caspar has recently been conducting some experiments with a view of preventing the ignition of oil in tanks by lightning and has secured some very satisfactory results.

Mr. Thor. J. Benson of Chicago a member of the Old Time Telegraphers' and Historical Association is an aspirant to a seat in the Illinois Senate. A petition to the Democratic Central Committee endorsing his candidacy has been signed by several hundred of his telegraphic brethren including most of the officials in Chicago.

Mr. F. E. Clary, who on August 1 retired from the superintendency of the Western Union Telegraph Company at New Haven to engage in other business at Los Angeles, Cal., was before leaving New Haven presented with a fine "Swiss Repeater" gold watch with his monogram on the case and on the inside the following inscription "Presented to F. E. Clary by Employees of the 7th District, Eastern Division, Western Union Telegraph Company, July 31, 1910." He also received a gold chain with a charm set with diamonds.

Postal Telegraph-Cable Company.**EXECUTIVE OFFICES.**

Mr. Charles C. Adams, second vice-president of the company sailed for Europe August 23, on the steamer Princess Cecilie to meet his family who have been spending the summer in France. Mr. Adams will be absent from his office until about September 20.

Mr. Charles P. Bruch, third vice-president, is again at his desk, much invigorated by his vacation of a month.

Mr. E. B. Pillsbury, general superintendent of the eastern division, New York, resumed his duties on August 29 after an extended vacation trip on the Great Lakes.

Mr. C. A. Richardson, manager of the Boston office is acting superintendent at that point vice Mr. A. L. Edgecombe who has been absent from his office for several weeks past suffering from a nervous breakdown. Mr. Edgecombe is at his old home in Portland, Me., and is reported to be slowly improving.

RESIGNATIONS AND APPOINTMENTS.

Mr. Paul S. Maisach, manager at Norwich, Conn., has resigned to accept a position as wire chief for the American Telephone and Telegraph Company at Providence, R. I.

Western Union Telegraph Company.**EXECUTIVE OFFICES.**

The following officials of the company have recently made a tour of inspection through the New England States: Mr. B. Brooks, general manager; Mr. W. H. Baker, vice-president of the American District Telegraph Company; Mr. F. A. Pickernell, assistant to the president of the American Telephone and Telegraph Company; Mr. A. G. Saylor, general superintendent; Mr. E. M. Mulford, division commercial superintendent; Mr. J. A. Hill, division traffic superintendent and Mr. F. D. Giles, of the general superintendent's office, all of New York; Mr. J. W. Reed, superintendent at New Haven and Mr. C. F. Ames, superintendent at Boston.

Mr. S. E. Leonard, superintendent at Denver has been appointed division commercial superintendent of the Mountain division with headquarters at Denver.

Mr. R. L. Brooks has been appointed division traffic superintendent of the Mountain division.

Mr. J. R. Terhune, superintendent at Nashville, Tenn., has been making a general inspection of his district accompanied by G. W. Lloyd, special inspector of Atlanta; H. C. Worthen, inspector, New York; W. K. McClarin, general foreman, Nashville, and A. T. Raymer, secretary to Mr. Terhune.

Mr. A. D. Bradley, assistant superintendent at Minneapolis, has been promoted to the superintendency at that point, vice James Swan, deceased.

Mr. W. H. Spain, who has been promoted from the management of the Akron, O., office to a similar position at Cleveland, was before leaving for his new post of duty presented with a pair of fine gold cuff buttons by the staff of the Akron office.

Twenty-four offices in New England, which were not heretofore in that classification, have been made all-night offices for the convenience of patrons who wish to make use of the telephone for sending their messages to telegraph offices.

The use of the new quadruplex sets which give perfect satisfaction on each of the four corners is being rapidly extended. The Buffalo quad, which has been in operation for some time past, works as well as the installation on circuits of not half the length. An installation in the Chicago circuit with repeaters at Buffalo is now being arranged for and it is thought that equally as good results will be obtained on this thousand mile wire.

The annual report of the company for the year ending June 30 will show gross receipts of approximately \$33,000,000, the greatest aggregate income ever received in one year. This is an increase of about \$3,000,000 over the previous year. The net earnings will amount to about \$5,800,000 or approximately 5.8 per cent. on the capital stock. The night letter service which is at present producing from 20,000 to 25,000 messages per day has not been in use long enough as yet to determine what the financial results will be.

The superintendents of the Eastern division together with several of the chief operators held a conference for the discussion of improvements of the service on August 26 in the office of General Superintendent A. G. Saylor in New York.

Mr. E. Y. Gallaher, auditor of the company, announces the following appointment:

Mr. J. J. Clunan to be division auditor of the Eastern division with headquarters at New York.

Mr. David Lynch, the cable expert, has been appointed division cable electrician. Mr. Lynch's headquarters will be at 16 Broad Street, New York.

RESIGNATIONS AND APPOINTMENTS.

Mr. Laurence D. Gagen, chief operator of the Akron, O., office has been appointed manager vice W. H. Spain, promoted to the management of the Cleveland office.

Mr. George H. Card has been appointed manager of the Poughkeepsie, N. Y., office vice Mr. Samuel K. Rupley, retired. Mr. Rupley who served during the war both as an enlisted man and as military telegrapher, had been manager of the Poughkeepsie office ever since the war.

Mr. Hugh McPhee, chief train despatcher of the Santa Fe Railway at Emporia, Kan., has been appointed manager of the San Francisco office, vice Mr. John V. O'Brien, who has been promoted to be special agent of the company in charge of the commercial business of the first district, Pacific division, with headquarters at San Francisco.

M. C. Allen, Division Plant Superintendent, Western Union, New York.

Mr. M. C. Allen, whose appointment as division plant superintendent of the Western Union Telegraph Company at New York was briefly mentioned in our August 1 issue has had a wide experience, both practical and theoretical, in all phases of plant work and being a specialist in that line is well fitted for the duties of the position which he now holds. Mr. Allen's experience began with the American Telephone and Telegraph Company at Boston in 1895. While employed in that city he served as inspector and district inspector. In 1903 he was transferred to New York where he was engaged in the traffic department and on inside and outside plant work. In April, 1908, he was appointed division superintendent of plant of the New York division of the American Telephone and Telegraph Company, which position he held at the time of his recent transfer to the service of the Western Union Telegraph Company.

W. A. Porteous, Western Union Manager, New Orleans.

Mr. William A. Porteous, who has been appointed manager of the New Orleans office of the Western Union Telegraph Company, is one of the most popular and capable men in the telegraphic service in the South.

Mr. Porteous started in the telegraph business as a messenger boy on the floor of the New Orleans Cotton Exchange and went from there to the Western Union Telegraph Company, serving that concern as messenger.

He was next advanced to check boy, later became an operator, and while thus employed he acquired a superior knowledge of all branches of the telegraph. After several years spent in the railway service, he returned to New Orleans in 1890 and remained with the company until 1891,



W. A. PORTEOUS,
Manager Western Union Telegraph
Company, New Orleans, La.

when he went with the Postal company and opened an office in the Cotton Exchange on condition that he make a success of the office. It was understood that his salary would be increased and he would be promoted if he succeeded.

He went to work and made a success of the experiment. In a short time several operators were employed and many messengers needed to take care of the business.

He was made assistant manager of the New Orleans office and ultimately became superintendent. Resigning the latter position after a creditable showing in July, 1908, he entered upon the practice of law, being at the same time a solicitor and special agent of the Western Union, which place he held until his recent appointment.

He is a graduate of the Tulane law department and while practising law has built up a good business, which he now relinquishes to get back into telegraphic harness.

W. H. Spain, Manager, Western Union, Cleveland.

Mr. William Howard Spain, whose appointment as manager of the Cleveland, O., office of the Western Union Telegraph Company was briefly announced in our August 16 issue, was born near Kenton, O., February 17, 1871. He entered the telegraph service as messenger at Belle Centre, O., May 1, 1886. In July 1887, he qualified as an

operator, taking a position in the railway service. In 1888 he entered the employ of the Rock Island Railroad and between that time and 1890 served at various places in the west and southwest for that company and for the Santa Fe and Missouri Pacific. In 1891 he entered the commercial field becoming an operator for the Western Union Telegraph Company at Joplin, Mo., and later at Kansas City. In 1896 he was appointed manager, of the Webb City, Mo., office, which position he held until 1902, when he was transferred to the management of the office at Fort Scott, Kansas.



W. H. SPAIN.
Manager, Western Union Telegraph
Company, Cleveland, Ohio.

In April, 1904, he became manager at Akron, O., where he was located at the time of his present promotion. Mr. Spain's advancement in the profession has been well deserved and is the result of careful, conscientious work in behalf of his employing interests. His many friends predict that future advancements are in store for him.

The Cable.

Mr. S. S. Dickenson, general superintendent of the Commercial Cable Company is spending his vacation at Lake Placid, N. Y.

Mr. Charles Priest, electrical engineer of the Commercial Cable Company, New York, is in Nova Scotia on a vacation.

The cable steamer Admiral Caubet, belonging to the French Cable Company engaged in the repair of the United States and Hayti cable broken off Cape Hatteras, put into New York a few days ago for supplies.

The cable steamer, Mackay-Bennett, belonging to the Commercial Cable Company, made a quick repair of the New York-Havana cable broken off Hatteras, July 29 in two thousand fathoms of

Through the intercession of the American Ambassador at Rio de Janeiro, Irving B. Dudley, the application of the Western Telegraph Company, an English corporation for an extension of its exclu-

sive rights for twenty years has been defeated. This leaves the Brazilian government in a position to grant concessions for cables to American companies on the expiration of the Western Company's present concession in June, 1913.

The new Western Union cable between Bay Roberts, N. F., and Penzance, Eng., has been completed. The two existing Western Union cables between Penzance and Canso, N. S. have also been repaired recently and are now in excellent working condition. The Western Union cable steamer "Robert C. Clowry" has returned to New York having completed the work on that company's cables in the vicinity of Nova Scotia, where it has been working for the past two or three months.

The Morkrum Printing Telegraph.

The Morkrum Company of Chicago, have developed a new printing telegraph system, which is now in operation on the regular service of the Postal Telegraph-Cable Company between New York and Boston.

The system is operated duplex with standard telegraph equipment of rheostat condensers, etc., and is equipped with a Morse set that can instantly be thrown in, and the line is balanced in the usual manner.

It is a selective system operated with a single strength of current and accomplishes more than was ever before attempted, in that it transmits and prints both small and capital letters, and also twenty-eight figures and characters, a total of eighty letters, figures and characters, and delivers a message that cannot be distinguished from typewritten copy.

The system is direct acting, the letters or characters struck on the key-board being printed on a home-recorder, and on the distant receiving printer. In case of an interruption the receiver at the sending station operates the same as a sounder, giving instant notification of line trouble. A principal claim made for it, is its simple unit system. The printers for both the home-recorder and receiver being identical and interchangeable, and the transmitting and selective system being divided into units so that removal and substitution of any part can be accomplished within from one to two minutes.

The system is the joint invention of Charles L. Krum and his son, Howard L. Krum, and it takes its name in part from Mr. Joy Morton, who has given his support to its development.

A Way of Saving Money.

Judging from the reports of the Serial Building Loan and Savings Institution financial conditions in telegraph and telephone circles are improving. From January 1 to July 1 of this year that organization has added eighty names to its membership and list of depositors and the number of its shares outstanding has increased from 5,567 to 6,034 or

nearly nine per cent. There are thousands of telegraph and telephone employes who could buy their own home or save money through this association if they would but make a start. The Serial is conducted for the benefit of the members of the telegraph and telephone professions and seeks to encourage thrift. One of the most pitiful sights is that of an old telegrapher who has broken down so that he can no longer work at his profession and who has not saved anything for his old age. Every young man should save a portion of his earnings so that when old age comes he will not be dependent upon the charity of others. The Serial makes it easy for anyone to save a small amount weekly or monthly as may be most convenient.

Trade Notes.

The Western Electric Company reports that during the past twenty months it has sold over a quarter of a million rural telephones. This is an unprecedented figure for these sales, and it is a certain indication that the rural telephone movement is progressing rapidly.

The United States Electric Company, manufacturer of the Gill selector, for telephone train despatching, announces that it has recently made arrangements with the Kellogg Switchboard and Supply Company of Chicago, manufacturers of high grade telephone apparatus to act as their exclusive agents in the sale of telephone equipment to railroads. This combination will, no doubt, result in the production of a very superior grade of selector and telephone equipment especially adapted for railway services. This company, on August 26, gave a public exhibition of their selective system for telephone train despatching and for operating semaphore signals. The exhibition, which was held in the company's showrooms at 284 Pearl Street, New York, was witnessed and commented upon most favorably by the metropolitan press.

Insulating Material.

Before the telegraph came into use, over sixty years ago, the question of wire insulation was one which had received little attention because of the fact that there was practically no demand for insulated wires. With the advent of the telegraph, however, the question of insulation became an all important one. Para rubber, the best insulating material known, soon deteriorated and became useless. The problem which confronted those who wished to make use of the electric current was where they could procure a compound which would combine the insulating properties of Para rubber with a long life.

Mr. Austin G. Day made a careful study and investigation of this problem, performing hundreds and thousands of experiments before he found a solution. The result was "Kerite," and the test of over fifty years has proven how well

the problem was solved. The excellence of Kerite as an insulating medium was quickly recognized, and in 1868 Professor Samuel F. B. Morse, the inventor of the telegraph, after having seen the new compound thoroughly tested wrote a commendatory letter to Mr. Day in which he said in regard to Kerite: "Its quality or rather property of resisting the deteriorating causes which tend to destroy sooner or later the insulation by gutta serena, or caoutchouc, makes it an invaluable discovery in aid of telegraphic extension. The tests to which it has been submitted and by which it has been proved to resist the deteriorating effects of ozone of the atmosphere appear perfectly satisfactory, and I therefore most cheerfully and cordially join with those who have tested its efficiency in congratulating you on your success in introducing so valuable an aid to the telegraphic enterprise of the world."

The opinion of Professor Morse has been seconded by thousands of others since that time and the use of Kerite has extended from the telegraph to other fields which require an insulating material with high insulating properties together with a long life. The reason for the excellence of Kerite as an insulator is not hard to find. In the usual rubber and mineral compounds the Para gum is, by long-continued working on the rolls, mechanically mixed with sulphur and dry mineral ingredients, none of whose constituents have any real insulating value but act simply as a filler to the gum which is the only active insulator in the compound, except the small percentage of wax (not over five per cent.) that would be permitted under the usual specifications for such compounds. In Kerite insulation, on the other hand, the Para gum is mixed with crude Kerite, the result of twenty years of experimentation to produce a preservative for rubber gum, which by itself is a highly perishable commodity. Not only does crude Kerite possess to a marked degree the ability to amalgamate closely with Para gum in such a manner as to prevent its deteriorating, but it is in itself an active insulator of a high order, so much so, in fact, that were it feasible to spread crude Kerite upon a wire, a highly satisfactory insulation would result, as there would then be a maximum of the imperishable material, crude Kerite. Its resiliency, however, is such that it requires the admixture of a considerable amount of Para gum to cause it to flow properly through the dies of the tubing or covering machine.

Kerite has been advertised continuously in *Telegraph and Telephone Age* almost from the beginning of this publication in 1883 and has always made good any claims advertised. Kerite insulated wires and cables have done continuous service for the past forty to fifty years and there are in operation to-day many such cables that have given the highest service for this long period of time.

Telegraph and Telephone Age is headquarters for telephone, telegraph and wireless books and cable codes.

Radio-Telegraphy.

The Navy Department has purchased twelve sets of wireless apparatus from the National Electric Signaling Company, of Pittsburg.

It is reported that as soon as the high power wireless stations, which the Australian Government is about to install, are completed many of the vessels which visit Australian ports will be equipped with wireless.

It is reported that the White Star Line has commissioned one of their vessels as a training school in wireless telegraphy for operators to be employed on their vessels and those of associated companies.

Two of the sealing vessels of the Newfoundland fleet were equipped with wireless during the past season. By co-operation, each notifying the other when they sighted a seal pack, both vessels made larger catches than they could have secured if they had been obliged to depend alone upon their individual efforts to find the seals.

Three of the steam trawlers of the North Sea fleet have for some time been equipped with wireless apparatus, and it is now reported that the results obtained by this service in the way of assisting in the marketing of the fish have been so satisfactory that steps are being taken to extend the use of wireless on this class of vessels.

A patent No. 966,475, for space telegraphy, has been awarded to C. R. Saffell, of the United States Navy. The speed of the alternating current generator which energizes the oscillation circuit is kept constant by a motor and connection from the transmitting key for increasing the torque of the motor.

A patent, No. 966,539, for transmitting apparatus, has been taken out by Lee DeForest, of New York. For maintaining a uniform length of arc in a vapor of ethyl alcohol and methyl alcohol supplying carbon to the electrode.

A patent, No. 966,555, for a variable self-inductance coil, has been awarded to J. R. Jesse, of Birmingham, Ala. For wireless telegraphy one coil sliding within the other forming primary and secondary, together with sliding contacts to make the connection.

A patent, No. 966,560, for an arc mechanism for space signaling, has been granted to R. Kent, of New York. Electrodes, a drip pan beneath and means for dripping a vaporizing fluid into the pan.

A patent, No. 966,705, for signaling by wireless telegraphy, has been issued to V. Poulsen, of Copenhagen, Denmark. A generator supplying an arc connected with a self-induction and capacity, with means for damping the oscillations so that they may be caused to cease periodically.

A patent, No. 967,118, for a device for detecting waves in wireless telegraphy, has been secured by G. C. Ellwood, of Arbutle, Cal. A variable inductance with indicators and means for connecting the inner and outer coils to give the desired inductance.

It is reported that the Marconi Wireless Telegraph Company has made an offer to the Portuguese Government to establish wireless stations in all of the colonies of Portugal, and that the government is favorably disposed toward the proposal.

Major Samuel Reber, chief signal officer of the Department of the East has for some time past been conducting experiments at Sheepshead Bay, Brooklyn, in exchanging wireless messages between an aeroplane in flight and a nearby land station. Major Reber has been assisted in his experiments by ex-Sergeant Horton and a sending apparatus devised by Mr. Horton has been used on the aeroplane.

The application of an American wireless telegraph company for a concession to establish a wireless station at Hongkong has been refused by the English Colonial office. According to consular reports there is a strong desire in commercial circles in Hongkong for the establishing of a wireless station at that place as many of the vessels which call at that port are equipped with wireless.

The Johnson Wireless Holding and Manufacturing Company, of St. Louis, has filed articles of incorporation with a capital stock of \$100,000, for the purpose of manufacturing and dealing in devices for wireless telephones. The company expects to establish a factory in San Antonio, Tex., for the manufacture of telephones and equipment for wireless stations. The incorporators are: Charles P. Johnson, Ralph Jones, Alexander Young, Max F. Ruler and Ralph O. Johnson. Headquarters of the company will be at St. Louis.

Telephone Rates in Boston.

The Massachusetts Highway Commission, which has been investigating the question of telephone rates in Boston and vicinity for some time past, has drawn up a schedule of rates which it is believed will be equitable to all subscribers and to the company and will distribute the cost of telephone service among the various classes of subscribers more fairly than it is now distributed. In making up the proposed schedule the commission has had the assistance of Messrs. D. C. and W. B. Jackson, consulting telephone engineers, and the schedule which has now been submitted to the New England Telephone and Telegraph Company is largely based upon the report which those gentlemen made several months ago. It is figured that the proposed revision would mean a reduction in revenue to the company of \$400,000 per year and require the expenditure of between one and two million dollars to make the changes. This expense would be largely caused by the elimination of the multi-party line and substituting for such service two-party lines.

Mr. Carl V. Snow, first class sergeant, United States Signal Corps, who has been located at Circle, Alaska, has been transferred to Fort Wood, New York Harbor.

The Telephone.

Mr. A. B. Conklin has been appointed general manager of the Atlanta Telephone and Telegraph Company vice Mr. C. J. Simmons, resigned.

Mr. H. R. Van Deventer, of Sumter, S. C., author of "Telephonology," has been ill with typhoid fever for some time past, but is now well on the road to recovery.

Mr. A. G. Mackenzie formerly publicity agent of the Rocky Mountain Bell Telephone Company at Salt Lake City, has been appointed division commercial superintendent with headquarters at Helena, Mont.

Mr. Herbert W. Drake, formerly division supervisor of leased wires of the American Telephone and Telegraph Company at New York, is now assistant to Mr. George E. Hudson, special agent in charge of the leased wire service.

Although the telephone service of Copenhagen is better developed than in most European cities, it will be a surprise to many to learn that only recently has the main exchange in that city been changed from the magneto to common battery system.

Mr. John J. Carty, chief engineer of the American Telephone and Telegraph Company, New York, accompanied by his wife and son and Mr. Charles E. Scribner, chief engineer of the Western Electric Company, have gone to Paris to attend the second international conference of telephone and telegraph engineers which meets in that city September 4 to 11.

M. Bela Gati, chief of the Hungarian telegraphs and telephones of Budapest, Hungary, expects soon to make a tour of inspection of the telegraph and telephone systems of the United States. Before coming to this country M. Gati will attend the second international conference of telephone and telegraph engineers at Paris and will present a paper before that body.

During the first six months of the current year the American Telephone and Telegraph Company and associated companies added 308,000 stations to their system of which 73,000 were sub-licensee stations and 235,000 belonged to the Bell companies. The company is spending during the present year \$28,000,000 in new construction and during the first half of the year eighty per cent. of the construction requirements was financed out of earnings.

The telephones used on the steamship *Lusitania*, as well as on other trans-Atlantic liners are of special design. The induction coil, condenser and bell of the instrument are inclosed in a small box, and the switch hook which projects from one side is provided with a special retaining device to prevent the receiver from being knocked off by the motion of the ship. The receiver is allowed to rock on the hook, otherwise the lever would lift and make a false connection when the ship was pitching and rolling.

Mr. E. J. Wehrley, special agent in the general commercial department of the American Telephone and Telegraph Company at New York sailed August 27 on the steamer *Philadelphia* for a month's vacation in France and England.

The second annual convention of district managers of the New England Telephone and Telegraph Company was held in Boston, August 11 to 13. About one hundred managers were in attendance and several interesting papers were read and discussed upon topics connected with the extension of the telephone service.

The Chesapeake and Potomac Telephone Company has announced a reduction of rates in the city of Baltimore averaging about ten per cent. The Public Service Commission of Maryland will soon give a public hearing at which complaints of telephone users will be investigated and the new rates will be considered to determine whether they are equitable to all telephone users.

It is reported that the Automatic Telephone Company, of Chicago, will begin service about October 1 with over 20,000 subscribers. \$3,500,000 of receiver's certificates of the Chicago Subway Company were issued to pay for the construction of the new telephone system and it is stated that \$3,000,000 of this amount has already been expended.

The City of Seattle has appointed Messrs. Frank B. Hall and C. H. Judson, telephone experts, to make a valuation of the two telephone plants in that city to determine whether the companies are charging fair and equitable rates. The result of this investigation will be brought before the Washington Railroad Commission on September 26 at which time the commission's engineers will also make a report on the independent telephone company in Seattle.

The following changes have recently been made in the staff of the American Telephone and Telegraph Company: Mr. A. W. Drake, division superintendent of plant of the Philadelphia division has been appointed to a similar position in the New York division, vice Mr. M. C. Allen, appointed division plant superintendent of the Western Union Telegraph Company at New York; Mr. W. J. Hoar, division superintendent of plant at Atlanta has been transferred to Philadelphia to succeed Mr. Drake. Mr. L. R. Jenney, district plant chief at Indianapolis, has been made division superintendent of plant at Atlanta, vice Mr. Hoar; Mr. H. H. Hamlen, division superintendent of plant at St. Louis has been transferred to Chicago to succeed Mr. M. H. Clapp, appointed division plant superintendent of the Western Union Telegraph Company at Chicago; Mr. W. D. Staples, district plant chief at New Haven has been appointed division superintendent of plant at St. Louis, vice Mr. Hamlen. Mr. G. A. Watson, district traffic chief at Pittsburg has been transferred to a similar position at Atlanta, Ga.

A Canadian Telegraph Feat.

BY D. R. SHEEHAN, MONTREAL.

What has perhaps proven itself to have been one of the biggest undertakings in the recent annals of any telegraph company to enlighten the outside world upon the facts of an all-absorbing topic of International interest, has been the recent work of the Great North Western Telegraph of Canada, in supplying the entire press of the world with the reports of the identification and arrest, on board the steamer Montrose, of the now notorious Dr. Crippen.

Acting upon the wireless reports received from Captain Kendall of the Montrose, voicing his suspicions of two mysterious characters on board his ship who had booked their passage from Antwerp to Canada, the leading dailies of the entire world assigned some of their most expert correspondents to Father Point, Quebec, where all steamers coming up the St. Lawrence river stop to take on their pilots. For the two or three days preceding the arrival of the steamer, these shrewd newspaper men flocked into this little hamlet, and it may be safely said that there were a sufficient number of correspondents gathered together here to write up the daily happenings of the world at large. Excitement ran at fever heat during the days of waiting, and every speck which loomed up on the horizon caused a rush to the wharves. Here men could be seen all day long, and during the greater part of the night, keeping a vigil watch upon the sea, watching and waiting for the slightest hint of the coming of the Montrose. Meantime Inspector Dew of Scotland Yard had arrived on the steamship Laurentic, a much faster steamer than the Montrose, and he was immediately besieged with newspaper men and camera fiends. Never were so many questions put to an individual before, the ultimate result being that the noted detective was obliged to lock himself in his room and refuse to be interviewed. Nevertheless these scribes found plenty to write about, and the little Great North Western office, with its three wires, was "swamped" from morning till night with "copy," making it necessary for some of the correspondents to drive to Rimouski, a distance of seven miles, to work some of their specials off from the railroad station.

Upon the arrival of the writer at the seat of action, he learned that the local staff, consisting of two operators, had had practically no sleep for the previous three days, and when he offered to "sit in" and relieve the manager, who was working a wire, his services were gratefully accepted. On Sunday morning, July 31, the patience of all was rewarded. At about 9 o'clock the top-masts of the Montrose could be distinguished piercing a dense fog, and a cheer went up from the waiting throng. It had been arranged that the newspaper men should board the government tug "Eureka," which hitherto was assigned to the placing of pilots on incoming steamers, and that Inspector Dew, with two provincial detectives, disguised as

government pilots, put out to the Montrose in a row boat beforehand and identify and arrest their man, should he prove to be the right party. Up to this time the only information to work upon was the alleged suspicions of Captain Kendall, and everyone, even the inspector himself, carried their doubts as to whether or not they were on a wild goose chase. As soon as the steamer hove well in view, the detectives jumped into a waiting row boat and started out to meet her. After they had gotten well under way, the small army of scribes boarded the tug Eureka and, in order to avoid any suspicion from the Montrose, steamed away out into the fog banks. It had been arranged that at the sound of three blasts of the Montrose whistle we were to go alongside, this also indicating that the arrest had been made and that Dew had secured his man. Anxious indeed were the minutes spent in suspense and waiting. The coming signal from the Montrose would soon make known to the representatives of the world's press whether or not they had come thousands of miles only to be disappointed and robbed of "a big story" for their respective papers. Once we thought we heard the cue, but it was only the echoing blasts of a huge fog horn down the coast, and the hopes of all dropped for a moment.

However, after having waited close on to a half hour, three sharp, distinct blasts of the Montrose whistle told the story that Captain Kendall's suspicions had been confirmed, that Dr. H. Crippen, and his stenographer, disguised as a young boy, were now securely gripped in the hands of the law, and had been placed in custody as fugitives from justice.

Our tug immediately drew alongside, and in the face of a drenching down pour of rain and severe thunder storm the thirty or more correspondents scrambled up the rope ladder, which had been dropped down to them, from the deck of the Montrose and scattered helter-skelter in all directions gathering fragments of news to flash to the waiting world. The manner in which these inexperienced seamen made their way up the ladder presented a humorous spectacle, which, however, might have taken on a very serious aspect had anyone missed his footing.

Just as the big freighter got well under way, loaded bottles were hurled over the side, containing meagre news of the arrest. These were later picked up by a motor boat which had been chartered and hurried back to Father Point, where the news was flashed in all directions.

One of the most important features of the little drama, at least as far as these newspaper boys were concerned, was yet to come. A special tug had been chartered by the Great North Western Telegraph Company to run down from Quebec to Grosse Isle, a small government quarantine station, where inward bound ships take on the government physician. It was arranged that this tug should pick up "all the copy" on board the Montrose, and then, if possible, beat this steamer

on to Quebec City, where a full staff of operators were kept in waiting with their wires all made up to give the Monday morning editions throughout the world the full and complete story. The government maintains a small one wire office at Grosse Isle, and here the Great North Western had placed an expert operator with a direct Associated Press wire made up to handle promptly their correspondent's copy. The operator here also waited patiently through the long hours of the night for a sight of the slowly approaching steamer. At last we steamed into the river off Grosse Isle and each one of us strained our eyes and ears for some sign of the telegraph tug, and sooner than perhaps was expected she came in sight, a tiny black spot on the dark waters of the river, with her red lanterns agleam. It was truly a welcome sight, and again a cheer was sent up, this time in favor of the telegraph company, which had carried out their arrangements up to this time in such a satisfactory manner.

As the little tug, "The Spray," drew alongside, the question arose as to whether or not she could possibly make Quebec City ahead of the Montrose, and in spite of the views of several experienced seamen which indicated that the undertaking was an impossible one, the little French-Canadian captain on board "The Spray" assured us that he would either lead the big boat into Quebec harbor by a good margin, or blow up his little tug in the attempt. Upon hearing this, many of the "Scribes" who had shown much pluck during the past few days, and who had decided to go up on this little "spit-fire," changed their decisions, and rather than risk their lives in such a venture, they remained with the Montrose, but literally kissing their precious copy good-bye, entrusted it to the hands of a telegraph representative on board the tug. Only one of the whole crowd volunteered to accompany the copy back to Quebec, this being "Jack" Ross of the Toronto Globe, who, despite the protests of his newly made friends, cautiously slipped down the ladder and jumped aboard the little black object alongside. He alighted right side up and crawled on hands and knees down into her little cabin. With a fond good-bye and all sorts of good wishes for a safe and successful trip up the inky river, "The Spray" started on her race against time, upon which so much depended.

After having been gone from the side of the Montrose for some little time, all that could be seen of this little messenger was, a streak of sparks and flame leaping from her funnels, and Mr. Ross has since stated that she barely "touched the high spots" on the journey to Quebec. The woodwork around her boilers had become so warm that he feared that neither he nor any of the special matter on board would ever reach their destination. But this little captain knew just what his mite of a tug could endure, and his instructions were to his engineer: "Empliez l'engine autant qu'elle peut contenir."

On board the Montrose all sorts of predictions as to the fate of the "Telegraph Tug" were circulated and the nerves of every correspondent on board were strung up to the highest pitch. Their plight would certainly have been a sad one if their copy had gone astray, and later when we drew into Quebec wharf, and learned that "The Spray" had beaten us by nearly an hour and a half, and were assured that all the copy was on the wires and being rushed ahead, every man breathed a heavy sigh of relief. Upon landing we rushed to the Great North Western Telegraph office, and again resumed the writing up of any new developments which had taken place on the trip up from Grosse Isle.

In all there must have been close on to a hundred thousand words of special matter filed in Quebec office at the one time, and the manner and despatch with which it was handled, was surely a credit to those who made the arrangements. After the excitement had subsided and the last few words of the story were being ticked out, each and every newspaper man in the party stated enthusiastically that they had received the best possible service, and they all voiced the one unanimous opinion, viz.: "The Great North Western Telegraph Company and the little French-Canadian captain, had sure made good."

The Quadruplex.

"The Quadruplex," by Maver and Davis, is doubtless the most thoroughly practical low-priced work treating on this subject ever published.

It is clear and lucid in its style, a text-book free of all technicalities and easily comprehended. It contains 128 large pages, is copiously illustrated, bound in cloth and well printed on heavy paper.

It embraces just the ideas that should find a place in every telegraph office, and no telegrapher who desires to acquire a complete knowledge of multiplex telegraphy, the perfect understanding of which is so essential in these days, should fail to promptly obtain a copy of this important book.

Its chapters include: Development of the Quadruplex; Introduction and Explanation; The Transmitter, Rheostat and Condenser; Stearns Duplex; Instruments of the Polar Duplex; The Polar Duplex; The Quadruplex; The Dynamo-Electric Machine in Relation to the Quadruplex; The Practical Working of the Quadruplex; Telegraph Repeaters; The Wheatstone Automatic Telegraph.

It will be seen at a glance that such chapters as these fully cover the modern apparatus found in the telegraph offices of to-day. Copies of this book can be obtained from us at \$1.50 each, express charges prepaid. Address J. B. Taltavall, 253 Broadway, New York.

As there are only a few copies of this important work on hand and as a new edition of the book is not contemplated, it will be well to secure a copy before the supply is exhausted.

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September 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Securing Business for the Telegraph.

Under the new scheme of organization which is being adopted by the Western Union Telegraph Company, the administration will be divided into three branches, making what is technically called the three column organization. These columns will be designated commercial, traffic and plant, each under the direction of a superintendent. For the present the geographical unit is the division, but it is probable that later the same system of columns will be extended down to the smaller districts. The United States is divided into six divisions and in charge of each is a general superintendent, who has a larger degree of individual executive authority than in the past.

Each general superintendent will have as his assistants the superintendents at the head of the three columns. These men are specialists each in his own department, and will report directly to the general superintendent. The managers will as heretofore report to the district superin-

tendents. The district superintendent reports all matters relating to the procuring and reception of business to the division commercial superintendent, the division traffic superintendent receives reports in regard to the operation of the system, and to the division plant superintendent are referred all matters relating to the plant in the way of new equipment, repairs and maintenance of existing equipment.

Probably the most radical change in this scheme of organization over the one which has existed heretofore is the creation of a department the duties of which consist in looking after new business. Where a superintendent has to discharge the duties of all three of these branches of the service there is a natural tendency to devote the larger part of the time to the plant and to the handling of such business as may come in without solicitation. As a result the efforts made to procure new business are often very limited and not being conducted according to any fixed rules are very often barren of results. With the new scheme of organization, however, work along this line will be systematized and this branch of the service instead of occupying a secondary place will take equal rank with the other departments.

This is an important change and one which ought to be productive of excellent results. Heretofore the telegraph has been regarded by the majority of people rather as a necessity than a convenience and as a consequence its use has been largely limited to cases of extra importance. It will be the business of the commercial superintendents to educate the public to the fact that there are many times when although the mails might serve their purpose, it would be largely to their advantage to make use of the telegraph. There is no doubt but that a vigorous campaign along this line will result in a large increase of traffic and we predict for the telegraph a great expansion in its recognized field of usefulness as a result of the new Western Union organization.

Life Protection.

Protection by life insurance for one's family and dependents, against financial loss through death, has not only come to be the recognized duty of every man and woman of to-day, but the great necessity of modern life, to which the world no longer holds guiltless those who neglect so obvious a duty. The question is therefore not only shall we insure, but where can we do so at the least possible cost, consistent with safety and permanence, and how much insurance shall we carry?

The business aspect of the situation has gradually forced itself on the community, till finally, it no longer is so much a question which society or company is promising the most for the least money, or has paid the largest amount to beneficiaries of deceased members, but rather, simply a question which is the safest and most economi-

cal, and for that reason is the best able to redeem its promises, when the certificate becomes a claim.

In the light of the fact that The Telegraphers' Mutual Benefit Association has for close on to half a century, proclaimed the absolute necessity of life insurance and has provided a safe and economical form of protection for the home and family, within the means of every telegraph and telephone employe, it is surprising that there are so many who have not as yet fulfilled their duty in this respect.

It limits its field and extends its advantages only to those engaged in the service of the great public utilities, the telegraph and telephone, which includes railroad telegraph service, and after admission wisely places no restriction on the membership, either as to occupation or residence.

No other existing society is in such strong financial condition, nor can show like results achieved at such low cost to the persistent member. It is a good association to work for, and it is a good association to belong to, and all members of the electrical fraternity should deem it a privilege to bring the advantages of membership to every eligible acquaintance and aid in every way to increase the membership.

THE "NEW YORK POSTAL."

Its Room and Its Chiefs.

BY J. P. WILLIAMS, ASSISTANT CHIEF OPERATOR.

The operating room is located on the twelfth floor of the building at 253 Broadway. That the designers intended this department to reflect the highest type of electrical knowledge, was amply shown on its completion and is well known to telegraphers generally, but it is of especial interest to know that this high standard has been maintained. Improvements of various kinds have been introduced, all that had become obsolete removed until the facilities for handling the enormously increased traffic are considered perfect. Visitors, representing foreign telegraph administrations, have pronounced it the finest telegraph operating room in the world. Not alone is this true of its equipment, but in point of ventilation, sanitation and light and shade, it is, perhaps, not surpassed anywhere.

The personnel of the operating department is remarkable for lengthy continuous service. Night Manager D. F. Mallen, Chiefs C. J. McCarthy, F. E. McKiernan and J. A. McNulty having each served 24 years, indeed the average term of service for the nine principal chiefs is recorded at 20½ years.

The department is in charge of F. Frederick Norton, who, entering the service in 1888, has advanced step by step to his present position.

John J. Whalen is assistant manager and has been in the service since 1892.

John B. Rex is general traffic chief, having entered the service in 1895. He is assisted in his

work by Messrs. J. T. Ewing, W. C. Morris and W. F. Stirling.

The city division is in charge of Charles B. Obst, assisted by P. L. Riley. T. J. Kreger supervises the New Jersey division.

The "two Macs," Messrs. Frank E. McKiernan and Joseph A. McNulty, preside, respectively, over the West and South and the East switchboards, having charge of the wires extending in these directions. Both gentlemen who have occupied these positions for over 20 years deserve to be especially mentioned for their ability and popularity. They have grown with their work and if personal appearance is an indication, they are good for many years to come. Mr. McKiernan is assisted by Messrs. J. J. Fredericks, O. J. Nourse, and T. P. Smith. Mr. A. J. Ward assists Mr. McNulty.

W. E. Todd is quad and equipment chief. Mr. Todd entered the service in 1887 and has filled various positions in the department.

The night service is supervised by Daniel F. Mallen, who, as stated previously, entered the service in 1886. Mr. Mallen is assisted by Charles J. McCarthy, another veteran, who fills the role of assistant night manager, and the following traffic chiefs, Messrs. W. W. Wilson, T. H. Tierney, F. R. Huppe, and J. M. Mearns. E. A. Coney is night wire chief, assisted by Messrs. S. C. Dodd, W. J. Kavanaugh and W. W. Albright.

John H. Twyford has charge of the all night force, assisted by J. P. Williams.

Harmony is the keynote which sets this department alive with rythmical activity and a keen desire to do one's best animates the entire force.

In connection with this subject it is pleasing to note that the physical comfort of the employes has not been forgotten. Aside from a tastefully furnished rest room for the women, a smoking room has been provided for the men, containing comfortable chairs where one can enjoy a cigar and peruse current periodicals, a book from the library or quietly enjoy the ever-changing marine life on the lordly Hudson River, a beautiful view of which may be had from the windows.

Indeed, it can be truthfully said that on the proposition of looking to the comfort of its employes, this company has kept abreast of, if not anticipated, like efforts of other large corporations.

—*Postal Telegraph.*

Weber's Handy Electrical Dictionary is a practical handbook of reference, containing definitions of every term or phrase used in the electrical industry. This vest pocket size indexed handbook, which contains over two hundred pages and over three thousand definitions, is so clear and lucid in its definitions that it is an indispensable guide to the electrician in the intelligent performance and understanding of the duties of his profession. Price, 50 cents. Address orders to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.

The Military Telegrapher in the Civil War.

PART XLV.

BY S. L. ROBINSON, HARBOR SPRINGS, MICH.

(Continued from page 559, August 16 issue.)

About the tenth of July I was ordered to report to General A. J. Smith who was leaving on an expedition after the Confederate General Forrest. We reached Tupelo, Miss., without meeting opposition but just beyond found the enemy ready for battle.

It was a lively one too, and the only time that General Forrest was whipped. I never saw as many dead bodies on a battle field in so small a space, where first one side and then the other had charged. For want of rations and ammunition General Smith could not follow up his advantage, so we started on our return trip to Memphis.

The first evening after starting back, as our men had fairly got settled in camp the enemy commenced dropping shells among us from a battery, but a cavalry charge started them on the run and we met no further trouble.

In order to rest his infantry General Smith decided to send the cavalry under General Grierson on to Memphis, while he with the remainder of his command went into camp, when they reached the Memphis and Charleston Railroad.

General Smith granted my request to go ahead with the cavalry and giving me some despatches for General Grierson with two orderlies I started to catch up with the cavalry who were several miles ahead.

To shorten our route we followed a bridle path through a piece of woods where we had to ride single file. I was in the rear when, without warning several shots were fired and my horse being hit stumbled and threw me off. My two orderlies not knowing how many there were of the enemy rode on to meet our forces and get reinforcements.

As soon as the bushwhackers saw that I was alone and wounded, they came up to me saying "hands up," for I was trying to pull my revolver out of my bootleg, but my right hand was paralyzed from one of the shots so that I could not move it.

After stripping me of all but my shirt and trousers they told me to stay there and they would be back after me. They ordered me to get up at first but I told them I could not, and seeing that I was covered with blood they evidently thought I was badly wounded. As soon as they had gone I got up and tried to walk. It was hard work but I would go a few feet, fall and then try it again. In trying to cross a creek I fell off the log used as a bridge landing in about six inches of water and as much mud. At first it seemed a bad accident but the water refreshed me and after hard work in getting to the bank on the other side I started ahead and soon heard a bugle call. It was a squad of our cavalry looking for me. I made all the noise I could and was picked up by them and taken in to General

Grierson's headquarters where I received medical attention. Lying on an old straw tick I saw four bullets cut out of me. One in my knee, two that passed through one leg stopping just under the skin on the other side, one that went through my right arm near my elbow, then striking a rib ran around and was cut out on the other side of my body. One went through my shoulder and two lodged in my right hip where they are still, and yet officially I was not in the army. When I was shot my pocket telegraph instrument was in the saddle bags on my horse, and thus the guerillas did not know I was an operator. They captured cipher book number 12, that being in my blouse pocket but being unable to read thought it merely a memorandum book. Had I been captured by regular soldiers and taken to the enemy's headquarters, the cipher book would have been all the evidence necessary to convict me as a spy being inside their lines. Generally we dreaded being caught by guerillas but for once it was my salvation.

The pain at the time I was shot was not bad, but the next day riding in an ambulance over rough roads was a severe ordeal and when we reached the railroad at Lagrange and I was put on a car for Memphis it was a pleasant change.

When the train arrived at Memphis the boys from our office met me at the depot and carried me to our headquarters on a stretcher.

I kept out of a hospital, the boys taking care of me in our rooms. With their company and attention I was able to get out with a crutch and cane in less than two weeks. I then went home for a short furlough the only one while I was connected with the corps.

For the few months I served as a bugler in a regiment that never left Detroit, I am entitled to a pension and to join the Grand Army, but my four years of actual service a great part of the time in the field, as a result of which I carry a lead mine in my body, and ran the risks of being shot as a spy does not count. It has been left for a private citizen to grant the pension which we deserve from his own purse until such time as a generous Congress shall wake up to the fact that we were of some use.

Perhaps our heirs may get a leather medal to hang up and look at after the few remaining ones of us have been called in.

In September I was back again in Memphis, staying there until December 21, when I was ordered to go with General Grierson on a raid to destroy the Mobile and Ohio Railroad south of Corinth and otherwise, damage the enemy as much as possible. At that time the Confederate general, Hood and his army was at Corinth and with our cavalry brigade we could not chance any general engagement. It was strike and get away.

When we reached Ripley, Miss., General Grierson sent me with a battalion of the Second New Jersey cavalry as an escort to reach the railroad and gain as much information as possible. Then

we were to destroy bridges, etc., and go south until we found our main command.

We struck the railroad at Rienza, an outpost of the enemy a few miles south of Corinth. We captured the picket post, set fire to the bridges and then started south along the line of the railroad.

We were in the saddle two days and nights. It was a ticklish situation, the Confederate cavalry being behind and we guessing as to what was in front.

The second night about ten o'clock after crossing a big swamp over a corduroy road we reached our main command and it was a very welcome meeting.

I was so tired I could not sleep, in fact we were all about as exhausted as possible and still be able to go.

General Grierson's command destroyed the railroad in many places, also army stores at various points. We were only routed once and then by a drove of hogs, that we captured as they were being driven by some Confederates to feed their army.

Our men tried to drive the hogs on to Vicksburg, but after vain attempts, hogs and cavalry did not seem to mix well, the hogs were driven into a yard shot and burned to keep the enemy from getting them.

We met little opposition and finally reached Vicksburg, where I remained until about the twentieth of February, 1865 when I was ordered to New Orleans. From there I was sent to Fort Morgan at the mouth of the river below Mobile, after staying there and at Navy Cove for two months, I was ordered to Mobile.

On our trip from New Orleans to Fort Morgan our boat was caught in a storm and came near going down. Charles W. Pearson who is now living in New York, and I were the only passengers. When daylight appeared we were close to shore near Pensacola, Florida. About our only work at Fort Morgan was fishing and swimming, eating oysters, crabs, etc.

I staid at Mobile until the first of May when I was sent to Citronelle to open the line. The last army of the Confederacy had arranged to surrender and it was my privilege to stand in the doorway when General Taylor surrendered to General Canby at Citronelle, Ala., May 4, 1865.

The middle of June I was called to New Orleans and ordered to Shreveport, La., to take charge at that place. I found L. C. Baker, superintendent of the Confederate lines at Shreveport who turned the same over to me.

There I also found my old commander, General Herron in charge. Here I remained as manager until the government lines were turned over to the commercial companies, December 1, 1865. I was then retained as cipher clerk and government supervisor of telegrams until March 31, 1866, when I was honorably discharged.

I staid at Shreveport and Marshall, Texas working for the Southern Telegraph Company until September, 1866, when the cholera and yellow

fever combined made me feel like again seeing the north so I severed my connections with the company and came north.

The only Shreveport operators who are still alive to my knowledge are L. H. Korty, my brother, B. L. Robinson, and myself.

Before saying "30" I want to express myself as to the treatment I received at Shreveport and Marshall after the close of the war. It was well known that I was a northerner and in the northern army, but I was never treated better among strangers and made many warm friends. If my vote would do it I would have every man who served in the Confederate army receive a pension from our government.

They were as patriotic as we were, they simply saw things from a different standpoint, and to-day they would fight for our flag the same as we. Let us forget our past little family quarrel and stand for one government, one people, and one principle of good citizenship.

(Concluded.)

Some Confederate Telegraph Reminiscence.

Mr. George M. Dugan who served as a military operator in the Confederate Army during the Civil War and was for many years thereafter superintendent of telegraph of the Illinois Central Railroad but who is now living in retirement at Tip Top, Ky., in a recent article in the New Orleans "Picayune" gives some interesting reminiscences of his war time experience.

Mr. Dugan gives in part the following account of his military career:

"I find that it is much easier to talk about incidents of the war than it is to write about them. I will begin by telling a circumstance which will interest some people in north Mississippi. I received the following order:

Bolivar, Tenn., April 2, 1864.

Special Order No. 1.

Geo. M. Dugan, superintendent Southwestern Telegraph Company, is directed to proceed to north Mississippi for the purpose of repairing the telegraph wires to reconstruct it northward.

The commanding officers of the forces along the Tallahatchie River will furnish Mr. Dugan a sufficient detail of men to assist him in reconstructing the line and render him any other assistance he may need.

By order of

J. R. CHALMERS,

Brigadier General.

L. T. LINDSEY, A. A. A. G.

"The next day I received the following message:

Geo. M. Dugan, superintendent, etc.: General Forrest desires the wire between Grand Junction and Memphis taken down and brought off to some available point on the Central Railway, to be used in carrying out General Chalmers' order to you. Captain Lindsey will aid you; confer with him. All goes well.

FRANK C. WHITTHONE,

Telegrapher Forrest Cavalry.

"I picked up a detail from Mabry's command and proceeded to carry out the order without delay. It must be remembered that the Memphis and

Charleston Railroad was in possession of the enemy and great caution and quickness was necessary to get the wire. I struck the line near Moscow, Tenn., and took down all the wires thence to Collierville and then east to Grand Junction. We impressed the necessary wagons and forwarded the wire to safety, after which we burnt several bridges, doing most of the work at night, often almost in sight of the enemy's camp.

"On the return trip, near Holly Springs, we came to a camp composed principally of ladies in carriages, buggies and wagons, who had been about the enemy's lines buying supplies in exchange of a few bales of cotton. Several of the ladies were from Columbus, Miss. It was about 10 o'clock at night when we reached the camp. I found that the guard around the camp was two men whom I had sent with the wagons of wire, and called to them to know what it all meant. They told me that captain—I have forgotten his name—who was a secret service man, had ordered them to guard the party. I knew several of the ladies, who appealed to me for assistance, saying that they had been arrested by the said captain, and they feared that he would confiscate their goods. The captain had fallen asleep, and I asked the ladies if they had any liquors, and, getting a bottle, I called up the captain and proceeded to entertain him with stories of my raid for wire. It was not long before he was again sound asleep, so soundly I had no fears that he would wake for several hours. I then went to the guard and said there was no further need for them. So we hitched up the horses and mules and hurried towards Oxford, leaving the captain to enjoy his repose. I never met him or heard of him afterwards, but the ladies were a long time expressing their gratitude.

"At another time I was moving along the Central Railway on an old push car, and reaching the Tallahatchie, found it out of its banks. I found also a courier on his way to west Tennessee with important dispatches for Colonel Richardson; I knew the young man, who asked me for whatever assistance I could give in getting across the river. The old car was 7 x 9 feet. I told him there was but one thing I could do—mount his horse on the car and push him over the railroad bridge. It was very dangerous, barely sufficient room for the horse to stand and, even if he kept quiet, it would be a desperate risk. We got the horse on the car and he seemed to be aware of his risk, for he never moved until we had crossed. This will give an idea of our facilities and the risks we had to take.

"While sitting in the telegraph office at Water Valley, Miss., when General A. J. Smith, with his 40,000 men, was pressing our little force back, I heard a message pass over the wire reading thus:

Grenada, Miss.:

General Forrest, Oxford, Miss.: Where would it be convenient for me to meet you to-morrow?

(Signed)

"R."

(An infantry colonel from the Virginia army who was at home on leave of absence.)

"In a short time I heard the answer:

Oxford, Miss., etc.

Colonel R.: You will find me on the skirmish line in front of the enemy, where you are invited with a musket on your shoulder.

(Signed)

N. B. FORREST.

"Another time I heard General Forrest, who was in the telegraph office at Oxford, say: 'Whit, send a telegram to my wife at Grenada. Tell her to come up to-morrow and fetch Willie and my roan horse. That's all; now read it.'

"Mrs. Forrest, Grenada: Come up to-morrow and bring—' That was enough.

"You — fool, I told you to say fetch. I don't want my words changed."

"A few days afterwards I was in the office at Oxford and found a lot of messages for Forrest and took them up to his quarters. As it was late and getting dark, he needed a light. He said to Pete, his servant: 'Go get me a candle. Pete returned in a short time and reported he could not find a candle. 'Go back and tell Major Severson to send me a candle.' Pete again returned and reported that Major Severson said, 'The mess chest had not been unpacked.' Then there was trouble. He thundered at Pete: 'Go tell Major Severson if he don't send me a candle in two minutes I will burst his — mess chest over his head. There was a bright light in the tent in a minute.'"

The House Printing Telegraph Company.

BY J. E. SELDEN, CHICAGO.

If my testimony will help to settle any discussion regarding the working of the old "House System" between New York and Boston, you are welcome to it; and it is to the effect that the office at Springfield, Mass., was certainly a repeating station and as collateral evidence I will give an instance where one message was repeated once too often for the comfort of the parties interested.

One day during July, 185— a Mr. Colt, a prominent and wealthy citizen of Pittsfield, Mass., and a dealer in wool received from his agent located at or near West Brookfield the following message:

"Meet me at West Brookfield to-morrow, Answer."

Wondering what should require his presence Mr. Colt promptly answered: "I will meet you in West Brookfield to-morrow." This was duly delivered to the agent. Mr. Colt took an early train and when he arrived at West Brookfield the agent was waiting for him. After the usual greetings and unfavorable criticisms of the weather the conversation grew slack, each waiting for the other to state the object of the meeting until at length Mr. Colt said, "Well, what did you want to see me about?" The answer was, "Why nothing in particular, what did you want of me?"

It rather surprised Mr. Colt and, of course, led to an exhibit of the two despatches.

"I have not sent you a message in the last two months" was the claim of the agent, which the operator at the station confirmed. "I received this

message yesterday saying, 'I will meet you at West Brookfield to-morrow'—and here I am." The situation was somewhat confusing, and Mr. Colt took the next train for Pittsfield at a temperature several degrees above that registered by the thermometer, Frank Palmer, who was then superintendent, received a letter by the next mail which was also warm and the matter came to my hands for investigation. And here it is necessary to digress somewhat in order to prepare the way for the solution of the tangle.

In those ante-cable days the foreign news was obtained by intercepting the in-bound steamers as they passed Cape Race, where the commercial news previously prepared in cipher by an agent on the other side was thrown overboard in a water-tight case to be picked up by someone in a small boat—on the watch for it and rushed ashore to the telegraph office as soon as possible thus anticipating the arrival of the steamer in New York by sometimes two days. Whenever a steamer was due we were required to hold the line open until we got "good night" from D. H. Craig, then Associated Press agent at New York. This was a sleepy job as there was "nothing to do," and the "grinders," (whose functions I have described before) and messenger boys would bunk in any corner they could find and sleep until further orders.

The copies of repeated messages being on a paper tape about an inch wide and of various lengths were not very convenient to file away, but were disposed of by rolling them up into disks the size of a dinner plate and piling them in a closet adjoining the operating room. The pile being a little softer than the floor was used by messengers and grinders to sleep on during the waits for steamer news. The disintegration of some of the disks was inevitable and the one containing Mr. Colt's message—filed away a year before—furnished the key to the problem. That particular message escaping from the roll found its way to the floor of the operating room just one year from the date of its first appearance. It was picked up by a messenger boy who seeing the date was correct, supposed it had blown off the file of messages to be sent and carefully replaced it, with the result stated. The wrath of Mr. Colt was finally appeased by an explanation, apology and the refund of his railroad fare, and the incident probably only survives in the memory of the writer.

Many pleasant memories linger around my sojourn in Springfield, and I left there many old friends whom I should like to meet again, but never shall.

There was Uncle Dan Kingsley, the genial host of the American Hotel where I boarded, to see him at the front door whenever a train came in wiping his shining pate with one hand and the other reaching for the travellers' grip, would make a stranger feel "at home" before he got within ten feet of the door.

Henry Gray, the popular superintendent of the Boston and Albany Railroad, who hailed me the morning after the great auroral display (of I forget what year), with "Hello, Jack, did you see the 'Oreëlius Boreëlius' last night?" I did.

The old pioneer baseball club which I organized was quite a social feature of that time and I believe was the first club to play the modern game in the State and we used to play to quite respectable-sized audiences on "Barnes' Lot," and "Hamptden Park" when it was first opened to the public. If I had foreseen at that time the financial possibilities of baseball, I could have dropped telegraphy and become a professional "batter" to my advantage—but gate money and curved balls were unknown quantities then and the price of admission was within the reach of all.

Submarine Telephone Cable Across Chesapeake Bay.

The many interesting features of the installation of a sixteen-pair submarine telephone cable beneath the waters of the Chesapeake Bay have attracted considerable attention. The cable is now in place and is giving service, affording a short cut of fifty miles in any telephone conversation between Baltimore and Cape Charles.

The cable was laid from Love Point, on Kent Island, to Sandy Point, northeast of Annapolis. The cable is five miles long, and the installation, because of the great weight of the load on the cable barge, was a difficult one.

When this cable left the New York plant of the Western Electric Company, which manufactured it, it was in four sections, each of which, strung on an immense reel, contained 6,600 feet of lead covered and armored cable. Each spool with its load weighed 58,000 pounds.

The cable was taken from the four reels at the dock on West Street, New York, and wound in a "figure eight" on board a barge. The barge was towed to Chesapeake Bay and the cable was then laid without mishap.

The installation of this cable makes possible a short cut for telephone subscribers in Baltimore who may wish to talk to people in Delaware or on the eastern shores of Maryland and Virginia.

The Bell Telephone Company of Pennsylvania has run additional wires to the terminals of this cable from points in the southern part of the eastern shore, and from Baltimore and Annapolis to the other end.

The lead covered cable is armored with alternate layers of jute and wire. This outer covering is believed to be capable of withstanding the ravages of the deep for many years.

Mr. S. V. King, manager of the Western Union Telegraph Company, at Charleston, W. Va., in renewing his subscription for another year writes: "The semi-monthly visitation of *Telegraph and Telephone Age* is very cordially welcomed."

International Association of Municipal Electricians Meets in Convention at Rochester.

The fifteenth Annual Convention of the International Association of Municipal Electricians will be held in Rochester, N. Y., September 6, 7, 8 and 9. Rochester offers many attractions as a convention city, and the assembly at Atlantic City in 1909 chose wisely when they selected the place for this year's meeting. A good time as well as a most instructive gathering is assured for all of those who attend. Ample space has been provided in Convention Hall, where the business sessions will be held, for exhibits and the displays of prominent manufacturers will be up to the usual standard in quality, quantity and interest.

The following program has been arranged for the business sessions and the entertainment features of the convention.

The following papers will be presented and discussed: "Wireless Telephone and Telegraph," by John W. Kelly, Jr., chief of the electric bureau, Camden, N. J.; "Lightning Protection," by Walter M. Petty, borough electrician, Rutherford, N. J.; "Mercury Arc and other Rectifiers," by H. G. Kennedy, superintendent of fire telegraph, Rochester, N. Y.; "Relation of the Telephone to the General Organization of Fire Department Service," by H. C. Bundy, superintendent of fire telegraph, Watertown, N. Y.; "Underground Work," by J. B. Yeakle, superintendent of fire telegraph, Baltimore, and Clarence R. George, city electrician of Houston, Texas; "Modern Police Signal System," by Joseph B. Smith, superintendent of police telegraph, Rochester, N. Y.; "City and National Code Rules and the Relation of the City and Underwriters' Inspectors," by R. A. Smith, city electrician, Norfolk, Va.; "Inductive Loads of Low Power Factors," by A. S. Hatch, of Detroit, Mich.



J. B. YEAKLE, BALTIMORE.

President of International Association of Municipal Electricians.

Tuesday, September 6—10 a. m., opening exercises, including the address of welcome by Mayor Hiram H. Edgerton, of Rochester; 2 p. m., business session; 8 p. m., inspection of fire alarm telegraph system of Rochester.

Wednesday, September 7—10 a. m., business session; 2 p. m., automobile ride around the city and through the parks, preceding which the official photograph of the convention will be taken; 8 p. m., business session.

Thursday, September 8—Business sessions at 10 a. m. and 2 p. m. In the afternoon the visiting ladies will be conducted on a shopping tour and a street car ride around the city.

Friday, September 9—Business sessions at 10 a. m. and 2 p. m. When the business of the convention is completed those present will take special cars to Manitou Beach on Lake Ontario, where dinner will be served.



FRANK P. FOSTER, CORNING, N. Y.

Secretary of International Association of Municipal Electricians.

The officers of the association are: J. B. Yeakle, superintendent of fire telegraph, Baltimore, president; J. S. Craig, superintendent of fire telegraph, Toronto, first vice-president; A. L. W. Kittridge, superintendent of police telegraph, New Haven, Conn., second vice-president; A. J. Bell, superintendent of fire telegraph, New Rochelle, N. Y., third vice-president; C. S. McCosker, city electrician, of Mobile, Ala., fourth vice-president; Mr. Frank P. Foster, superintendent of the electrical department, Corning

Glass Works, Corning, N. Y., secretary; C. E. Diehl, superintendent of fire and police telegraph, Harrisburg, Pa., treasurer.

The executive committee consists of H. G. Kennedy, chairman, Rochester, N. Y.; S. W. Manning, St. Paul, Minn.; L. L. Kingsbury, Baltimore, Md.; O. M. Schafer, Trenton, N. J.; A. L. Pierce, Wallingford, Conn.; J. C. Simpson, Washington, D. C.; Clarence R. George, Houston, Tex.; C. S. Downs, Altoona, Pa., and J. W. Kelly, Jr., Camden, N. J.



CLARK E. DIEHL, HARRISBURG, PA.
Treasurer of International Association of Municipal Electricians

New Fire Alarm System in Brazil.

An up-to-date fire alarm and police telegraph system is being installed in Sao Paulo, Brazil, by the Gamewell Fire Alarm Telegraph Company. The fire alarm system consists of 160 boxes with twenty-four circuit central office equipment so that the number of boxes can be largely increased from time to time as required without any reconstruction of the system.

The central office is equipped with all of the latest and most improved apparatus, consisting of relay and annunciator, joker and gong, circuit boards, protector boards, dial transmitters, punching registers and time stamps, and a 24-circuit automatic line tester. The system will be operated by a 30-circuit storage battery equipment, with all of the latest approved switchboards, cells and battery racks. The office will be provided with all of the minor accessories and appliances necessary to make it as complete and perfect as any fire alarm central office in the world. The police signal system consists of 160 seven-call patrol boxes, which are to be installed in sixteen circuits.

The Sao Paulo system will also include a complete flashlight and gong connection with every

patrol box. The wiring and outside construction for these systems will be done by the authorities of Sao Paulo. The installation of the apparatus will be under the supervision of one of the Gamewell Company's constructing engineers. The population of Sao Paulo is now 400,000, an increase of 160,000 in the last eight years.

Addresses of United States Military Telegraphers Wanted.

Mr. David Homer Bates, 658 Broadway, New York, secretary of the Society of the United States Military Telegraph Corps is anxious to know whether any of the following named operators who served in the telegraph corps during the civil war are still living, and if so their present address. The places given after the names are their last known addresses:

George S. Albright, Fayetteville, Ark;
S. T. Armstrong, Tacoma, Wash.;
Philip Bashford, Alexandria, Va.;
Philip Bowers, Paoli, Ill.;
W. H. Chaddock, National Military Home, Wis.;
Robert Cowell, Franklin, Tenn.;
M. D. Frisbie, Cynthia, Ky.;
Edward Fuller, ————;
James K. Gulliver, Salt Lake, Utah;
Charles A. Homan, Reading, Pa.;
George S. Holmes, ————;
Maynard Huyck, ————;
F. W. Kennan, ————;
Joseph D. McCleverty, ————;
John H. Purnell, Opelika, Ala.;
W. H. Sisson, Chicago, Ill.;
I. G. Webb, ————;
F. C. Long, ————;
James Meagher, ————;
B. McMurtry, ————;
C. D. Montanye, ————;
C. H. Spellman, San Antonio, Tex.;
John L. Sponagle, Port Orchard, Wash.;
D. N. Stewart, Detroit, Mich.;
John N. Stewart, Chicago, Ill.;
Ellis Stone, Bloomington, Ill.;
F. G. Waddell, Columbus, O.;
Orin J. Waddell, Cincinnati, O.;
D. A. Williams, Kansas City, Mo.;
J. W. Wickard, Monclova, Mex.;

Should any of these persons be identified as now living or if known to be dead, Secretary Bates will be thankful for the information.

Mr. H. H. Ward, a forty-niner of the telegraph a gentleman who is frequently mentioned as being active in telegraph circles in New England and New York City since 1849, having for many years been cashier in the main office of the Western Union Telegraph Company in New York, and who now resides in East Orange, N. J., in renewing his subscription for another year, says: "Like many others, I appreciate your publication and should not like to be without it."

The Reunion of the Old-Time Telegraphers' and Historical Association and of the Society of the United States Military Telegraph Corps.

The twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps will be held at Chicago, September 8, 9, and 10. The headquarters of the convention will be at the Auditorium Hotel which faces the lake front on Michigan Boulevard and which is admirably situated for the convenience of the visitors. The coming reunion is the fourth in the series which has been held in Chicago, that city having entertained the annual gatherings of 1883, 1888 and 1893. The central location of Chicago, together with the fact that so many of the old time telegraphers have their residence in that city gives ample assurance that the twenty-ninth annual reunion will be well attended. Since this is the first reunion to be held as far west as Chicago since 1903, when Milwaukee was the host, many who have not been able to meet their comrades of former days since that time will be able to attend the coming gathering.

From present indications there will be an unusually large number of military telegraphers present at this meeting. The members of this gallant band are fast dropping from the ranks, but it is expected that a goodly percentage of the survivors who now number less than three hundred will grasp the hands of old comrades at Chicago next week. Since the reunion at Pittsburg, last year, nineteen have been stricken from the roll by death, namely, Dr. Wm. M. Ash, at Woodside Park, Maryland; G. W. Baxter at Pittsburg; B. F. Bush, at Denver; Charles E. Chandler at Los Angeles; H. H. Craig, at New York; Thomas A. Davin at Boston; E. G. Fish at Kansas City; Charles W. Hammond at St. Louis; Wm. H. von Hartman at Westville, Okla.; George P. Lennox at Belleville, Ill.; David W. McAneeny at New York; William Martin at Ironton, Mo.; Herbert R. Sackett at Columbus, O.; Michael Smith at Jersey City; H. C. Vincent at Marietta, O.; M. E. Washburn at Indianapolis; Joseph Finegan at Baltimore; Wm. R. Woodard at Springville, Tex., and Levi C. Weir at New York.

Though many members of the Old Time Telegraphers' and Historical Association have passed away during the last year the ranks of this organization are continually being swelled by new recruits from among those who each year reach the twenty-five year mark of time since they entered the telegraph service. The Association now has a membership of 1,360. Five forty-niners of the telegraph have died during the past year, namely: William Arnoux, Emory Cobb, Charles H. Haskins, A. B. Talcott and E. M. Tomlinson. As all of the forty-niners are now well past three score and ten, it is only a question of a few years when the last links joining the first telegraphs to the telegraph systems of the present day will have been severed.

Several of these veterans will attend the Chicago reunion and their presence will greatly enhance the old time aspect of the occasion.

Other old timers who have died since the Pittsburg reunion are Laurence F. Dowling, E. G. Cochrane, Mrs. G. M. Eitemiller, Joseph Landis, J. R. Van Wormer, H. L. Shippey, L. A. Angel, G. J. Frankel, C. H. Schermerhorn, Edward Curry, M. T. Quigley, J. B. Twiford, Paul Sheehan, B. D. Chandler, C. A. Darlton, J. C. Reilly, D. C. Sullivan, P. J. Burke, J. H. Converse, W. H. Glover, W. C. Furness, Lyman McCarty, Jesse Knight, A. M. Musser, and James Swan.

Those who visit Chicago to attend the reunion will find many things of interest in the second city of the land which will attract their attention. The program includes visits to some of the most prominent places in Chicago and in addition to these trips, which will be taken by the gathering as a whole, there will be opportunity for individuals to visit any other places which may strike their fancy. The reunion will open Thursday morning, September 8, in the parlors of the Auditorium Hotel, with a joint meeting of the two associations, at which the new president, Mr. W. J. Lloyd, will be installed in his office, and those in attendance will be welcomed to the city. Following this will be the separate business meetings of the two organizations. An opportunity for shopping will then be taken advantage of by the ladies and at 3 p. m. a ball game between the Chicago and Cincinnati teams of the National League will be attended by the visitors. In the evening tickets will be provided for the various amusement parks of the city.

Friday morning a special train on the Chicago and North Western Railway will convey the party for a ride of twenty-three miles to Highland Park, one of the beautiful suburbs of Chicago. There Mr. Frederick W. Cushing, a vice-president of the Old Time Telegraphers' and Historical Association will be the host at a luncheon served at the Hotel Moraine. In the evening the entertainment will consist of a theatre party.

Saturday morning will be spent in sight seeing. Among other points of interest the famous Union Stock Yards will be visited. No special entertainment has been provided for the afternoon, as the Committee of arrangements thought it best that this time should be left free for each one to go wherever his inclination might lead him.

The crowning feature of the occasion, the banquet, will be held at the Auditorium Hotel, Saturday evening, beginning at 6.30. This is a part of the program which is looked forward to from year to year by those who attend all of the reunions, and the banquets of the past have been



WILLIAM J. LLOYD, CHICAGO.
President of Old Time Telegraphers' and
Historical Association.



BERNARD E. SUNNY, CHICAGO.
Vice-President of Old Time Telegraphers'
and Historical Association.



THOMAS W. CARROLL, CHICAGO.
Vice-President of Old Time Telegraphers'
and Historical Association.



FREDERICK W. CUSHING,
HIGHLAND PARK, ILL.
Vice-President of Old Time Telegraphers'
and Historical Association.



FRANKLIN J. SCHERRER,
NEW YORK.
Secretary of Old Time Telegraphers' and
Historical Association.



JOSEPH UHRIG, CHICAGO.
Member Executive Committee, Old Time
Telegraphers' and Historical Association.



WILLIAM E. BELL, CHICAGO.
Member Executive Committee, Old Time
Telegraphers' and Historical Association.



ADAM W. REIDLER, CHICAGO.
Member Executive Committee, Old Time
Telegraphers' and Historical Association.



JOHN McROBIE, CHICAGO.
Member Executive Committee, Old Time
Telegraphers' and Historical Association.

occasions long remembered by those who were fortunate enough to be present. Many notable speeches have been made at these events and the record of them all forms an important part of telegraphic history.

Mr. Bernard E. Sunny, president of the Chicago Telephone Company and a vice-president of the Old Time Telegraphers' and Historical Association, will preside as toastmaster of the occasion.



COL. WM. B. WILSON, HOLMESBURG, PHILADELPHIA.
President of the Society of the United States Military
Telegraph Corps.



WILLIAM L. IVES, NEW YORK.
Vice-President of the Society of the United States Military
Telegraph Corps.



CHARLES A. TINKER, NEW YORK.
Vice-President of the Society of the United States Military
Telegraph Corps.



DAVID HOMER BATES, NEW YORK.
Secretary and Treasurer of the Society of the United States
Military Telegraph Corps.

The first speaker will be Mr. Bernard J. Mullaney, who will address the gathering in behalf of the city of Chicago; Colonel William Bender Wilson, president of the Society of the United States Military Telegraph Corps, will respond to Mr. Mullaney. Among others who will make remarks befitting the occasion will be W. R. Plum, Frank J. Loesch, Charles S. Holt, M. J. O'Leary, and J. B. Taltavall.

The officers of the Society of the United States

Military Telegraph Corps are: Colonel William Bender Wilson, Holmesburg, Philadelphia, president; William L. Ives, New York, and Charles A. Tinker, Brooklyn, vice-presidents; David Homer Bates, 658 Broadway, New York, secretary and treasurer. The executive committee is made up as follows: Colonel Robert C. Clowry, New York; William R. Plum, Lombard, Ill.; Colonel Albert B. Chandler, W. J. Dealy and David

Homer Bates, New York; Charles A. Tinker; Brooklyn; Richard O'Brien, Scranton, Pa.; John Wintrup, Philadelphia, and Marion H. Kerner, New York.

The officers of the Old Time Telegraphers' and Historical Association are W. J. Lloyd, Chicago, president; T. W. Carroll, B. E. Sunny and F. W. Cushing, all of Chicago, vice-presidents; F. J. Scherrer, 195 Broadway, New York, secretary and treasurer. The executive committee consists of



COL. ROBERT C. CLOWRY, NEW YORK.
Member Executive Committee of the Society of the United States
Military Telegraph Corps.



COL. A. B. CHANDLER, NEW YORK.
Member Executive Committee of the Society of the United States
Military Telegraph Corps.



G. A. CELLAR, PITTSBURG, PA.
Member Executive Committee, Old Time
Telegraphers' and Historical Association.



ABEL H. BLISS, CHICAGO.
Member Executive Committee, Old Time
Telegraphers' and Historical Association.



JOHN C. BARCLAY, NEW YORK.
Member Executive Committee, Old Time
Telegraphers' and Historical Association.



JOHN WINTRUP, PHILADELPHIA.
Member Executive Committee of the
Society of the United States Military
Telegraph Corps.



RICHARD O'BRIEN, SCRANTON, PA.
Member Executive Committee of the
Society of the United States Military
Telegraph Corps.



W. J. DEALY, NEW YORK.
Member Executive Committee of the
Society of the United States Military
Telegraph Corps.

G. A. Cellar, Pittsburg; H. D. Reynolds, Buffalo, N. Y.; John C. Barclay, and Charles C. Adams, New York; W. E. Bell, Joseph Uhrig, John McRobie and Adam W. Beidler, Chicago.

The committees having charge of the arrangements for the reunion are:

Reception Committee of the Old Time Telegraphers' and Historical Association—Joseph

bank, J. P. Heffernan, W. H. Mann, G. A. Keil, J. E. Haskell, C. H. Kehnroth, G. W. Dailey, M. T. Cook, W. W. Ryder, C. H. Finley, W. Bennett, J. G. Jennings, A. J. McGrath, D. S. Anderson, H. S. Waters, J. C. Duffy, F. T. Wilbur, F. W. Conger, Leo Peters and H. L. Reno.

Reception Committee of the United States Military Telegraph Corps—A. H. Bliss, chairman.



CHARLES C. ADAMS, NEW YORK.
Member Executive Committee, Old Time Telegraphers' and Historical Association.



MARION H. KERNER, NEW YORK.
Member Executive Committee of the Society of the United States Military Telegraph Corps.



HARVEY D. REYNOLDS, BUFFALO, N. Y.
Member Executive Committee, Old Time Telegraphers' and Historical Association.



ANDREW CARNEGIE, NEW YORK.
Founder of the United States Military Telegraph Corps.

Uhrig, chairman, A. B. Cowan, Warren Baker, E. W. Mayfield, C. W. Potter, John K. Crawford, Frank J. Vlazny, M. J. Kenyon, C. H. Shedd, F. V. Moffitt, H. T. Price, John P. Boughan, Addison C. Thomas, T. N. Powers, Claude Powell, J. E. Applegate, P. W. Drew, J. A. Cummins, F. E. Serfass, C. M. Baker, E. S. Williams, S. T. Fulton, John F. Butler, H. T. Reneau, H. C. Bur-

E. W. McKenna, Hon. A. W. Nohe, Wm. R. Plum, H. P. Darlington, Daniel Hogan, Rev. W. D. Gentry, John R. Dixon, H. D. Sloat, John D. Voltz, Z. P. Hotchkiss, Chas. F. Gross, S. E. Ingram, Cass G. Sholes and Henry W. West.

Ladies' Committee of the Old Time Telegraphers' and Historical Association—Mrs. W. E. Bell, chairman; Mrs. B. E. Sunny, Mrs. G.

W. Dailey, Mrs. T. W. Carroll, Mrs. W. J. Lloyd, Mrs. Joseph Uhrig, Mrs. A. W. Beidler, Mrs. F. W. Cushing, Mrs. A. J. McGrath, Mrs. C. W. Potter, Mrs. M. T. Cook, Mrs. F. V. Moffitt, Mrs. F. W. Conger, Mrs. J. A. Cummins, Mrs. D. S. Anderson, Mrs. H. S. Waters, Mrs. C. H. Finley, Mrs. A. B. Cowan, Mrs. E. S. Williams, Mrs. A. C. Murphy, Mrs. T. N. Powers, Mrs. H. T. Price, Mrs. T. P. Cook, Mrs. J. G. Jennings, and the Misses Mary Cowan, Annabelle Cowan, Helen Bell, Bessie Lloyd, Alice Robinson, Pauline Murphy, Helen Cook, Charlotte S. Pendry and Nellie Hope.



WILLIAM R. PLUM, LOMBARD, ILL.
Member Executive Committee of the Society of the United States
Military Telegraph Corps.

Ladies' Reception Committee of the Society of the United States Military Telegraph Corps—Mrs. W. R. Plum, Mrs. E. W. McKenna, Mrs. A. H. Bliss, Mrs. Florence D. Niblock, Mrs. A. W. Nohe, Mrs. L. B. Parker, Mrs. Daniel Hogan, Mrs. Charles F. Gross, Miss Margaret Charles Gross, Miss Alice S. Pettit, Miss Livonia Ingram, Miss Nina G. Sloat, Miss Rose Marie Moore and Miss Frances Bliss Moore.

Committee on Badges—F. V. Moffitt, chairman, George Smallbone, and A. B. Cowan.

Committee on Hotels—A. C. Murphy, chairman, E. S. Williams, F. V. Moffitt and M. J. Kenyon.

It is now thirty years since the Old Time Telegraphers' and Historical Association or rather the Old Time Telegraphers' Association as it was first called was organized. The first meeting was held at Cincinnati, O., September 7, 1880. Of the eighty-five who were present at the first meeting there are now living: Nathaniel Hucker, John A. Townsend, Wm. C. Long, George T. Williams, E. W. McKenna, Philip Bruner, John F. Wallick, J. W. Tillinghast, George W. Irwin, George T. Gilliland, Edward H. Hogshead, Colonel Robert C. Clowry, Z. P. Hotchkiss, W. R. Plum, George M.

Dugan, George J. Goalding and Jules J. Guthridge.

The following is a list of the places of meeting and the officers of the Association since its organization:

1880—Cincinnati, O., president, *O. H. Booth; vice-president, G. M. Dugan; secretary, *J. C. Mattoon.

1881—No meeting on account of the death of President Garfield.

1882—Niagara Falls, N. Y., president, *O. H. Booth; vice-president, G. M. Dugan; secretary, *J. C. Mattoon.

1883—Chicago, Ill., president, W. R. Plum; vice-president, W. B. Wilson; secretary, *J. C. Mattoon.

1884—St. Louis, Mo., president, G. M. Dugan; vice-president, *E. Rosewater; secretary, *S. B. Fairchild.



PROFESSOR SAMUEL F. B. MORSE.
The Inventor of the Telegraph.
Born at Charlestown, Mass., 1791. Died at New York 1872.

1885—New York, N. Y., president, *C. W. Hammond; vice-president, *Chas. E. Taylor; secretary, *S. B. Fairchild.

1886—Cleveland, O., president, *J. D. Reid; vice-president, *C. S. Jones; secretary, W. J. Dealy.

1887—Philadelphia, Pa., president, *C. C. Hine; vice-president, *Chas. E. Taylor; secretary, W. J. Dealy.

1888—Chicago, Ill., president, *David Brooks; vice-president, *Irwin Dugan; secretary, W. J. Dealy.

1889—Louisville, Ky., president, *Chas. E. Taylor; vice-president, *Day K. Smith; secretary, W. J. Dealy.

1890—Kansas City, Mo., president, *Day K. Smith; vice-president, *B. Hughes; secretary, W. J. Dealy.

1891—Washington, D. C., president, G. C. Maynard; vice-president, *D. A. Williams; secretary, W. J. Dealy.

1892—Omaha, Neb., president, *E. Rosewater; vice-president, G. M. Dugan; secretary, W. J. Dealy.

1893—Chicago, Ill., president, A. H. Bliss; vice-president, *W. D. West; secretary, W. J. Dealy.

1894—Baltimore, Md., president, Chas. Selden; vice-president, *M. Marean; secretary, W. J. Dealy.

1895—New York, N. Y., president, *E. C. Cockey; vice-president, *R. J. Hutchinson; secretary, W. J. Dealy.

* Deceased.

1896—Pittsburg, Pa., president, S. A. Duncan; vice-president, *J. D. Flynn; secretary, W. J. Dealy.

1897—Nashville, Tenn., president, James Compton; vice-president, *Martin Barth; secretary, W. J. Dealy.

1898—Omaha, Neb., president, *J. J. Dickey; vice-president, L. H. Korty; secretary, W. J. Dealy.

1899—Boston, Mass., president, H. J. Pettengill; vice-president, E. B. Baker; secretary, *John Brant.

1900—St. Paul and Minneapolis, Minn., president, *H. C. Hope; vice-president, H. A. Tuttle; secretary, *John Brant.

1901—Montreal, Can., president, L. B. McFarlane; vice-president, J. E. Hutcheson; secretary, *John Brant.

1902—Salt Lake City, Utah, president, *G. H. Corse; vice-president, B. Brooks; secretary, *John Brant.

1903—Milwaukee, Wis., president, U. J. Fry; vice-president, Wm. J. Lloyd; secretary, *John Brant.

1904—Atlanta, Ga., president, C. C. Adams; vice-presidents, W. H. Adkins and J. M. Stephens; secretary, *John Brant.

1905—New York, N. Y., president, John C. Barclay; vice-presidents, F. W. Jones and F. Pearce; secretary, *John Brant.

1906—Washington, D. C., president, *W. H. Young; vice-presidents, *C. P. Adams, G. W. Ribble and J. B. Yeakle; secretary, *John Brant.

1908—Niagara Falls, N. Y., president, H. D. Reynolds; vice-presidents, *G. A. Burnett, I. McMichael and G. F. MacDonald; secretary, *John Brant.

1909—Pittsburg, Pa., president, G. A. Cellar; vice-presidents, W. J. Camp and C. E. Bagley; secretary, F. J. Scherrer.

*Deceased.

A Complete List of the Living Members of the United States Military Telegraph Corps So Far as Known.

Abernethy, John T.	Bruner, Philip
Adams, Milton F.	Brush, S. T.
Albright, George S.	Buell, Madison
Allison, George	Bull, Henry P.
Anderson, Joseph	Burhans, William W.
Armes, William J.	
Armstrong, Ewing L.	Carnegie, Andrew
Armstrong, S. T.	Cassell, J. A.
Atwater, Henry H.	Chaddock, W. H.
Atwell, J. W.	Chandler, Col. A. B.
	Child, Hubert
Barnes, Cassius M.	Clowry, Col. Robert C.
Barton, Stephen E.	Cochrane, Achilles P.
Bashford, Philip	Cole, George
Bassett, W. F.	Colestock, Daniel
Bates, David Homer	Cowell, Robert
Beckwith, Samuel H.	Crain, M. D.
Bender, Robert W.	Cromwell, George E.
Benedict, C. H.	Croning, Daniel
Benner, Frank	Crouse, Jesse W.
Bliss, Abel H.	Cruise, J. D.
Bliss, J. E.	Culbertson, Cambridge
Bohle, R. H.	
Boyd, Joseph W.	Darlington, H. P.
Boyle, E. C.	Daugherty, Walter
Brenneman, A. Thomas	David, Thomas B. A.
Brooke, Thomas H.	Davis, Frank P.
Brown, Charles Exera	Davis, Samuel
Brown, J. R.	Dealy, William J.
Browne, Henry R.	De Bree, Nathan

Dennis, L. B.
Denny, J. C.
Dixon, John R.
Dougall, William H.
Dougherty, C.
Dow, D. D.
Duell, John T.
Duncan, J. C.

Eckert, Gen. Thos. T.
Eitemiller, George M.
Elliott, R. H.
Evans, Frank H.

Felton, G. C.
Ferris, D. V.
Fitch, Derick H.
Fonda, Ten Eyck H.
Forsey, W. S.
Fowler, J. J.
Fraser, Philip B.
Freeland, J. W.
Frisbie, M. D.
Fuller, J. A.
Furr, R. A.

Gard, D. H.
Geiger, John M.
Gentry, Rev. W. D.
Gilmore, Col. J. R.
Goalding, George J.
Graham, Richard
Greene, E. C.
Gregg, Harry L.
Griffin, Russell B.
Griffin, S. L.
Griffith, C. H.
Groomes, Isaac C.
Gross, Charles F.
Gulick, C. W.
Gulliber, James K.
Guthridge, John F.

Hallam, Isaac W.
Hammond, Charles D.
Hancock, A. G.
Hansen, Joseph.
Harveycutter, John
Hatton, O. C.
Hauxhurst, H. C.
Henderson, George
Henderson, Harvey B.
Hogan, Daniel
Hoge, O. E.
Holley, Minard Y.
Holmes, George S.
Homan, Charles A.
Holt, Theodore
Hood, Oliver Perry
Hoover, R. B.
Hotchkiss, Z. P.

Howe, G. W.
Hull, A. K. V.
Hull, Henry P.
Huntington, Geo. M.
Huyck, Maynard

Ingram, S. E.
Ives, William L.

Jaques, Charles W.
Jayne, John E.
Johnstone, W. F.
Jones, George E.

Kanode, A. H.
Kennan, F. W.
Kenny, Edwin
Kerhey, Joseph Orton
Kerner, Marion H.
Kettles, William E.
Kiley, John K.
King, Thomas M.
Knapp, Stewart W.
Knight, Frank B.
Knittle, Joseph
Korty, L. H.

Lafaye, J. H.
Laird, Thomas A.
Lamb, Frank H.
Langdon, Thomas
Lawrence, George J.
Lemoreaux, C. L.
Lewis, W. T.
Lindauer, A. C.
Lonergan, John
Long, F. C.
Loomis, Charles Fred
Low, George A.
Lowe, James
Ludwig, Charles J.
Ludwig, J. F.
Lyons, William J.

McCleverty, Joseph D.
McCloskey, I. T.
McClure, J. P.
McCoy, Daniel B.
McIlvaine, J. F.
McKelvey, A. T.
McKenna, E. W.
McMichael, Isaac
McMurtry, B.
Magehan, W. H.
Maize, Isaiah D.
Maloney, Patrick
Martin, Henry S.
Martin, Robert W.
Mason, J. Q.
Matlock, Henry H.
Maynard, George C.

Mcagher, James
Mixer, Charles H.
Montainye, C. D.
Moore, Charles W.
Moreland, Theodore E.
Morris, Absalom M.
Morrison, Thomas

Naile, George W.
Newton, E. C.
Nichols, J. Hervey
Nichols, A. M.
Nohe, A. W.
Norris, James B.

O'Brien, Dr. John E.
O'Brien, Richard
O'Neal, William C.
Orton, Albert W.

Palmer, Charles H.
Parsons, James K.
Parsons, John W.
Paxson, Charles A.
Pearson, C. W.
Peel, Edwin
Perdue, L. Ford
Perkins, George W.
Peterson, Joseph H.
Phelps, Ransom
Pierce, George C.
Pitfield, James W.
Plum, Henry W.
Plum, William R.
Pond, Chester H.
Pope, J. William
Power, Richard
Prichard, John W.
Purcell, P. Jos. A.

Railton, G. W.
Rand, D. E.
Rawlings, T. E.
Reid, Douglas
Reese, Samuel
Reeves, J. E.
Robinson, Byron L.
Robinson, Jesse H.
Robinson, Merritt F.
Robinson, S. L.
Roche, Thos.
Rodgers, T. J.
Rose, Luther A.
Rowe, R. D. E.
Rumsey, S. B.
Rupley, Samuel K.

Sanborn, F. A. H.
Sargent, W. D.
Scanlan, John
Schnell, Andrew C.

Schnell, Joseph
Schnell, Thad. M.
Sheldon, Irvin B.
Sheldon, William A.
Sholes, Cass G.
Shoch, W.
Shrigley, James A.
Shuman, W. A.
Sisson, W. H.
Sloat, Harry D.
Smith, Charles W.
Smith, George K.
Smith, J. Elliott
Smith, Robert H.
Smith, Walter
Snow, H. N.
Spellman, C. H.
Spencer, Harry B.
Sponagle, John L.
Sprague, Henry C.
Stewart, D. N.
Stewart, John N.
Stone, Ellis
Strubbe, W. G.
Stumm, Frank A.
Sullivan, Daniel

Talbot, Robert M.
Talmage, George J.
Taylor, Perlander A.
Taylor, W. S.
Thode, George F.
Tinker, Charles A.
Tompkins, E. P.
Tyler, James D.
Van Valkenburgh, F. S.
Vincent, O. B.
Volz, J. D.
Von Eye, Edward

Waddell, F. G.
Waddell, Orin J.
Walsh, Arthur
Ward, Edward T.
Watts, Jonn C.
Ways, Chas. E.
Webb, J. G.
Weitbrec, R. F.
West, H. W.
White, W. N.
Wickard, J. W.
Williams, D. A.
Wilson, Ellis J.
Wilson, Col. Wm. B.
Winder, Alfred
Wintrup, John
Wolffe, C.
Wood, William B.
Woodring, W. H.
Wortzman, L. W.
Zion, A. A.

Forty-Niners of the Telegraph.

Name.	When entered the service	Where entered the service.
Barr, M. W.	1847	Wheeling, W. Va.
Berry, Stephen	1846	Boston
Bethune, N. W.	1847	Montreal
Brigham, George F.	1848	Fredonia, N. Y.
Brigham, Henry H.	1849	Warren, Pa.
Bright, Louis A.	1849	Pottsville, Pa.
Brownson, W. G.	1849	Poughkeepsie, N. Y.
Buell, Madison	1847	Buffalo, N. Y.
Carleton, G. W.	1849	
Carnegie, Andrew	1848	Pittsburg, Pa.
Clark, James J.	1845	Philadelphia
Clark, William H.	1849	Frankfort, Ky.
Cleveland, Uriah	1847	Toledo, O.
Compton, J.	1848	Wheeling, W. Va.
Daugherty, A. D.	1848	Coldwater, Mich.
David, T. B. A.	1849	Pittsburg, Pa.
Davis, A. G.	1849	Poughkeepsie, N. Y.
Dodge, L. C.	1847	Burlington, Vt.
Dunham, James	1847	Poughkeepsie, N. Y.
Dwight, H. P.	1847	Montreal
Easson, R. F.	1849	Toronto, Ont.
Eckert, Gen. Thos. T.	1848	St. Clairsville, O.
Flagg, John A.	1849	
Frey, George H., Sr.	1849	Springfield, O.
Gentry, Dr. W. D.	1848	Hopkinsville, Ky.
Greene, Joseph S.	1846	Philadelphia
Guthridge, J. F.	1849	Attica, Ind.
Haviland, James D.	1847	Detroit
Hepburn, H. C.	1845	Philadelphia
Homans, Benjamin	1848	Baltimore
Hoyt, Samuel	1848	Milan, O.
Hucker, Nathaniel	1847	Buffalo, N. Y.
Hunt, Thomas	1849	Morrow, O.
Huntington, Geo. M.	1849	Watkins, N. Y.
Lassell, W. B.	1849	Oswego, N. Y.
Louis, L. A.	1848	Louisville, Ky.
Lumhard, Julius G.	1847	Ashtabula, O.
Matthews, Charles P.	1849	Columbus, O.
Melbourne, W. A.	1848	Bardstown, Ky.
Merrilow, James	1849	Wilmington, Del.
Morris, S. R.	1847	
Porter, E. P.	1846	Geneva, N. Y.
Reed, Henry A.	1849	Carmel, N. Y.
Reid, Douglas	1847	Sandusky, O.
Ryan, Reuben H.	1848	Milan, O.
Scott, M. A.	1848	
Sutherland, John A.	1849	Buffalo, N. Y.
Titcomb, H. B.	1848	Memphis, Tenn.
Townsend, John A.	1849	Akron, O.
Tree, J. B.	1847	Washington
Tubbs, F. H.	1848	Milan, O.
Tyler, Artemus E.	1848	Erie, Pa.
Van Duzer, A. M.	1849	Fredonia, N. Y.
Ward, Henry H.	1848	Springfield, Mass.
Ware, James	1847	
Weller, Alfred	1847	Marshall, Mich.
Williams, George T.	1849	Sinclair, N. Y.
Worl, James N.	1848	Philadelphia
Worl, W. S.	1849	Philadelphia

American Telegraph Engineering—Notes on History and Practice.*

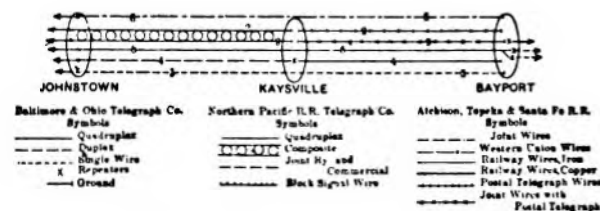
BY WILLIAM MAVER, JR., AND DONALD McNICOL.
(Concluded from page 553, August 16 issue.)

In the course of time, however, relays of 150 ohms were adopted for simplex Morse circuits. For duplex and quadruplex service the neutral relays were wound to 200 ohms, the polar relays to 400 ohms, (each coil of the differential windings) and for many years these resistances have been the standard. Within the past eight or ten years, however, there has been a still further reduction of the resistance of main line relays (to $37\frac{1}{2}$ ohms) on many of the commercial and railway telegraph way wires with a very pronounced improvement in the operation of the circuits, especially in bad weather. At the present time the tendency of American practice is to the employment of lower e.m.f.s at the terminals of the circuit and to lower resistances in the relays for multiplex working. During the period when No. 9 iron wire was the standard for telegraph purposes, and when the insulation resistance of the lines, was far below present day standards, a high e.m.f. was necessary in order to maintain proper current values, but by the substitution of low resistance copper conductors in place of iron wire and with improved line construction, the way has been paved for the employment of lower voltages, and relays of much reduced resistance in multiplex operation. Thus some very satisfactory results have been obtained recently in different parts of the country on quadruplex circuits using e.m.f.s as low as 200 volts on well insulated lines of comparatively low resistance (two ohms per mile) and with polar relays wound to 100 ohms and neutral relays to 50 ohms. The length of the cores of these relays has been somewhat increased. The "potential" resistance of 600 ohms (usually inserted between the current generators and the multiplex apparatus) in these instances has also been reduced to 300 ohms, and the "proportion" resistance and "leak" shunt in the field key system from 1200 to 600 ohms, and from 900 to 450 ohms, respectively. The objective in these modifications of the prevailing practice is to reduce the inductive effects upon parallel circuits and to render the relay less sensitive to inductive disturbances from any source.

SOME TELEGRAPH ENGINEERING DETAILS.

It might be supposed that telegraph engineering has to do mainly with purely physical and technical questions, but the close relationship existing between the handling of traffic (telegrams, leased wires, etc.), and the machinery employed in handling it, is such that the telegraph engineer, perforce finds himself involved in the study of traffic details which he cannot well omit without loss to the economies of operation. This for example obviously

requires keeping in the engineer's department an accurate record of existing wire facilities, data as to the daily efficiency of operation of all circuits (especially multiplex and automatic circuits) and information as to their electrical condition, together with carefully prepared tabulated records of details pertaining to methods of traffic movement and the amount of traffic handled on the respective circuits throughout the system, in order at once to enable the engineers to determine whether existing facilities are being utilized to the best advantage, or whether additional facilities, or modifications of the arrangement of present facilities may be deemed advisable. Information of this kind is especially important as a guide in the matter of underground construction and cable work extension. Thorough engineering organization and the application of engineering principles to all work under way or prospective also results, among other things, in placing the engineer's department in a position to intelligently and promptly decide all strictly engineering and related traffic questions that are continually arising in the operation of a large telegraph system.



GRAPHIC METHOD OF MAPPING TELEGRAPH CIRCUITS.

The graphic method of mapping circuits indicated in the accompanying diagram to show at a glance the routes of the various wires, their allotted numbers, how operated, offices entered, material of wire, by whom owned, etc., has been found of great utility wherever used. The scheme which is clearly susceptible of many amplifications was probably first employed in the engineering department of the Baltimore and Ohio Telegraph Company in 1885-88 by one of the present writers and it may be of interest to note that details of the nature indicated relating to over 50,000 miles of actual wire were shown on a map four feet long by three feet wide.

Blank forms for certain reports were also used in the operation of the same company, the information derived therefrom enabling the engineer's department to maintain an intelligent supervision of the circuits, that resulted in a clearly perceptible enhanced earning capacity in the case of numerous circuits. Somewhat contrary to expectations these reports were prepared by chief operators or clerks at no additional expense. As will be readily understood, the knowledge that the operation of all circuits was under constant impartial supervision was not overlooked by those directly in charge of the operation of the circuits.

A knowledge of the condition of the insulation resistance and conductivity of every circuit, open or in cables is manifestly of great importance to the engineering department and reports of the tests of

*A paper presented at the Twenty-seventh Annual Convention of the American Institute of Electrical Engineers, Jefferson, N. H., June 28-July 1, 1910.

conductors for these properties are promptly forwarded to the engineer's department periodically.

THE TELEPHONE IN ELECTRICAL TESTING.

In America the tangent galvanometer has long since been set aside and simpler and quicker methods of circuit testing and fault localizing have been adopted. Many tests, such as those for insulation resistance and conductivity are now made with high resistance voltmeters, especially where earth currents from adjacent grounded trolley circuits (which frequently indicate an e.m.f. of fifteen to twenty volts) are not troublesome. The milliammeter is also used for making insulation resistance measurements not exceeding one megohm and for other electrical tests. The telephone receiver is used as an indicator in many tests. This instrument in connection with an "exploring" coil is largely utilized for localizing faults in aerial cables and in underground cables, especially where the latter are laid in conduits. In making these tests a high frequency current is established in the defective conductor and the exploring coil, a semi-circular coil of fine wire in circuit with the telephone, is moved from point to point along the cable sheath, the indications in the telephone increasing or diminishing as the defect is reached. The telephone receiver as a testing device is particularly advantageous for practical purposes as it places in the hands of the electrical worker or "trouble hunter," an instrument at once portable, and easily understood, and one that is not readily deranged by rough handling. Where a head-band is used to support the receiver, the hands of the workman are free.

POLE LINE CONSTRUCTION—AERIAL VERSUS UNDERGROUND CONDUCTORS—NOTES ON DUPLEX AND QUADRUPLER OPERATION.

Owing to the confusion and general disarrangement of business that usually follows the prostration of the telegraph wires by severe sleet or wind storms in this and other countries, every notable occasion of this kind has been followed by insistent demands on the part of the interested business communities that measures be taken to prevent a recurrence of these disarrangements. So much has this been the case that in Great Britain, at least, where such storms are quite frequent, and where owing to the geographical shape of the country the loss of telegraphic communication due to the effects of such storms has been felt with peculiar force, these demands have been met by the British government in the laying of an emergency telegraph cable between London and North Britain. The fact that such unanimous demands are made for the prevention of even a temporary loss of the telegraph between important centers is, it may be remarked, a rather notable acknowledgment of the indispensability of this public utility as a part of the commercial and social structure of a country.

Apart from the very important matter of maintaining uninterrupted telegraphic communication regardless of weather conditions in the interests of

the general public, it may safely be assumed that the various telegraph authorities in this country have not been unmindful of the financial losses sustained by the telegraph upon the occasion of each recurring collapse of poles and wires, and that every possible remedy therefor has been most carefully considered. Furthermore, telegraph lines are not only subject to widespread damage from abnormally severe sleet and snow storms, but are also in many places exposed to the ravages of forest fires, avalanches of snow, washouts due to floods, and to destruction by lightning. Again, the average life of a pole line in all parts of the country probably does not much exceed ten years. Consequently, if the financial and engineering difficulties in the way of placing telegraph wires underground on a large scale had not been practically insurmountable, that solution of the problem unquestionably, would have long ago been adopted. But it is well known, for instance, that the increased static capacity and mutual induction of the conductors carried in cables reduces very materially the length of circuit that may be used in satisfactory telegraph operation. Already indeed the presence of a comparatively limited amount of underground cable in the circuits passing through the principal cities of the country has very perceptibly reduced the speed of signaling, and the general efficiency of automatic and multiplex telegraph circuits in this country. Being therefore aware of the great technical and financial difficulties that would attend the placing of wires underground generally between cities and towns over the expansive territory of this country, the question of building stronger pole lines, and of employing larger and stronger wires has been frequently proposed by telegraph engineers. The well known "A" and "H" methods of setting wooden poles have of course received due consideration, and in trials have been found to add considerably to the stability of lines. In addition, however, to doubling the expense for poles, further objection to the use of these methods, especially where the telegraph lines are on a railroad right of way, is the extra space required for setting, which very often is not obtainable. Another plan tested was that of using worn out track rails, set up in "H" form and braced one foot apart. The cost of setting these rails is, however, rather high, being about eleven dollars per unit. In especially exposed places the plan of doubling the number of poles from say fifty to one hundred per mile, has been adopted with considerable success. A reduction of the height of poles and an increase of their girth has also been advocated and there is now a tendency in that direction. It is very probable that pole lines built in the future will, when possible, be built of poles considerably less than 35 feet in height (the present general practice) with head and side guys located about every half mile regardless of the contour of the line. On heavy loaded lines with the poles set about 100 feet apart reduction of the leverage obviously increases the efficiency of guy-

ing. In the construction of a thirty-wire line by using ten-pin cross arms, a 25-foot pole would generally leave sufficient clearance.

The employment of re-inforced concrete poles for telegraph purposes has been suggested as offering a solution of the problem as regards durability and reliability, but has not gained much headway hitherto, principally owing to the present high cost of such poles and also to the excessive cost of transportation. Even, however, if experience should show that cement poles will possess the ability to withstand the strains brought to bear on them by wires heavily coated with sleet, there still remains the unfortunate fact that the wires themselves may break under the strain. It would of course, be a decided gain to avoid the total loss of miles of pole line by the collapse of the poles, like bricks in a row—a not infrequent occurrence under present conditions.

In relation to the immediately foregoing remarks, it may not be amiss to digress here to suggest that since the telegraph lines are not put up merely for a day or a year, that a combination of concrete poles, or towers of equal strength and durability with perhaps some form of housing for the wires along permanent and isolated rights of way may be among the possibilities of future telegraph engineering; since such a plan offers promise of reliability of operation without the detrimental accompaniment of impaired efficiency of the telegraph service that follows the placing of telegraph conductors underground. In view of the importance of the subject further reference may here be made to the reduced efficiency of quadruplex telegraph operation within recent years, in some cases amounting to fifty per cent., due to the increased amount of telegraph conductors placed underground in cables in cities. In other cases certain quadruplex circuits have been abandoned because of inductive disturbances from parallel high tension transmission lines. It is a well established fact that prior to the introduction of these disturbing factors, duplex and quadruplex telegraphy in this country had attained a high degree of efficiency. Thus, for instance, it was formerly common practice to operate four, six or more quadruplex circuits between New York and Boston on open parallel lines, each with an efficiency equivalent to four wires worked simplex, and certain quadruplex circuits between New York and Chicago were operated as a rule with an efficiency of at least 9 per cent.

In the equipment of the quadruplex circuits to which special reference is now made, the ordinary horse-shoe polarized relay, with flat armature, and short cored neutral relay were employed without any devices to aid the operation of the No. 2 side excepting the Edison device of the back contact and repeating sounder attachment to the neutral relay. It is well known also that in isolated sections at the present time quadruplex circuits are still operative at high efficiency. It would appear evident therefore that a restoration of the original

efficiency of this exceedingly important arm of the telegraph service would be alone an aim worth the best efforts and thought of telegraph engineers and executives. A return to the former or greater freedom from inductive disturbances would also vastly enhance the opportunities for the utilization of some of the readily available rapid automatic telegraph systems, which as previously intimated the introduction of night letter telegram service may render imperatively necessary in the very near future.

Returning briefly to a consideration of the matter of obtaining a permanent, non-inductive, non-retarding system of telegraph routes, it is clear that utilizing the suggested towers or reinforced concrete poles, with housed wires to afford mechanical protection against storms, incidentally thereby guarding against undue variations of insulation resistance (a great desideratum for numerous reasons) and by the proper selection of routes at a suitable distance from high-tension lines thus evading their disturbing inductive currents, an immediate improvement in the operation of circuits would be obtained. There would, however, still remain to be dealt with, the detrimental effects due to the presence of conductors in underground cables leading into and out of cities and towns. This difficulty could, however, be obviated by placing the main operating departments of telegraph offices on the outskirts of such cities, from which offices loops might be run from duplex and quadruplex circuits to the various branch and brokers offices without detriment to the operation of the multiplex main circuits. All wires not required for the actual handling of traffic in a given town would in such cases enter the main operating room on the outskirts of the city and pass on without entering the city proper. In many small towns the telegraph lines following the highways enter at one end of the town and pass out at the other end, a custom that has frequently involved placing a comparatively large amount of cable in an unimportant locality considered from a telegraphic standpoint. By the plan suggested, only wires needed locally would enter the place by the shortest route to the business center, thereby minimizing the amount of cable required for the proper transaction of telegraph business at that point.

It is unnecessary here to comment on the economies and improvement of operation that could be rendered possible by even a partial adoption of the foregoing suggestions, further than to remark that a proper consideration of the subject will show them to be manifold and of great value.

It had been intended to include in this paper a general reference to recent improvements in the interior equipments of telegraph offices and also to describe the methods and materials now employed in aerial and underground telegraph cable work in this country, but owing to the brief time available for the preparation of the paper it has not been practicable to carry out that intention.

High Resistance Measurements by a Direct Reading Instrument.

BY ARTHUR J. ROWLAND, PHILADELPHIA.

Professor of Electrical Engineering, Drexel Institute.

The measurement of electrical resistance is one of the most important in electrical engineering, whether it is done in a research laboratory or in connection with tests to determine the efficiency and safety of a line or piece of apparatus. A number of methods are in use; some better adapted to the measurement of low resistance and some to high resistance determinations. In all of them indirect methods are almost invariably employed; and yet the advantage of being able to make a reading by direct observation when measuring resistance is as great as for any other things capable of being measured. And while everyone knows this, there are enough different good reasons to make it worth while to remind ourselves of what they are by tabulating some: (a) The satisfaction in taking a direct reading; no waiting for the result. (b) The speed of reading and of checking results. (c) Anyone can make the readings. (d) Errors are much less likely than by other methods. But the instruments which have been available for directly measuring resistance are ohmmeters which are either electro-dynamometers, or those which are voltmeters marked off in ohms.

The electro-dynamometer instruments are built with a fixed coil and a movable coil; the fixed coil being in series with the apparatus whose resistance is to be determined, while the movable coil is connected across its terminals. Such instruments are subject to all the faults of this class; having very uneven scales, a peculiar sensibility to stray magnetic fields and the near presence of iron; while they are not at all dead beat. They are also of quite limited range; at best reaching a high limit of resistance measurement at a few thousand ohms.

The voltmeter instrument must be supplied with a constant voltage (a condition which is practically almost impossible to obtain) and then a given instrument is available over only a very moderate range.

It must be partly because of the difficulty found in the design of a good instrument for direct resistance measurement that so little has been done in the past in the way of producing one; while nothing has been done in planning one for the direct measurement of dielectric or insulation resistance. The very fact that no instrument has been available for measurements may give the reason why so little real knowledge of insulation and insulation resistance has been gained.

It is true that a voltmeter can be used in an indirect way, and is used very extensively in telephone engineering, for determining insulation resistance. But it is not direct reading; changes its indication with the amount of e. m. f. in use; for a given change in resistance the change in scale reading is very different at different points along the scale; at the lower end of the scale where the

needle stands for most observations of insulation resistance the inaccuracy of a determination is very great. Besides all this, the person having insulation measurements to make on telephone systems seems commonly to have very curious ideas of what he is doing when making them by the aid of a voltmeter, and no notion at all of what the real insulation is or ought to be. Furthermore, for cable testing and all kinds of work where insulation resistance is important and no constant source of e. m. f. like the storage battery of the central office is available, it is necessary to carry a bulky equipment of cells and voltmeter if insulation resistance tests are to be made at all.

Ten or a dozen years ago, Mr. Sidney Evershed, after much experiment with ohmmeters of a fixed coil type, some of which were made and sold in this country, turned his attention to the develop-



FIGURE 1.—THE MEGGER.

ment of a portable ohmmeter for high resistance measurements which would have moving coils only and include the valuable features of permanent magnet instruments. Some four years ago the perfected instrument (the Evershed Megger) was put on the market. The Megger has a dead beat movement and enormously increased sensibility above that of former ohmmeters. It is available in standard instruments in various ranges between 1000 ohms and 2000 megohms.

It is rather remarkable that this instrument has not been brought prominently to the attention of American engineers until this present year; and up to the date of writing this article there has been so little detailed information regarding it given to the public, that the author feels sure of interesting his readers by the following description.

The Megger complete and ready for use is illustrated in Figure 1. This shows the instrument one-sixth of its full size. The insulation resistance to be investigated is connected between the binding posts, one of which is marked "line"

and the other "earth." The crank is turned at fair speed and the amount of insulation resistance in megohms read from the scale. The whole process requires a few seconds; the operation can be conducted by anyone; the results have an accuracy usually considerably higher than that ob-

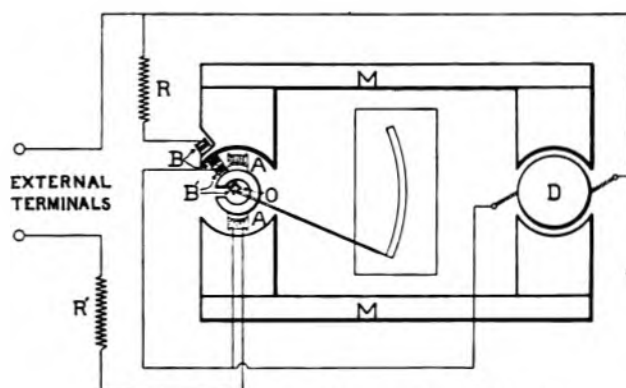


FIGURE 2.—DIAGRAM OF INSTRUMENT.

tainable with other apparatus available for such measurements. The Megger is portable, weighing about twenty pounds. It is self contained. It is not affected in any way by its surroundings.

In Figure 2 is shown diagrammatically the arrangement of the interior parts. Figures 3 and 4 show the interior construction and the moving system respectively. Referring to Figure 2 we see that permanent magnets, M , M , are so arranged that a closed magnetic circuit is formed. In this magnetic circuit at one end a pair of pole pieces are placed, between which a dynamo armature revolves. At the other end is another pair of pole pieces, within the field of which the mov-

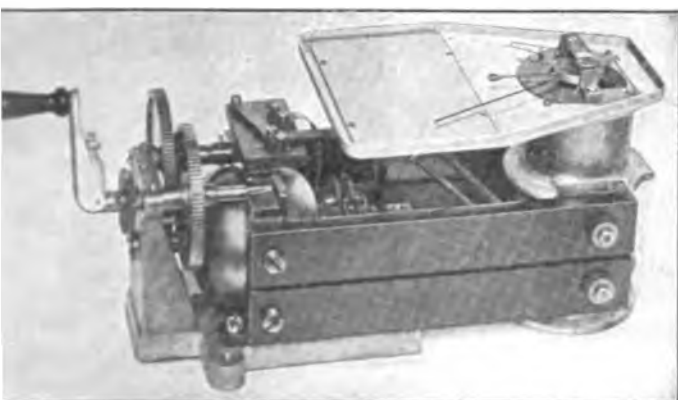


FIGURE 3.—AN INTERIOR VIEW.

ing system works. The dynamo, driven by the crank placed as shown in Figure 1, furnishes the e. m. f. by means of which the instrument operates. It may supply 100, 250, or 500 volts. Careful designing has brought the torque to be supplied for driving this machine to so small an amount that very little effort is required on the part of the operator.

The moving system is made of three coils rigidly connected to each other (see Figures 2 and 4). Tracing out the connections it will be found that the coil, A , of the moving system is in series with the apparatus under investigation through resistance R' . It is the deflecting coil and it exerts a deflecting force in the field where it is placed proportional to the current in it. Coils B and B' are connected in series. They, with resistance R in series, are put directly across the dynamo terminals. They constitute the controlling coil of the instrument, the amount of their restraining force being a function of the position they take. As shown in Figure 2, the indicating needle points to zero on the scale; coil A has a large current in it and coils B B' are exerting a maximum restoring force. Reference to Figure 4 will show how the moving system is assembled. The current is led in and out of the coils through very slender copper ribbons which produce no torque; there are no springs; the needle takes a position determined wholly by the torque of current in a magnetic field.

The proper relation between deflecting and restoring forces is secured through the use of the $\odot$ shaped iron piece within coil A which may be seen in Figures 2 and 4. It is mounted securely in place on the frame which supports the moving system.

Since it is the plan of this article to merely

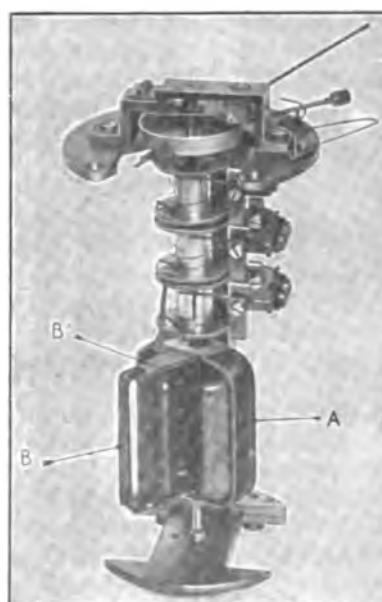


FIGURE 4.—THE MOVING SYSTEM.

give an outline of the nature of the Megger no attempt will be made to further describe the many details of construction which go to make the instrument the reliable piece of apparatus it is. The fact that it is an instrument of the moving-coil-permanent-magnet type gives it all the good points which belong to this class, while being an ohmmeter it is even more constant in cali-

bration. For some purposes the variable e. m. f. derived from the dynamo operating at various speeds is very useful; for cable testing (on account of the capacity present) it is bad. For the last sort of testing, therefore, a constant pressure megger is made. In it a friction clutch is interposed between the last gear and the dynamo armature, so contrived that when operated above slipping speed the e. m. f. is constant within negligible limits.

Among the many direct applications of insulation resistance measurements one or two may be mentioned. Periodic examination of apparatus for insulation resistance, as is done so readily with a megger, will reveal depreciation, whether due to moisture or to the development of some permanent defect. A skilled observer can even tell from the behavior of his megger whether the fault is due to moisture or proximity of conductors, for example.

Meggers are also supplied in such form that by throwing a simple switch the instrument, along with an accessory rheostat, becomes a Bridge Megger. That is, a Megger available for all sorts of Wheatstone Bridge work, including Varley loop tests. For the last named purposes it has some merit in using so considerable an e. m. f. that contact potential differences existing at faults or along lines become nearly or wholly negligible. For general work the bridge rheostat has points of special merit. American users have pronounced it the most rapid rheostat made. Under test by well-known American engineers, the Bridge Megger when used for measurements between one ohm and a megohm shows a high accuracy; as high as the best American made testing sets. The accuracy of the Megger, also, is limited only to the accuracy with which the scale can be read.

A Story of the Days of the Early Telephone.

Mr. E. J. Edwards told recently the following story of the early days of the telephone, a part of which he saw acted in the early spring of 1877, when he was staying at the United States Hotel in Boston for a few days.

"After breakfast, on the second morning of my arrival at the hotel, I went to the men's parlor to look over the morning papers. Presently there entered two elderly men who seemed to be warm friends. In appearance they were typical of the dignified, cultivated, quiet-mannered merchant of Boston. Any one seeing them would have said at once that they were owners of vessels plying between Boston and China or the West Indies. One of them jingled some coins in a pocket; the other tossed a ring of small tools back and forth in his hands. They took their stand near where I was seated.

"I wouldn't give a sixpence for the whole capital stock,' I could not help hearing one of them say. 'I wouldn't have gone into it if So-and-So had not asked me to do it as a sort of favor to him.'

"But I hear that Dr. Hubbard has at last worked out a plan for marketing the stock, and he is a pretty clearheaded business man,' spoke up the other.

"Before the first speaker could reply a third man, whose appearance and manner also indicated the successful merchant engaged in the China trade, came into the parlor, walked with as rapid a step as his dignity would permit up to the two men, and extended both hands first to one of them, then to the other.

"This is very surprising,' he exclaimed radiantly. 'It has all happened over night. What do you think our stock is quoted at to-day?'

"The pair looked at the newcomer as though they felt that their friend was trying to have a little fun with them.

"No, I'm not joking,' the man protested. 'It's a fact. Dr. Hubbard has worked out his plan. It's going to be a great success. Everybody will be rushing to buy stock. Two hundred and fifty was offered for it this morning, and that's a jump from almost nothing over night.'

"The two dignified listeners actually gasped when they heard that announcement. They said nothing; they were struck speechless, apparently; and as they stood there, staring at their friend in a most undignified manner, the latter turned to one of them with: 'I had perfect confidence in Dr. Hubbard. I knew he'd do it. Aren't you glad I persuaded you not to drop out?'

"The next day, in conversation with the famous Tilly Haynes, proprietor of the hotel, I learned the sequel of the little scene I had beheld the morning previous in the men's parlor.

"I have three permanent guests who together made a million overnight this week. They are old-time Boston merchants who, with their families, live with me in the winter and spring. Somebody persuaded them to take stock in the original Bell Telephone Company, and for a long time they were in the dumps over the investment. Then Dr. Gardiner Hubbard took hold of the company and put it on its feet. Night before last the stock went up like a balloon literally over night, and two of those three men aren't quite certain yet whether they are dreaming or whether it is a real experience for them. I wish I had bought some of the stock six months ago, when people wouldn't look at it at any price,' concluded Mr. Haynes, regretfully."

TELEGRAPH AND TELEPHONE AGE.

PUBLISHED ON THE 1ST AND 16TH OF EACH MONTH.

Telegraph and Telephone Age is the leading telegraph newspaper of the world. The technical side of the telegraph, as well as a complete digest of telegraph news and information, is presented in each issue, and events discussed editorially, all in a manner to aid, instruct and interest every individual telegrapher. Sample copies sent on application. Terms of subscription: United States, Philippine Islands, Cuba and Mexico, \$2.00; Canada, \$2.50; all other foreign countries, \$3.00 per year.

Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

The Railroad.

The telephone will be used for train despatching on the new Oregon Trunk Railway.

The Bessemer and Lake Erie Railroad will soon begin despatching all trains by telephone between Pittsburg and Conneaut, O.

The Lehigh Valley Railroad has begun the installation of telephone despatching circuits between Jersey City and Easton, Pa., and between Penn Haven Junction and Wilkes-Barre.

The Erie Railroad is installing telephone booths made of concrete at sidings and other places along their lines where trainmen frequently have occasion to communicate with their headquarters for orders.

Mr. John Matthews, formerly wire chief and manager of the telegraph office of the Gulf, Colorado and Santa Fe Railway at Temple, Texas, has been appointed telegraph manager of that system vice W. M. Knowd with headquarters at Galveston.

Mr. J. Beaumont, formerly superintendent of telegraph, telephone and signals on the Panama Railroad, is now assistant to Mr. W. H. Finley, signal engineer, of the Chicago Great Western Railway.

James E. Hurley, general manager of the eastern lines, of the Atchison, Topeka and Santa Fe Railroad died at Carlsbad, Austria, August 16, aged fifty years. Mr. Hurley had been connected with the Santa Fe system for the past thirty years being at one time a telegrapher in the service of that railroad. He was regarded by his acquaintances as a prince among men and was universally respected.

M. Roy Strong, son of Arthur W. Strong, a telegraph operator on the Cleveland and Pittsburg division of the Pennsylvania Railroad was one of the successful competitors for two \$600 scholarships which are awarded annually upon a competitive examination to sons of Pennsylvania Railroad employees. Mr. Strong will take a course in the Case School of Applied Science, Cleveland.

Mr. G. A. Lawrence has been appointed assistant superintendent of telegraph of the Atchison, Topeka and Santa Fe Railway at Los Angeles, to succeed Mr. H. C. Chace, who has been appointed division traffic superintendent of the Western Union Telegraph Company. Mr. Lawrence has for some time past been chief clerk in the office of Mr. Chace and was formerly wire chief and manager of the Los Angeles relay office.

Many of the railway telegraph superintendents are very busy at this time in pushing the installation of telephone despatching equipment, and it seems to be a question of only a short time now when the telephone will be used more than the telegraph for this purpose. The next important electrical problem which the railroads will have to solve will probably be that of electrification of their lines. The larger cities of the country are bringing much pressure to bear upon the railroads to make them do away with the smoke which is such an objectionable feature around large railroad terminals. As a consequence many of the railroads will probably have

to make a start at least in the electrification of their lines during the next few years. Already the telegraph superintendents of several large railroad systems have been asked to gather statistics covering this subject. The carrying out of this work will introduce many interesting problems in the operation of telegraphs and telephones along the electrified lines.

A Problem in Telephone Line Testing.

Editor Telegraph and Telephone Age:

Referring to the question put by Mr. Grandy in a recent issue, I wish to give the following solution:

In making the tests Mr. Grandy may have used different poles of the battery at each test; or the contact surfaces of each cross may have been dissimilar, in either case he would have obtained different readings.

It requires but very little difference in the contact surfaces to cause a very great difference in the resistance offered by each cross.

If a positive pole of the battery was used during the test, a copper oxide was formed at the contact. this copper oxide is an insulator; if a negative pole was used, the effect would have been just the reverse, as a negative pole would have broken down any oxides which may have formed, thereby lowering the resistance.

The effect was not entirely due to one particular cause, it may have been caused by a difference between the contact surfaces and using different poles at each test.

In making comparison tests of this kind it is always best to use the same pole at each test, otherwise there will be difference in the readings that are misleading.

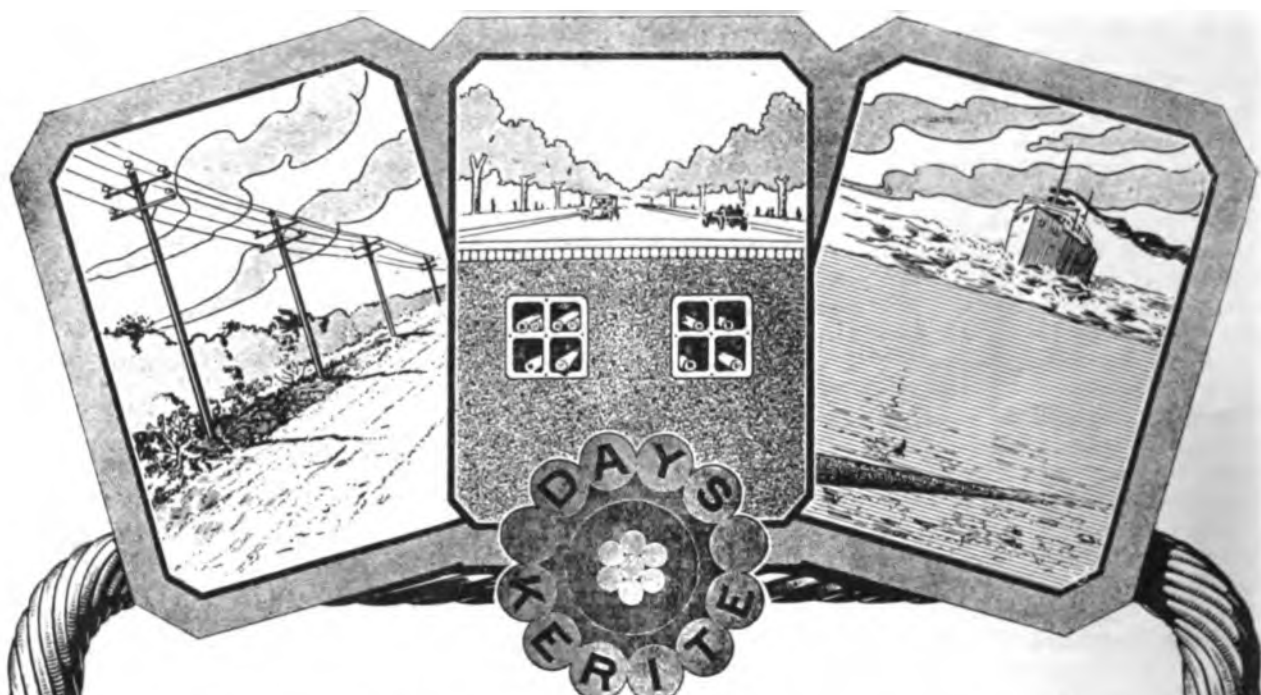
This peculiarity of the poles explains why it is possible to get different readings during wet weather, using both poles, even when the leakage from other sources is very small. It also explains why it is always best to make an insulation test with a negative pole to the line.

Owing to this peculiarity of the positive and negative poles, I have succeeded on several occasions in successfully working long single telegraph wires of several hundred miles length during excessive rainy periods, by putting a positive pole at one end and grounding the other (no repeaters being available) when those same wires would practically go grounded with battery at both ends or a negative pole at one end and grounded at the other.

S. R. Beatty.

New York, August 20, 1910.

The testimony of progressive operators is that Telegraph and Telephone Age is so thoroughly comprehensive in character as to make it absolutely indispensable to those who would keep informed. Its technical articles are of high practical value. Write for a free sample copy.



No matter where or how you use

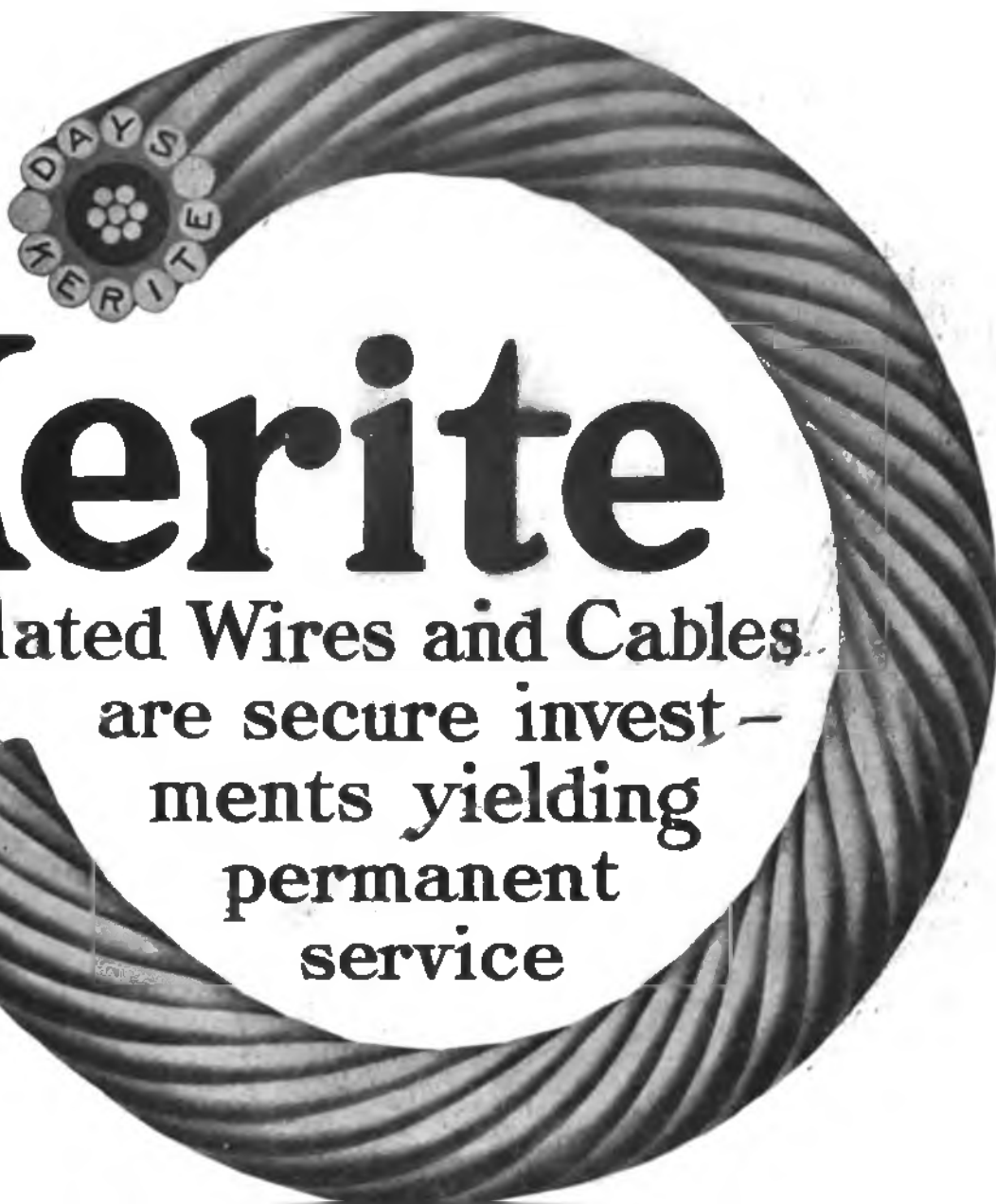
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Possibilities of Telegraph Development.

In the year 1950, John Doe, commercial emperor of the world, sat in his office chair, busily thinking. A metal attachment pressed upon his temples, and a series of clicking instruments surrounded him. And with the whirring of the machine his thoughts sped along the wires directing great enterprises in the remotest parts of the earth. John Doe did not need to descend to the antiquated media of speech and writing. He employed no clerks and no stenographers. He merely thought.

That is the bizarre conception of the future of the telegraph and electric communication to which Mr. Belvidere Brooks, general manager of the Western Union Telegraph Company, smilingly nodded approval as it was presented to him recently by a newspaper reporter.

Mr. Brooks' smile was rather quizzical, but just as quizzical might have been the smile of the man to whom was presented fifty-two years ago a prophecy of the actual achievement of the telegraph to-day.

Fifty-two years ago the first message was flashed across the cable Cyrus Field and his associates stretched beneath the Atlantic from Hearts Content, N. F., to Valentia, Ire. The cable broke the second day and not until 1866 was permanent communication established between the two continents. Since then the trans-atlantic cable, in connection with the telegraph, has become one of the first essentials of world commerce. What will be its future furnishes a tremendous field for speculation, and Mr. Brooks, in discussing the question, said:

"Within five years the telegraph business of the United States will have trebled in volume.

"The cable service will follow a corresponding rate of increase. At present only five per cent. of the population of the United States use the telegraph at all. Within a decade, at least, this proportion will have doubled. The grasp of the telegraph and the cable upon the business of the world is as yet imperfect. Tremendous opportunities lie in the extension of electric communication to unexplored and unexploited countries. The telegraph will play an important part in the opening of the great empire of China to world commerce.

"With the extension of the system will come a cheapening of rates and increased power and service to commerce. I do not think the wireless will ever achieve much on land. As a means of communication between ships and between ships and shore stations it has demonstrated its value. It is unlikely that it will ever supersede the cable.

"Experts in the employ of telegraph and cable companies are constantly inventing new devices with which to quicken the service and remove mechanical difficulties in the way of the growth of electric communication. No one can say that the experimentation of the next twenty-five years may not bring forth results as startling as the first flight of an aeroplane."

It is peculiarly significant that within a year telegraph and telephone companies have ceased to war and now work to each other's great advantage. What may happen when the interrelation of all devices of communication is perceived and an immense system formed, embracing all of them, is hard to conceive. Jules Verne never ventured anything more startling in the way of prophetic imagination than the suggestions which the general manager of the Western Union Company offers as the possible future of world communication. Here are some of them:

A simple arrangement of tap-stations in mid-ocean whereby liners passing on the sea or passenger aeroplanes cruising overhead might pick up or send messages from the land or from other ships of the air or the sea.

A system of electric communication so complete that the commerce king of the next half century may sit at ease in his office chair and conduct gigantic campaigns embracing every country in the world in their scope, by merely conversing with his stenographer.

Transmission so simple and instantaneous that the King of England in his palace could converse familiarly in cipher with his royal consort vacationing in the foothills of the Himalayas; that politicians, envoys, ministers of state, could transact international politics as effectively as though closeted in an embassy of either nation.

The combination of Tesla's theory of wave transmission, telephony, telegraphy and the cable—the result a device whereby the intellectual financial giant of the future need only think to give his schemes world-currency.

Mr. Brooks became general manager of the Western Union Telegraph Company last February. One of the innovations in telegraphic service for which he is primarily responsible is the fifty word night letter which has already done much toward achieving the popularizing of the telegraph, which is one of his ambitions.

International Telegraph Tournament.

The rules for the international telegraph tournament to be held in Turin, Italy, next year have been decided upon by the committee having the matter in charge, and a list of events prepared. This tournament which will be held in connection with the International Exposition of Labor and Manufactures will begin August 22. The competition is open to employees of either sex of any of the government telegraph systems as well as to those employed by the cable companies or the private telegraph companies. Telegraphers connected with the navy, army engineering corps, or government railways of any of the countries are also eligible.

Those who desire to take part in the contest should make application through their respective government administrations. In this application which should be presented to the Minister of Posts and Telegraphs at Rome, not later than June 15, 1911, the contestant should indicate the events in which he wishes to take part.

The contest will be in three parts, for the Morse, Hughes and Baudot systems respectively. The Morse trials will consist of sending with the key and receiving on the sounder or from Morse writing apparatus. The duration of the Morse trials will be twenty minutes for sending and thirty minutes for receiving.

The text to be transmitted will be composed of words taken from a language agreed upon and of groups of letters and of figures. It will be printed on sheets, containing fifty words each. The text will be different for each system but will be the same for all of the contestants of the same system.

A special trial of receiving from the sounder and writing with a typewriter will be given if before June 15, 1911, at least ten contestants belonging to at least three different administrations shall make application at Rome for such a contest. In this case the typewriter will have to be provided by the contestant.

In the trials of the Morse system the speed will be as desired by the contestant, and to this end the text for the receiving trials will be transmitted by means of the Wheatstone. The matter received must be written in roman characters for the letters and arabic for the figures. For writing pencils, ordinary pens or stylographs may be used. These will be provided by the contestants themselves. In case of any breakdown for which the contestant is not responsible and by reason of which the sending or receiving by any of the systems is interrupted that test will be thrown out and the contestant will be given an opportunity to repeat his trial. The sending must be carried on according to the rules of the International Telegraph Regulations.

For the purpose of classification each word, group of figures or letters or punctuation mark sent or received will be given a value of five points for the Morse and three points for the Hughes and Baudot systems.

Errors will consist of words, groups of letters, or figures and punctuation marks changed in any way whatever and not corrected by the contestant in the course of the trial and all words, groups of letters or figures and punctuation marks omitted.

The value of each error not corrected will be as follows: Twelve points for each word or group of letters or figures containing only one wrong letter or figure and for each punctuation mark that is changed or omitted; fifteen points for each word or group of letters or figures containing two or more wrong letters or figures; eighteen points for each word or group of letters or figures omitted.

The number of points made by each contestant will be established for each system by multiplying the number of words sent and received by Morse or the words sent by the Hughes or Baudot systems by the co-efficients given and subtracting from the product obtained the points corresponding to the errors made in the respective trials.

In the award of prizes there will not be included any who fail to make at least 2,500 points in the

Morse system, 3,400 points with the Hughes system or 3,200 points with the Baudot, or any who make uncorrected errors in the Morse trials greater than 250 points or 300 points in either the Hughes or Baudot trials. In case of a tie between two contestants they will be given a second trial at a time selected by the judges in order to determine which should be given the priority in the classification.

Prizes awarded will be of three classes; individual prizes for each system; an all-around championship prize and a prize of representation given to the representatives of the government making the best showing.

Contestants will be given only one trial in each system but may take part in the trials of one, two or all three systems, provided they have previously signified their intention of so doing. Ten individual prizes will be given in the Morse class, eight in the Hughes and eight in the Baudot. The prizes will consist of gold and silver medals and objects of art.

The list of prizes will be definitely fixed before the closing of entries to the contest.

There will be fifteen judges, five in each class chosen from the nations competing and a president who will preside over the awards in all three classes. All contestants should be at Turin two days before the trials begin in order to receive the necessary instructions. The trials will all be public, but all precautions will be taken to see that the contestants are not interfered with in any manner.

General Mention.

Jurisdiction over the telephone and telegraph companies operating in New York State will be assumed by the Public Service Commission of the second district on September 1. A chief will soon be appointed to take charge of this work.

The Telepost Company has opened offices at Kansas City and Omaha for commercial business, their lines having been extended to those points from St. Louis.

A thousand messenger boys of Chicago were given a free excursion on August 7 by boat to Waukegan, Ill., where dinner was given to them and supper was served on the boat on the return trip. This excursion was made possible by the efforts of Mrs. Frederick W. Packard, of Chicago, who founded the Chicago Messenger Boy's Humane Association.

Peter Delaney, an operator employed in the Detroit office of the Western Union Telegraph Company, in a fit of insane rage at a supposed affront while on duty in the main operating room fired five shots from a revolver one of which slightly wounded William Schwartz, another operator and a second one of which hit Arthur McArdle, assistant night chief, inflicting a serious wound in the chest. Delaney who is well known throughout the United States has been declared insane and ordered to be confined in an asylum.

Mr. H. E. Merrell, general manager of the United States Electric Company, New York, accompanied by his wife, sailed August 23 on the steamer Princess Cecilie for a vacation in Europe.

The American Telegraph Typewriter, the invention of Dr. G. A. Cardwell, was given a trial recently at the New York Police Headquarters to enable the police officials to judge as to the advisability of installing it in that department. Machines will soon be installed in the office of the New York City News Association and in the offices of all the newspapers in New York and Brooklyn which that association serves.

A final agreement has been reached between the United Press of Washington, D. C., and the United Press Associations of New York in the controversy that has been going on in the courts for several years over the rights to the name "United Press." The settlement is the dissolution of the Washington corporation by the court on the petition of William Wolff Smith and Ernest H. Pullman, the proprietors, thereby giving the rights to the New York organization.

Mr. Herbert Laws Webb, the well-known telephone engineer and author of London, England, in commenting upon the decision of the Postmaster-General of England to make a trial of delivering telegraph messages by telephone suggests that if telegrams were addressed to the subscriber's telephone number instead of to the street number such service would be expedited and at the same time at least two words and sometimes more would be saved in the address.

The second annual convention of the Association of Railway Electrical Engineers will be held at the Hotel La Salle, Chicago, September 27-30, inclusive. An interesting program is being prepared. The entertainment will be in charge of the Electric Supply Manufacturers Association of which Mr. George H. Porter, of the Western Electric Company, Chicago, is secretary. Mr. George B. Colegrove, chief electrician of the Illinois Central Railroad, is secretary of the Association of Railway Electrical Engineers.

A new invention for transmitting photographs by wire consists of a screen with a number of square openings at regular intervals. A duplicate screen is provided for the distant point. The various shades of the picture are reported by telegraph with the duplicate square number in the screen. The operator at the distant point shades the squares accordingly and thus makes a duplicate picture.

The St. Louis Republican, of August 15, 1860, of which we have received a copy, notes that in the "Nebraskian," of April 28, the same year, is found a notice of the Missouri and Western Telegraph Company, at St. Louis, of which Edward Creighton, of Omaha, was treasurer and Robert C. Clowry, of St. Louis, secretary and superintendent. It is announced that the company intends to construct a telegraph line to Omaha and Council Bluffs immediately and to extend it westward to the Pike's Peak region.

What Our Friends Say About This Publication.

Mr. C. A. Stimpson, of Philadelphia, formerly and for many years identified with the telegraph service now with the Philadelphia Electric Company, writes: "You will never make a mistake in renewing my subscription. Of all the electrical journals on file in my office, the Telegraph and Telephone Age is pre-eminent."

Mr. F. C. Hackett, of Toledo, O., who devoted many years of his life to telegraph interests, occupying official positions at Cleveland, Toledo, Pittsburg, and in other cities and who is now engaged in commercial pursuits, writes in renewing his subscription:

"I have been a continuous subscriber for your journal for a good many years, and find that it is very interesting and instructive. While I am not now engaged in the telegraph field, I am still interested in matters pertaining to the telegraph, and look forward with pleasure to the coming of each issue of your valuable paper."

Mr. J. Grant Riach, in charge of the telegraph at Plumtree, Southern Rhodesia, in a recent letter has this to say:

"We are far removed from the noises of varying kinds that are always associated with busy industrial and commercial centres. There is little diversion, indeed, in this remote part of the globe. To be able to shoot an antelope, a buffalo or even an old crocodile after office hours becomes tame and monotonous sport."

"It is when one becomes (as we all do at times) sick of the office atmosphere, sick at the sight of the Morse, sick at the eternal click, click, click of the armature, sick at having to say good morning to a pal, in fact sick at the very knowledge that one is alive, that one suddenly realizes what a comfort it is to pick up a copy of Telegraph and Telephone Age."

"Despondency vanishes like a drink. It seems that the more often each copy is perused the more interesting 'Age' becomes. It is instructive, educative and the best intellectual tonic on the market for those in the profession."

"Enclosed find fifteen shillings to cover the cost of a bound volume of your publication for 1909."

Telegraph Opportunities in Canada.

Since the recent adjustment of wages of telegraphers in the commercial service of the Canadian Pacific Railway's Telegraph, the operators connected with that system are probably paid better than those of any other company employed under similar conditions. The rapid expansion of business in Canada and especially in the western part of the country has created a demand for operators which exceeds the available supply. It is the general consensus of opinion of operators who have gone from the United States to Canada that living conditions are much more favorable there than in this country. Any good telegrapher who is looking for employment should have no difficulty in finding the same at satisfactory wages in Canada.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XIV.

What is the chief objection to the use of gravity cells as a source of current for telegraphic purposes in a large office?

What is the general construction of the pole-changer used by the Western Union Telegraph Company?

How are the long and short ends of the current supply obtained without extra dynamos?

What rule governs the fall of electromotive force in a conductor?

Why is it important that the resistance of the tap or leak should be proportioned to a permanent artificial circuit and not to the external line?

How can you find the joint resistance of any two conductors?

Draw a diagram illustrating the connections of the polechanger and dynamos.

What is the path of the current when the transmitter is open?

What is the path of the current when the transmitter is closed?

If the short end current is too weak how can you increase it?

CHAPTER XV.

Of what does the standard Western Union quadruplex set consist?

Why is the Freir self-polarizing relay so called when it is in reality a neutral relay?

How is the action of this relay produced?

Why is this relay not affected by the home battery current?

What means is used to prevent the relay from being operated by the short end current?

What should be the relative position of the armature between the two magnets of the relay?

Which force of a magnet begins to act at the greater distance, the attractive or the repelling force?

Why is the Freir relay more efficient than the ordinary relay with the horseshoe shaped yoke?

Under what conditions will a weak current develop more quickly a higher degree of magnetism than a stronger current?

How does the use of the Freir relay do away with the necessity for the condensers which are used to help some other relays over the period of no magnetism?

Obituary.

Joseph Finnegan, a member of the United States Military Telegraph Corps died at his home in Baltimore, Md., August 1. Mr. Finnegan served in the Army of the Potomac construction corps, under Mr. Dennis Doren.

Edward Stager Wright, son of the late E. P. Wright, formerly superintendent of the Western Union Telegraph Company at Cleveland, O., died in that city, August 16. Mr. Wright was a former newspaper man, having at various times been an editor of the New York Times and of papers in Cleveland, Cincinnati and St. Louis. Having an ample fortune he retired from active duty, however, in 1908, and since then he had devoted himself to the study of law as a pastime.

James Swan, superintendent of the Western Union Telegraph Company at Minneapolis, died August 14, aged fifty-six years. Mr. Swan was born at Londonderry, Ireland, and entered the telegraph service at that place as messenger. When twenty years of age he came to New York and entered the employ of the Western Union and became one of the best known operators in the service in this city. In 1886 he was appointed chief operator of the Helena, Mont., office, and later became manager, which position he held until his promotion to the superintendency at Minneapolis in 1903. Among those of his official associates who were in attendance at Mr. Swan's funeral were: M. T. Cook, division commercial superintendent; W. J. Lloyd, division traffic superintendent and A. B. Cowan, superintendent at Chicago; P. W. Drew, superintendent of telegraph of the Minneapolis, St. Paul and Sault Ste. Marie Railway, and Wm. Bennett, superintendent of telegraph of the Chicago and Northwestern Railway, Chicago; J. Fitzpatrick, superintendent at Cleveland; W. R. Chapman, superintendent at St. Louis; U. J. Fry, superintendent of telegraph of the Chicago, Milwaukee and St. Paul Railway, Milwaukee; E. J. Little, superintendent of telegraph of the Great Northern Railway and George Boyce, superintendent of telegraph of the Chicago, St. Paul, Minneapolis and Omaha Railway, St. Paul; C. A. Crane, manager and N. Lee, chief operator of the St. Paul office; E. E. Kelley, manager of the Duluth office; A. D. Bradley, assistant superintendent at Minneapolis and L. F. Wise, manager; Miss M. O'Brien, chief clerk; W. H. Young, chief operator; J. M. Diegel, manager of the American District Telegraph Company; W. J. Durand, manager of the Chamber of Commerce branch office; E. F. Young, general foreman; C. M. Ferguson, attorney for the company and D. G. McIntosh, manager of the North American Telegraph Company, all of Minneapolis.

"Pocket Edition of Diagrams," etc., the latest revised edition, 334 pages and 160 illustrations, published by Telegraph and Telephone Age, price \$1.50, contains just the information every telegrapher requires.

LETTERS FROM OUR AGENTS.

LOS ANGELES POSTAL.

Mr. C. L. Lewis, superintendent at this point, is enjoying a much needed rest of a month.

Mr. H. J. Thompson, of this office, has been appointed chief operator; Mr. J. H. Dorsey, night chief operator; Mr. W. Ogden, assistant day chief operator, and Mr. A. B. Fountain, late night chief operator.

NEW YORK WESTERN UNION.

Mr. E. T. Burrill, assistant chief operator, has charge of the operating room during the absence on vacation of Mr. T. A. MacCammon, chief operator.

Mr. John Morrison has been appointed assistant general traffic chief.

Mr. L. C. Anstrom, has been appointed assistant night traffic chief in the Overland division.

Mr. E. E. Brannin, chief of the Jersey division has resumed duty after a severe illness from ptomaine poisoning.

Miss Bessie Eichler, of the Eastern division, was married at Middletown, Conn., August 25, to Mr. Henry C. Morgan of that city.

John J. Shaughnessy of this department died suddenly at his residence in Brooklyn, on Saturday, August 20.

J. F. Byrne, an operator employed in the main operating room, died August 17, aged forty-eight years. He was a brother of Dr. P. J. Byrne, a former telegrapher, who is now a prominent physician in this city.

OTHER NEW YORK NEWS.

Mr. W. O. Snyder, a well known member of the telegraph profession in New York and Philadelphia recently broke his leg by falling down stairs, which mishap will cause his confinement to the hospital for several weeks.

Assessments Nos. 512 and 513 have been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Charles A. Colwell at Buffalo, N. Y.; Dorman P. Bristol, at Elmwood Place, O.; Henry F. Tracey, at Chilli-cothe, Ills.; Arthur C. Jones, at Fleming, Pa.; Prescott L. Watson, at Wurtsboro, N. Y.; Frank E. Bryant, at Brooklyn, N. Y.; Nathaniel Mortell, at North Sydney, N. S.; John J. Larwood, at Albion, N. Y.; James P. McBurney, at New York; Charles E. Drew, at Rockville Centre, N. Y., and Crayton W. Black, at Columbus, O.

John J. Barry, aged sixty-two years, identified with the telegraph service in the superintendent's office of the Western Union Telegraph Company at New York for many years until 1900, when he retired from active business, died on August 24 as a result of an operation. For the past ten years Mr. Barry had devoted most of his time to benevolent work. For several years past he was commissioner of correction for the city, which position he resigned last February on account of failing health. Mr. Barry was a foremost citizen of

the Bronx, was president of the North Side Savings Bank and an important factor in politics. He was a member of all the telegraph organizations, and his untimely death is regretted by all who had the pleasure of his acquaintance. He is survived by a wife and nine children.

Advertising will be accepted to appear in this column at the rate of fifty cents a line, estimating eight words to the line.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, enables telegraph and telephone employes to provide for their families life insurance in reasonable amounts, at a cost so low as to be within the reach of all. It has already paid beneficiaries of deceased members \$1,500,000, at an average annual cost per \$1,000 of about four cents a day, and has also accumulated \$317,000 Reserve Fund securely invested, to provide against excessive cost in the future. Membership is easily acquired and cannot be invalidated during life for any cause except failure to pay the necessary mortuary calls.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, is assisting over one thousand telegraph and telephone people to save money, and is one of the safest possible depositories for your savings. Its stability is shown by the fact that it has a surplus reserve fund of over \$35,000, and its dividends have never been less than five per cent. Inquiries for information, whether in person or by letter, will receive prompt attention.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. They render the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taktavall, Telegraph and Telephone Age, 253 Broadway, New York.

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I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEY-BOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

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Legion Pattern 4.00
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THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

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Columbia, Pa. R. F. D. No. 1

Telegraph and Telephone Age

No. 18.

NEW YORK, SEPTEMBER 16, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Study of Telegraph Apparatus.

PART II.

In the previous installment of this article in addition to pointing out various possibly unappreciated points of uniformity in the construction of the different parts of the ordinary sounder each of which possessed an individual significance, it was stated that the length and diameter of the iron core of a magnet are actually regulated to suit the winding; that is to say, made no longer than is absolutely necessary to hold the required number of convolutions wound within a distance from the core not greater than that of the diameter of the metal itself.

As the total magnetizing force depends upon the number of convolutions in the coils as well as upon the strength of current, it follows that for equal results with the same size core, finer wire must be used in the coils for a weak current than with a strong current.

For example, a core and winding for a four ohm sounder having been used which is ample to produce the magnetic energy required to operate the lever bar properly with the current available, it follows that the same size core will do for any other magnet, regardless of the winding, provided

the same work is required of it, and the same magnetizing force is developed in its coils. Thus a 4 ohm sounder and a 50 ohm sounder perform identical work inasmuch as each actuates the lever bar with practically the same strength. For this reason the 4 and 50 ohm sounders, respectively, are usually constructed practically alike as to size and appearance, the difference being in the winding alone. As the higher wound instruments are used in connection with circuits where the current is comparatively weak, the additional number of convolutions of fine wire the spool contains makes up for such weakness and provides an equal magnetizing force.

In like manner the number of convolutions of wire required, and consequently the ohmic resistance of all telegraph magnets, is increased as the current in which they respectively operate are normally weaker.

The following information regarding the present Western Union standards for winding sounders and relays may be useful as well as interesting.

Instrument	Resistance	Convolutions in each spool	Size of wire used
Sounder	4 ohm	470	24 B & S
Sounder	50 ohm	1250	31 B & S
Single Relay	150 ohm	3400	30 B & S
Polar Relay	400 ohm	2780+2780	36 B & S
Neutral (Freir)		1900+1900	35 B & S
Third Coil		1900	35 B & S

It will be noticed that these figures give the number of convolutions in each spool only, the total number of course being just double that stated, as the two coils in separate spools are connected in series.

A comparison of the figures in this table also furnishes an observant and inquisitive student with a few facts that may possibly perplex him. For instance, he must not imagine that because the respective coils of a four and a fifty ohm sounder are wound with a view of being equally efficient on different circuits, owing to possessing identical magnetizing force, that the still higher windings of relays and other apparatus will give the latter magnets an equal value of exciting current.

The fact is, other pieces of apparatus do not require as much energy as a sounder because the operation of their armatures or movable parts requires less. For instance, it is obvious that more energy is required to bring a large sounder lever down properly than is demanded to actuate the small armature and shaft of a relay. In the latter case all that is required is merely such a magnetic strength as is necessary to move the lever across a small air gap and close a local circuit. Hence, although there are 6800 convolutions of wire around a relay magnet, against 940 for a sounder

the former is not nearly so strong a magnet, but is equally able to do the work required of it.

A neutral relay and a single line relay operate on practically the same principle and perform identical work, but on account of the former having to first overcome the short end value of current flowing in multiplex circuits before getting any "margin" or working energy the coils are wound to approximately 8,000 convolutions, thus requiring a different winding for identical work.

Again, the polarized relay, although the most sensitive instrument of the lot to the influence of a current of electricity, is wound higher than any of its companions.

This is due to the fact that on multiplex circuits it must be able to operate by the very feeble strength of the "short end" of the battery which at times may fall as low as ten milliamperes of current.

The figures given in the table of windings are not given for the sole purpose of furnishing new information, but rather to impress the student with the importance of becoming a close observer. The finished electrician is always the man who makes a point of reading between the lines, and not one of those who have eyes to see but see not.

(To be continued.)

Recent Telegraph and Telephone Patents.

A patent No. 13,146 (reissue) for a telephone transmitter, has been issued to W. E. Harkness of East Orange, N. J.

A patent No. 967,204, for a magneto telephone, has been taken out by O. M. Leich, of Genoa, Ill.

A patent No. 967,276, for a microtelephone has been secured by J. N. Wallace, of La Crosse, Wis.

A patent No. 967,409, for a telephone signal attachment has been awarded to W. F. Mikolasek of Scotland, S. D.

A patent No. 967,476 for a telephone system has been granted to C. W. Winston of Chicago, Ill.

A patent No. 967,692 for a telephone system, has been taken out by H. G. Webster of Chicago, Ill.

A patent No. 967,719 for a telephone noise excluder and current saving device, has been issued to W. E. Burt, of Uba, Wis.

A patent No. 967,747 for a transmitter mouthpiece has been granted to O. F. Falk, of Belleville, N. J.

A patent No. 967,748 for a telephone dictating machine or apparatus has been secured by O. F. Falk, of Belleville, N. J.

A patent No. 967,773 for a private branch intercommunicating telephone system, has been issued to N. H. Holland, of Chicago, Ill.

A patent No. 968,007 for a coherer for wireless telegraph systems, has been granted to C. Walker, of Knoxville, Tenn. Compensates for temperature variations, having a screw adjustment for terminals sealed in a tube and magnetically controlled for maintaining the adjustment.

A patent No. 968,396 for a telephone system, has been awarded to C. T. Patterson, of Albany, Ore.

A patent No. 968,402 for a lightning arrester, has been taken out by J. E. Petree, of Richmond, Mo.

A patent No. 968,405 for a lightning arrester, has been issued to W. E. Phelps, of Colebrook, Ohio.

A patent No. 969,095 for an intercommunicating telephone system, has been granted to A. Ekstrom, of Stockholm, Sweden.

The following patents have expired:

Patent No. 503,590 for telegraphy, issued to Stephen D. Field, of Stockbridge, Mass.

Patent No. 504,011 for an automatic telephone granted to Josef Wratitsch and Stefan Gergacsevic, of Graz, Austria-Hungary.

Patent No. 504,103 for a system of telephonic intercommunication, taken out by Frank R. Colvin, of New York.

Patent No. 504,250 for a telephone-exchange testing apparatus, awarded to Charles E. Scribner, of Chicago, Ill.

Personal.

Mr. Gerard Swope, general sales manager of the Western Electric Company, New York, has returned from a four months' trip through Europe in the interests of his company.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, has made a gift for the purpose of establishing a secondary school of agriculture for Vermont boys, to be opened in connection with Lyndon Institute, Lyndon, Vt. A two-year course in scientific and practical agriculture will be given, designed to prepare young men for successful farming under Vermont conditions.

Mr. Fred G. Boyer, superintendent of telegraph for the Standard Oil Company, who is located in Oil City, Pa., was a recent New York visitor, as was also Mr. John Darr, assistant superintendent of telegraph for the same interests.

Mr. J. A. Sutherland of Newark, N. J., a forty-niner of the telegraph, contributed some interesting telegraph reminiscence in a recent issue of the Newark Sunday Call. Both Mr. Sutherland and his wife are members of the Old Time Telegraphers' and Historical Association and are frequent attendants at the annual reunions of that body.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

President C. H. Mackay, who has been in Europe accompanied by his wife for the past two months, will return to this country about October 1.

Mr. Edward J. Nally, vice-president and general manager, left September 14 for Chicago on business connected with the service. He will be absent about a week.

Colonel A. B. Chandler, chairman of the Board of Directors, on August 20 celebrated his seventieth birthday at his home in Randolph, Vt. Among the telegraph people to congratulate him personally was Mr. C. A. Tinker, of Brooklyn.

Mr. E. B. Pillsbury, general superintendent, and Mr. E. Kimmey, superintendent, of New York, have returned to their offices after a trip of inspection through portions of New York State.

A three days' conference of the superintendents of the eastern division, recently took place in New York to discuss ways and means of improving the service. Those present were: E. B. Pillsbury, general superintendent, and Superintendents E. Kimmey, and C. F. Leonard, of New York; H. Scrivens of Pittsburg; H. D. Reynolds of Buffalo; C. E. Bagley of Philadelphia; and C. A. Richardson of Boston, acting superintendent, vice A. L. Edgecomb, absent on account of sickness.

Mr. L. Lemon, division superintendent, New York is acting superintendent at Buffalo, vice Mr. H. D. Reynolds, on vacation.

Mr. C. F. Leonard, superintendent at New York has returned to his office after an absence of two weeks.

Among recent executive visitors were: Mr. H. J. Pettengill, president of the Southwestern Telegraph and Telephone Company, Dallas, Tex.; Mr. George H. Usher, general superintendent, and Mr. James P. Edwards, division electrical engineer of this company at Atlanta, Ga.; Mr. Charles F. Mason, commercial engineer of the Pacific Telephone and Telegraph Company, San Francisco, Cal., and formerly an attache of the executive offices; H. J. Colebrook, assistant manager and A. J. Eaves, night manager of the Pittsburg, Pa., office of this company. Mr. Colebrook continued his trip to Bermuda where he will remain for a week or two.

A new line with four copper wires is being constructed along the Western Pacific Railroad between Salt Lake City and San Francisco.

This company has succeeded in securing a branch office in the Union Station at St. Louis, Mo., and now occupies similar privileges with the Western Union at that place.

RESIGNATIONS AND APPOINTMENTS.

Mr. C. W. Weber is acting manager of the Warren, O., office vice Mr. O. N. Maxwell, resigned.

Mr. James Cady has been appointed manager of the office at Vincennes, Ind., vice Mr. Frank T. Himler, resigned to engage in other business.

Mr. R. M. Robinson has resigned from the management of the office at Salt Lake City to engage in other business.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Colonel Robert C. Clowry, president of the company, celebrated his seventy-second birthday on September 8. The Colonel is in excellent health and

spirits and bids fair to live to a good old age. He was the recipient of many congratulatory messages.

Mr. Edward J. Hall, chairman of the executive committee, has returned from Europe where he has been for the past six weeks.

Mr. John C. Willever, secretary of the company, is again at his office after two weeks' spent in auto-mobiling through the New England States.

Mr. A. R. Brewer, treasurer of the company, has returned from New Hampshire where he enjoyed with his family a well earned vacation. Mr. L. Dresdner, assistant treasurer, accompanied by his wife is in the west for two weeks.

Mr. Wm. Finn of the office of the engineer of equipment has returned from Buffalo and Toledo where he has been for some time past conducting quadruplex tests.

Among recent New York visitors were Superintendents W. A. Sawyer of Philadelphia, N. E. Church of Pittsburg, and C. F. Ames of Boston, and Chief Operators W. G. Wetmore of Boston, W. J. Dodge of Pittsburg, and L. D. Wilbourn of Baltimore.

Mr. James J. Morris, manager of the Chamber of Commerce office of the company at Milwaukee, was a recent New York visitor coming here on his way home after a month's vacation spent at Atlantic City and other points.

The following appointments went into effect on September 1:

Mr. J. F. Nathan, assistant city superintendent, 16 Broad Street, New York to be district commercial superintendent of the first district, eastern division, with headquarters at 195 Broadway, New York.

Mr. Herbert Smith, assistant superintendent, New York, has been appointed district traffic superintendent of the first district, eastern division with headquarters at New York. He entered the service in 1866 in New York as a messenger, since which time he has occupied almost every position up to a superintendency. He is regarded as one of the best equipped telegraph officials in the service to-day.

Mr. W. J. Higgins, manager of the Buffalo, N. Y., office has been appointed district plant superintendent of the first district, eastern division with headquarters in New York. Mr. Higgins entered telegraph employ at Buffalo in 1884 at the age of eighteen and his service has been continuous since that time, occupying the positions of manager of a branch office, repeater chief, automatic chief, assistant chief operator, chief operator and manager of the Buffalo main office, which latter position he held until his present promotion. Before leaving Buffalo for his new post of duty Mr. Higgins was presented with a traveling bag and a handsome stick pin by the members of the Buffalo force.

Mr. T. A. McCammon, chief operator of the general operating department, New York, has been appointed district traffic superintendent, general

operating department, with headquarters in New York.

Mr. L. K. Whitcomb, formerly and for many years chief operator of the company at Chicago, Ill., has been appointed division traffic superintendent with headquarters at Dallas, Tex. Mr. Whitcomb is considered a very efficient telegraph official and his return to the service pleases his old friends.

Mr. E. E. McClintock, superintendent of telegraph of the Colorado and Wyoming Railroad, Denver, Colo., has been appointed superintendent of the first district mountain division with headquarters at Denver.

Mr. W. R. Gray has been appointed division plant superintendent of the Pacific division with headquarters at San Francisco and will assume the new position October 1. He has for many years past been associated with the Pacific Telephone and Telegraph Company.

Mr. J. G. Lay, inspector at San Francisco has been attached to the office of H. F. Dodge, division commercial superintendent at that point.

Mr. Sheldon M. Custer, manager of the branch office in the Land Title Building, Philadelphia, has been appointed district commercial manager of the seventh district, eastern division with headquarters at New Haven.

Mr. John A. Chapman for many years manager of the branch office at Third and Chestnut Streets, Philadelphia, but for some time past engaged in telephone work has been appointed district plant superintendent of the fourth district, eastern division, with headquarters at Philadelphia.

Mr. William E. L. de la Motte, manager of the Sandy Hook, N. J., observatory of the company was a recent New York visitor and took occasion to call on his numerous friends, while in the city. "Count" de la Motte as he is known, is one of the best posted men in marine telegraph circles, having been identified with that service since the early seventies.

Mr. Lawrence D. Gagen, whose appointment as manager of the Akron, Ohio, office was reported in a previous issue, is another young member of the profession who is rapidly forging to the front because of executive ability. He was born at Sandusky, Ohio, on January 15, 1884. He entered the telegraph service at that point as messenger on June 1, 1899, and soon graduated as an operator. He has occupied the positions of messenger, operator, wire chief, and manager and has profited by the experience obtained while filling each of these positions.

In recognition of the loyal services of the staff at the North Sydney cable station during the past year when both of the Canso-Penzance cables were out of service the company has granted to those employes a bonus of a month's salary. During this time over 3,500,000 messages were relayed at that point.

RESIGNATIONS AND APPOINTMENTS.

Mr. G. E. Woods, manager of the office at Jackson, Miss., has been appointed manager at Memphis, Tenn., vice E. T. Moore, resigned, to be later assigned to other duties. Mr. A. M. Stanley, manager at Corinth, Miss., succeeds Mr. Woods as manager at Jackson; Mr. B. Osborne, manager at Tupelo, Miss., succeeds Mr. Stanley; Mr. G. L. Tucker, manager at Leland, Miss., has been transferred to Tupelo to succeed Mr. Osborne, and Mr. F. L. Anglea has been appointed manager at Leland.

Mr. J. H. Jarvis, manager at Morristown, Tenn., has been appointed manager at Decatur, Ala., vice A. T. Cocke, acting manager, who has been transferred to the Memphis office.

Mr. R. E. Griffey has been appointed chief operator of the Memphis, Tenn., office vice B. A. Harris, transferred to the New Orleans office. Mr. W. D. Bard has been appointed wire chief to succeed Mr. Griffey and Mr. Fred Cord of New Orleans has been appointed all night chief to succeed Mr. Bard.

Mr. John A. Pferd has been appointed manager of the Buffalo, N. Y., office, vice W. J. Higgins, promoted to be district plant superintendent at New York. Mr. Pferd began his telegraph career at Buffalo as a messenger in 1873. Loyalty to his employing interests and faithful service always rendered in the positions filled by Mr. Pferd have resulted in his gradual elevation to the highest telegraph position in Buffalo. In 1894 he was made assistant manager and cashier of the Buffalo office which position he held at the time of his present promotion.

Mr. H. A. Knight, formerly chief clerk in the superintendent's office at Omaha, has been appointed manager of the office at Salt Lake City, vice A. W. Long, resigned to engage in other business. Mr. G. B. Slagle of the Denver office has been appointed chief operator at Salt Lake City.

Mr. L. H. Jordan has been appointed manager at Pittsfield, Mass., vice Miss J. M. Hamilton, resigned.

Mr. J. M. Hammersley, of Charlotte, N. C., has been appointed acting manager of the Winston-Salem, N. C., office, vice S. W. Tise, deceased.

B. L. Brooks, Division Traffic Superintendent, Western Union, Denver.

Mr. Belvidere Lee Brooks, division traffic superintendent, mountain division of the Western Union Telegraph Company, Denver, Colo., was born at Houston, Tex., November 30, 1880. He was first employed as a clerk in the Denver Western Union office, July 1, 1892. He later became a messenger in the Union Depot office at Denver. He was next employed as clerk at El Paso, Tex., being promoted later to the position of operator at that point. In 1902 he was advanced to the managership of the Las Vegas, N. M., office, resigning to go to San Francisco as operator. Later he worked in this capacity for the Western Union in St. Louis and for the Postal in Dallas, as well as for brokers and rail-

road companies. In 1904 Mr. Brooks was appointed assistant chief operator for the Western Union at El Paso, Tex., and advanced to the position of traffic chief, Denver, Colo., in 1906. Within a short time he was appointed night chief operator



B. L. BROOKS,
Division Traffic Superintendent, Western Union Telegraph
Company, Denver.

in the same office, in which capacity he served until the early part of 1910, when he was made inspector in the ninth district Western division which became the first district of the new mountain division when the latter division was created. This position he occupied at the time of his recent advancement.

**A. D. Bradley, Western Union Superintendent,
Minneapolis.**

Mr. A. D. Bradley, who has been appointed superintendent at Minneapolis to succeed James Swan, deceased, as briefly recorded in our September 1 issue, is by reason of the experience



A. D. BRADLEY,
Superintendent, Western Union Telegraph Company, Minneapolis.

which he has had in the telegraph service, especially qualified for that position. Mr. Bradley was born at Pittsburg, Pa., January 22, 1873. In 1895 he went to Minneapolis and entered telegraphic employ by accepting a position in the superintendent's office at that point. While thus engaged he devoted all of his energies to becoming familiar with the details connected with the office, mastered the art of telegraphy and proved to his employers that he was worthy of trust. After filling several minor positions in a most acceptable manner he was, on June 1, 1905, made assistant superintendent, which post he occupied until his recent advancement.

During his residence in Minneapolis Mr. Bradley has made for himself a host of friends and he is regarded by those who know him as one of the most capable telegraph officials in the west.

**J. F. Nathan, Commercial Superintendent,
Western Union Telegraph Company,
New York.**

Mr. James F. Nathan, who has been appointed commercial superintendent of the first district eastern division of the Western Union Telegraph Com-



JAMES F. NATHAN,
District Commercial Superintendent, Western Union Telegraph
Company, New York.

pany with headquarters at New York, was born in Chicago, November 11, 1870. He entered the telegraph service as messenger at Baltimore in 1884 and later became clerk, mastered the art of telegraphy and accepted a position as operator in the Western Union office at Baltimore. In 1892 he returned to Chicago and accepted a position under Mr. A. C. Murphy, superintendent of the city lines. In 1894 he was attached to the office of Mr. E. M. Mulford,

who was then manager at Chicago and served successively as clerk, solicitor and assistant to the manager. In 1903 he was appointed manager of the Boston, Mass., office. In 1905 he was transferred to New York as an inspector at 195 Broadway. On June 1, 1907, he was appointed assistant city superintendent in charge of the central cable office at 16 Broad Street, where he has since been located.

Mr. Nathan has long been regarded as one of the most energetic and capable officials in the service. His elevation to the head of the commercial department of the first district, which is probably the largest and most important in the United States, will afford him ample scope to display his executive ability.

The Cable.

Mr. George Gray Ward, vice-president and general manager of the Commercial Cable Company, New York, accompanied by his wife, will sail from Liverpool for home on the steamer Baltic September 17.

The Right Hon. Lord Strathcona and Mount Royal, K. C. M. G., High Commissioner for Canada in London, who is a director of the Commercial Cable Company and who has for many years been interested in telegraphs and cables, recently celebrated his ninetieth birthday.

Mr. F. H. Nichols is acting superintendent of the Anglo-American Telegraph Company, New York, vice Charles Trippe, deceased.

Mr. A. C. Forshaw, superintendent of the Direct United States Cable Company, London, England, after a service of thirty-six years has been retired on a pension.

The report of the Pacific Cable Board for the year ending March 31, 1910, shows total receipts from the British Columbia-Australia cable of £111,723. Of this amount £63,767 was expended in operation and £30,000 was assigned to renewal account. Interest and sinking fund charges amounted to £77,544, leaving a deficit of £59,588 to be met by the various governments which support the cable. In order to minimize the possible delays to traffic across Canada the board decided during the past year to lease a wire from the Canadian Pacific Railway from Vancouver to Montreal and operate the same so as to have at all times the exclusive use of one wire for the accommodation of the cable traffic. The rates for press matter between Australia and the United Kingdom were reduced on August 1, 1909, from one shilling to nine pence per word and this reduction together with the establishment of a new service between Canada and Australia increased the amount of press matter handled although the total for the year of this class of traffic was only 126,081 words.

Canadian Notes.

A. T. Nourse, for many years manager for the Great North Western Telegraph Company at Sherbrooke, Que., died August 29.

Mr. E. F. Bailey, formerly cashier of the Vancouver, B. C., office of the Great North Western Telegraph Company has been appointed assistant manager of that office. Mr. A. I. Morgan succeeds Mr. Bailey as cashier.

Mr. A. J. Clarke, night chief operator of the Vancouver office of the Canadian Pacific Railway's telegraph, has been promoted to the managership vice Mr. E. Patterson, resigned to engage in other business.

Mr. Charles Ernest Lillie, whose appointment as manager of the Quebec office of the Great North Western Telegraph Company was briefly mentioned in our August 16 issue, was born at Toronto, April 19, 1878. He entered the telegraph service in that city in 1893 as messenger boy and has gradually worked his way up in the service occupying successively the positions of check boy, operator, assistant wire chief, traffic chief and inspector, which position he held at the time of his recent advancement.

Trade Notes.

Messrs. Brown and Murray, Ltd., Mildmay Park Works, London, N., England, are the manufacturers of the inventions of Mr. S. G. Brown and Mr. Donald Murray. Mr. Brown's cable relay (which has no connection with the Brown and Allen relay) is now largely used by most of the large cable companies, which also make extensive use of the Brown magnetic bridge and shunt. Messrs. Brown and Murray, Ltd., also make the new and remarkable Brown telephone relay, an advertisement of which appears in another column. In addition to a variety of other instruments and machinery, they are also the makers of the Murray automatic page-printing telegraph and the new Murray multiplex apparatus, an announcement in regard to which appears elsewhere in this issue.

At a recent meeting of the stockholders of the Chase Motor Truck Company, of Syracuse, N. Y., the following directors were elected: Mr. A. M. Chase, Mr. A. C. Chase, Mr. H. P. Bellinger, of Syracuse, Mr. L. O. Bucklin, Little Falls, N. Y., and Mr. G. A. Brockway, of Homer, N. Y. These directors later elected Mr. A. M. Chase, president, Mr. H. P. Bellinger, vice-president, and Mr. E. A. Kingsburg, secretary and treasurer.

This is the concern which is accomplishing so much in its efforts to furnish the telegraph and telephone interests with an adequate motor truck for their line repairing and construction work. Chase Motor Trucks are used by both telegraph and telephone companies with most excellent results in saving time in effecting repairs. This motor truck is economical to operate, averaging fifteen miles per gallon of gasoline. These motor cars have given satisfaction wherever used, and have been subjected to unusually severe tests in running over sandy and mountain roads.

The Telephone.

Mr. F. H. Bethell, vice-president of the Bell Telephone Company of Pennsylvania and controlled companies, is spending a vacation in Europe.

The Pacific Telephone and Telegraph Company on July 1 had 379,513 subscribers' stations connected, an increase of five per cent. during the preceding six months.

The Federal Telephone and Telegraph Company of Buffalo, N. Y., has filed certificates with the secretary of state increasing its capital stock from \$6,000,000 to \$10,000,000.

Mr. Thomas W. Wilkinson of the Kansas City Long Distance Telephone Company has resigned to accept a position with the Missouri and Kansas Telephone Company.

Mr. Kendall Weisiger, assistant chief engineer of the Southern Bell Telephone and Telegraph Company, has been appointed traffic engineer of the company with headquarters at Atlanta.

Mr. L. M. Brown, district manager of the Pacific Telephone and Telegraph Company at Redding, Cal., has been promoted to a similar position at Chico, Cal. Mr. C. Olstead succeeds Mr. Brown at Redding.

Mr. L. D. McLean, formerly general contract agent of the Southwestern Telegraph and Telephone Company at Dallas, Texas, has been appointed general commercial superintendent of the Interstate Consolidated Telephone Company of Butte, Mont.

The Pacific Telephone and Telegraph Company has placed in service a new common battery telephone exchange at Riverside, Cal. Between \$175,000 and \$200,000 has recently been expended in improvements in the telephone system at that point.

The stockholders of the Southern New England Telephone Company will soon be asked to subscribe for a new issue of stock amounting to \$1,099,100. This will increase the total capitalization of the company to \$8,792,800. The issue of new stocks is for the purpose of raising money to carry on improvements and extensions of the plant.

A recent decision of an Arkansas court holds that it is negligence for a telephone company to fail to have its lightning arresters equipped with ground wires. The plaintiff was using his telephone in the ordinary manner when lightning entered the instrument and gave him injuries for which he was awarded a verdict of \$5,900.

The New England Telephone and Telegraph Company has announced that it has accepted the ruling of the Massachusetts Highway Commission in connection with its investigation of telephone rates in Boston and suburban district. The company will begin at once to prepare for the changes in its system which the establishment of the new rates will bring about. About 100,000 contracts will probably be rewritten. The company expects by November 1 to be able to offer service in any exchange, in accordance with the new schedule, to those who desire it.

The report of the Cumberland Telephone and Telegraph Company for the seven months ended July 31 shows gross revenue of \$3,931,564, an increase of \$229,808 over the corresponding period in 1909 and net revenue of \$1,693,938 an increase of \$110,710 over the first seven months of last year.

A new telephone transmitter invented by C. Lorenz of Berlin, employs carbon silicide or silundium in place of carbon. It is said that the new transmitter is more efficient than the carbon type and in addition has a longer life when operated at high voltage.

According to the latest statistics Dallas, Texas, holds second place among the cities of this country in regard to the number of telephones in service for every one hundred inhabitants, having 16.3 telephones for every one hundred of population. This number is exceeded by Los Angeles only.

The Southwestern Telephone News for August has on its front cover a large half-tone engraving of Mr. Frank B. Knight, the well-known old time and military telegrapher, who is now special agent in charge of publicity of the Southwestern Telegraph and Telephone Company at Dallas, Texas. Mr. Knight has been connected with the telephone service for the past thirty years.

Mr. John J. Carty, chief engineer of the American Telephone and Telegraph Company who has been in Paris attending the International Conference of Telegraph and Telephone engineers described before that body the work which is being done by his company in establishing underground connections between the principal eastern cities of this country in order to do away with the possibility of communication being entirely cut off during severe storms. The underground system at present contemplated includes Boston, New York, Philadelphia, Baltimore and Washington.

The Union Electric Telephone and Telegraph Company operating at Davenport, Iowa, and neighboring cities has applied for an amendment to its franchise to permit it to sell its property to the Iowa Telephone Company. The manager of the Union Company states that his company is losing money at the rate of \$1500 per month and the permission to sell is desired in order that the stockholders may realize about fifty per cent. on their original investment. If the permission is not given it is said that the company will soon be driven to bankruptcy.

Mr. H. R. Van Deventer of Sumter, S. C., author of "Telephonology" has compiled a Telephone Hand Book which is designed primarily for the use of those desiring to install a farmer's telephone line or establish a small exchange in a rural community. To meet the needs of such persons this work gives a model constitution and by-laws for a small telephone company and much valuable information in regard to pole line construction and the installation and care of the apparatus used in small exchanges and on magneto lines. The book has 127 pages and 80 illustrations. Price fifty cents.

A convention of the contract and commercial men of the Associated Bell Telephone Companies will be held at the Windsor Hotel, Montreal, September 20-23, inclusive. An interesting program has been prepared consisting of papers dealing with various phases of the work of the commercial department. Mr. H. S. Brooks, general commercial superintendent of the American Telephone and Telegraph Company, New York, together with all of the division commercial superintendents of that company will be present. At the conclusion of the convention those in attendance will be given a banquet by the American Telephone and Telegraph Company.

John T. Mulhall, Telegrapher and Lawyer.

The many friends in the telegraph service of Mr. John T. Mulhall will be glad to learn of his election as attorney for the Serial Building Loan and Savings Institution. The members of this association are also to be congratulated upon securing Mr. Mulhall's services to safeguard their interests in legal matters.



JOHN T. MULHALL, NEW YORK.
Attorney for the Serial Building Loan and Savings Institution.

Mr. Mulhall was born in Ireland in March, 1868. On October 4, 1882, he entered the telegraph service as a messenger and was assigned to the executive offices of the Western Union Telegraph Company at 105 Broadway, New York. While thus employed he mastered the art of telegraphy. He was soon promoted to the position of record clerk and on April 17, 1885, he became time clerk. This post he filled until February, 1899, when he retired to en-

gage in the practice of law having been admitted to the New York Bar after three years of study in the New York Law School and the New York University Law School. He has been remarkably successful in his practice and is regarded by those who are acquainted with his abilities as one of the bright lights of the legal profession in New York.

Philadelphia Electrical Society.

A meeting of the Western Union Philadelphia Electrical Society was held on August 12. The evening was given over by the instructor to explanations of dynamo currents, connected in series and multiple, and to arc and incandescent electric lights.

The lecturer then gave illustrations on resistance and conductivity, and explained quadruplex leakage. These subjects, being matters of practical information, were very interesting to the members of the society.

The last subject under consideration was insulation testing with the voltmeter and leakages on the various conductors of a line.

Lightning Protection.*

BY WALTER M. PETTY, RUTHERFORD, N. J.

The question of lightning protection for fire-alarm and police signal circuits is one that is of more or less interest to us all. I say more or less because to those fortunate ones whose wires and cables are all underground, the necessity for protection is much less than to the others who have combinations of aerial and underground wires, and still others who have nothing but aerial wires.

In a paper read by me before this association some years ago. I went into this question somewhat elaborately and while feeling that great progress has been made since that time in all classes of construction, I still am of the opinion, based on experience that some of the protective devices mentioned in that paper are still effective. It should be borne in mind that the actual danger of lightning is very remote. It may not be generally known, but statistics prove that when it comes to human life but two persons in every million are killed by lightning, and the actual damage done to property throughout this country is comparatively very small indeed. The same proportion holds good as I previously remarked with regard to the lines that are actually struck. All of us know of the enormous energy of a lightning flash or discharge and with our knowledge of the inductive influences of both static and dynamic in the neighborhood, it is reasonable to suppose that wherever a lightning discharge occurs with its enormous potential and current, everywhere in the neighborhood on every conductor will be induced current of more or less quantity according to the conditions of the circuit. If this

*Paper read at the fifteenth annual convention of the International Association of Municipal Electricians, Rochester, N. Y., September 6-9.

current is of such magnitude as to injure the apparatus in the circuit, and of course the apparatus of fire-alarm and police telegraph systems is in the majority of cases liable to be so injured; then comes the necessity of protection. The best and ideal method and like all ideal things impossible to attain, is to have our lines permanently grounded, that is, to keep them at the same potential as the earth; then an inductive discharge passing into the ground will do no damage, but of course, we know this is an impossibility.

The next best thing is to provide a ground connection with some sort of an air-gap between the lines and the earth. About this air-gap there is a difference of opinion, some authorities making it very small, and others, larger. The reason for this is that, besides dealing with the inductive discharge caused by lightning, we now have the possibilities of currents from other sources which under ordinary conditions are not dangerous, but which may follow on to outlines and cause as much damage as the lightning or inductive discharge itself. We therefore have not only to provide air-gaps of sufficient size, but also some sort of protective devices that in the event of high tension currents reaching our lines, the circuit will be open and no damage result.

The Underwriters' National Electrical Association has prepared in the Code, rules that cover protective devices for signaling systems. Of course, it is intended that these rules shall be general in character and the manufacturers of fire-alarm and other apparatus carrying small currents, have devised many schemes to comply with them. It is not my intention in this paper to mention any particular one of these devices. I would refer those interested to my previous paper on the subject, and also to the many manufacturers, especially of telephone apparatus who have put the devices on the market. I cannot pass this subject without speaking of apparatus which is not covered by the Code. I refer particularly to fire-alarm and police boxes, which being placed out of doors and seldom if ever protected by insurance policies, do not come strictly under the jurisdiction of the Underwriters' National Electrical Association. There has been in days gone by much discussion as to the advisability of grounding these boxes. The writer was at one time opposed to this, but like many a better man, he has seen the error of his ways, and now believes that not only is it advisable to ground these boxes for the safety of the public, but also as a precaution against lightning and high potential currents.

With the old style of boxes using fingers, the danger of welding of these fingers was very great. To a certain extent they were protected by the non-grounding of the boxes, but with the modern cutout devices installed in the boxes together with the new type of brake wheels this danger of welding the parts is very remote and in fact it is hardly necessary to be considered. On the other hand, if the box is not grounded there is always great danger of

a static charge seriously injuring anyone who attempts to open the door. The writer is of the opinion that the most important part of a fire-alarm or a police telegraph system is the box, and too great precaution cannot be adopted to protect this in every way. As mentioned in his previous paper, he has installed over every box a lightning arrester composed of five cylinders of non-arcing metal, spaced about one-sixteenth of an inch apart, the center one of which is grounded, and the two outer ones are connected to positive and negative legs of the line respectively. Since the installation of this type of arrester eight years ago, he has never had any damage result to his fire-alarm boxes notwithstanding that some of them are still of the finger type.

In discussing this question of Lightning Protection with some superintendents and also electric light engineers, the question has arisen as to the possible danger to apparatus from high powered wireless telegraph stations in the neighborhood. It would be interesting to find out from some of our members who have boxes in the neighborhood of some of these high tension stations whether they had had any trouble. The same protective devices which would be effective in the case of lightning should also be useful under the circumstances.

City and National Code Rules and the Relation of the City and Underwriters' Inspectors.*

BY R. A. SMITH.

City Superintendent of Electrical Affairs, Norfolk, Va.

The necessity for city rules, in addition to the National Electrical Code, is due to several reasons: 1st—The city rule is necessary to take care of the life hazard, as the National Code only takes care of the fire hazard. 2nd—There is need for rules that require better construction and protection for wiring in business sections, where wires are more exposed to mechanical injury and where the most clandestine work is found; and the only sure remedy for protection against interference is to prohibit open work and require all wires to be placed in conduits, this of course requiring special rules. There are many other reasons why cities should have additional rules to those embodied in the National Code, as there often arise emergencies that need an immediate remedy, and a rule has to be made to cover same without waiting for a new issue of the National Code. There are also many recommendations in the National Code: such recommendations not being binding, are not heeded, and as many of these suggestions would make excellent rules, it is necessary for the city to incorporate them in their rules in order to make them effective.

The rapid growth of the electrical business and the consequent changes in method of construction and materials, require frequent changes in the rules governing the installation of electrical wiring and apparatus, it is therefore not wise to attempt to

* Paper read at the fifteenth annual convention of the International Association of Municipal Electricians, Rochester, N. Y., September 6-9.

embody these rules in city ordinances, owing to the necessity for hurried changes and additions, and the slow and uncertain routine of the average council committee in handling these matters, and being altogether technical has to be left largely to the expert in charge and a committee. With a committee on Electrical Affairs, empowered to adopt such rules as they see best, and a clause prohibiting said committee from adopting any rule that allows anything prohibited in the National Code, the ideal inspection department would be approached.

The National Electrical Code is the outcome of years of study and experience of some of the ablest electrical and mechanical engineers in this and other countries, and is conceded to be thoroughly reliable, and has been adopted by all electrical inspection departments as a basis, and such other rules added as local conditions required.

It is well to bear in mind that in every fire insurance policy there is a clause stating that when any electric heat, light, or power wiring, or apparatus used on same, is installed in or on any building covered by said policy, the same shall be installed in conformity with the rules of the National Electrical Code, this therefore making it imperative that these rules be followed if property is to be insured; and it is for this reason that the city taxpayer is very much interested, or should be, that these rules be carried out. The failure of local inspection departments to properly observe this has cost citizens large sums of money and much annoyance, as the underwriters' inspectors are bound to uphold their rules, and require changes in work whenever they find rules have not been observed.

The writer after having had twelve years' experience in inspection work, and having had a chance to observe the methods of the insurance inspector, has come to the conclusion that every municipal electrical inspector can, in the interest of the taxpayer, give strict attention to the National Electrical Code, and that their relations with the underwriters' inspector can well afford to be cordial, at least, as this will enable all to have a better understanding of what is required.

The city inspector can also serve the interest of the taxpayer and his department by insisting that he accompany the underwriters' inspector when re-inspections are made in his territory, as this will facilitate the work of correcting defects and enable the city inspector to point out clandestine work. It is also advantageous to the taxpayer to get notice from the city inspector along with that of the underwriters', in case any defects exist, he then being assured that his interest is being looked after.

The new National Electrical Code, dated 1909, contains many changes, when compared with the 1907 issue, and in order to show this to those who have not looked into the matter, I have with me a few copies with new sections marked, and will try to explain these verbally.

I also have a few copies of the supplement on fit-

tings and signaling systems, the latter containing regulations for fire alarm systems.

Mr. R. W. A. Horner, a Veteran in the Service.

Mr. R. W. A. Horner, chief operator of the Western Union Telegraph Company at Lynchburg, Va., which is the repeating office for many of the New Orleans and other southern circuits, in a recent letter renewing his subscription makes reference to his forty-four years of service in that office, beginning as a messenger boy and occupying every position in the office including the managership as well as chief operator, which position he now occupies. While Mr. Horner is quite deaf he is regarded as one of the ablest chief operators in the south. His affliction, if anything, increases his power of concentration on the work in hand, and there is not a call made on any of the repeaters that escapes his immediate attention. Mr. Horner was all night wire chief of the office in the seventies, when A. S. Ayres, better known as "Patsy Ayres," and W. D. West were the star operators in the New Orleans office. "Their Morse," writes Mr. Horner, "was beautiful and the masterly sending of Mr. Ayres was always worth listening to. He invariably cleared his hooks one or two hours ahead of any of the other operators. He was no doubt the most rapid sender I ever heard. It was like sweet music to listen to him, every character being perfectly formed. It must have been a great task for the New York receiving operators to copy Mr. Ayres."

At that time Lynchburg and Rome, Ga., were repeater stations on the New York—New Orleans circuit, and while Mr. Horner was night attendant at Lynchburg Dr. P. E. Murray, until about a year ago manager of the Atlanta office, was the night attendant at Rome.

In his letter Mr. Horner states that "when Chattanooga, Tenn., in the seventies, was the relay office for the south, as Atlanta is now, Mr. J. B. Norris of that office was another bright star in the telegraphic firmament. His manipulation of the key was perfect and it required such fine boys as the Mareans, Morell, Fred and Dell, and William Harvey cutter to hold him down on the Washington wire. Mr. Norris is an old-timer and still in the harness at Chattanooga. I meet him sometimes on the wire."

Among the graduates of the Lynchburg office of whom Mr. Horner may well be proud are Mr. W. T. Gentry, president of the Southern Bell Telephone and Telegraph Company, Atlanta, Ga., and Mr. J. W. Crews, commercial superintendent of the same company at Richmond, Va. Of these two gentlemen Mr. Horner says: "Both are personal friends of the writer and both are first-class operators. Mr. Gentry was a number one base ball player, and but few of the boys could hold his swift curves."

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September 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Printing Telegraphy.

This is a subject which has always had a certain fascination for those interested in telegraphic affairs and is one which has provided a great field of research and experiment for inventors since a commercial telegraph system was first made possible by the inventions of Professor Morse. The installation of the first telegraph apparatus was followed within a few years by a printing telegraph system, the invention of Mr. Royal E. House, of Vermont. This system which was used for some time but was finally discarded as impracticable for general use, was the forerunner of many other systems most of which have been abandoned. Some of these have performed very satisfactorily under normal operating conditions and have given promise of effecting the usual revolution in telegraphic methods. In the final analysis, however, all have fallen short in some detail of the requirements for a printing telegraph which should be-

come a universal success and as such should generally replace Morse operation.

The failures have been so numerous that even some of the more optimistic in telegraph circles are beginning to feel that Morse transmission will always occupy the important place that it does today and that an ideal system of telegraphy will never be developed. Messrs. Maver and McNicol, in the article on "American Telegraph Engineering" which has been appearing in our columns for some time past summed up the situation and voiced the opinions of many very concisely in these words:

"It has long been recognized by telegraph authorities that an ideal system of telegraphy would be a simple and reliable page printer, capable of transmitting and receiving, say, from 600 to 1,000 words per minute on circuits of from 200 to 1,000 miles in length. To the inventor of such a system will ensue wealth and fame. It is hardly conceivable, however, that a telegraph printer can be devised that will not possess a number of prominent defects that will act against its general employment; for example, the necessity of preparation of the message for transmission, and its comparative expensiveness and complexity. The first defect would preclude its use on hundreds of stock exchange and "broker" circuits; the second would debar it from thousands of small way wires. These disadvantages are inherent also in all automatic machine telegraph systems, electro-magnetic or electro-chemical. The superiority of the Morse manual system above all other systems in the foregoing respects is universally admitted."

There are, however, at the present time no less than three different printing telegraph systems in progress of development in this country in which transmission is effected directly from a keyboard thus obviating the necessity of special preparation of the message for transmission. In regard to the expensiveness and complexity of any of these devices debaring them from use on the thousands of way wires it is now urged that the extension of the use of the telephone as an auxiliary to the telegraph will remove the necessity of maintaining these thousands of small offices.

The two objections named thus being disposed of the fact still remains that with any system of direct transmission the capacity of the wire is limited to the speed at which an operator can send from the keyboard. Though some of these systems can be worked duplex they still do not bring the capacity of the wire up to that of one which is operated by Morse quadruplex. Such a system does, however, possess the advantage of not requiring a skilled operator. This is a point of great importance to the telegraph companies at the present time, as the traffic which they are required to handle is rapidly increasing and the supply of Morse operators is not increasing in the same proportion, but has rather decreased in the past few years, be-

cause so many telegraphers have deserted the key to engage in other business. This condition of affairs is being taken care of by the railroads by adopting the telephone to meet their requirements. The commercial telegraph companies may deal with the situation by introducing into general use a keyboard transmitter printing telegraph system. Another alternative which many believe will solve the problem is the extension of the use of the Wheatstone automatic system. This largely increases the capacity of the wire but has the disadvantage of requiring a preliminary preparation of the message by perforating a tape and the translation into writing of the dots and dashes on the recording tape at the receiving end.

Some of the brightest engineering minds in the country are attempting to solve this problem of how to handle the telegraph business most efficiently. Even those who are in closest touch with the situation hesitate to predict what the future will bring forth. Present indications, however, seem to point to a great change in telegraphic practice during the next decade.

Service.

Mr. W. A. Porteous, manager of the New Orleans office of the Western Union Telegraph Company, in presiding over a banquet given to the former incumbent of his office, Mr. T. P. Cummings, who has recently been advanced to the superintendency, struck the keynote of success in the telegraphic profession. He said that the success of Mr. Cummings' administration would depend entirely upon the service rendered throughout his district. This means the service of every individual employe of the company. If one operator slights his work, is careless and makes many errors he will do more toward making the telegraph unpopular with the public than a half dozen employes who always try to perform their tasks as well as possible, can do toward popularizing the telegraph. The success of every employe depends entirely upon the support which is given to the telegraph industry by the public. Every employe, no matter how humble his station, can assist in increasing this support and in the same way every employe can help to weaken this support. Thus the success of everyone engaged in telegraphic work depends directly upon his own efforts, as unless the company which employs him is prosperous he cannot expect to receive any advancement. It is a fact worthy of note and one which has been proven many times that those who receive any important advancement in the ranks of the telegraph are those who always try to render the very best service in their power and are always looking for some way in which they can give a little better service than before. On the other hand those who are always bewailing the fact that there are no opportunities for advancement belong almost invariably to the class who frequently slight their work and are always afraid that they are going to do something that they will not get paid for.

This question of service applies with even greater force to managers and other officials of the telegraph than to their subordinates. The upbuilding of the business at every point depends largely upon the way in which the managers cooperate with their superintendent and assist him in his plans for extending the usefulness of the telegraph by always carrying out his instructions. The progressive manager, however, will go farther than this. He will be on the lookout for new ideas and when he discovers something of value will not hesitate to communicate the same to others who might be benefited by his knowledge. The manager represents the company in the mind of the public and is consequently a moulder of public opinion although he may not appreciate that fact. If he makes the customers of the company feel that he is anxious for their business and that he will use every means in his power to get their messages through with all possible despatch that part of the public with which he comes in contact will feel that the company is always ready to serve them and will be encouraged to make use of its facilities. A successful manager always makes those whom he meets in a business way feel that he is their friend and is straightforward in his dealings with them. If there is any interruption in the service so that messages are delayed he will be frank in stating the facts and will not try to make the customers believe that their telegrams have gone through without delay. While delays are always annoying they will usually be excused if their cause is known and it is shown that they could not be prevented. The best advertisement for any business is a satisfied customer and the successful manager is the one who uses every effort in his power to satisfy his customers by giving them the best service possible.

Postal Company Acquires Telephone Property.

Deeds have been recorded in Nashville, Tenn., by which the Postal Telegraph Company acquires the property of the Alabama & Tennessee Telephone & Telegraph Company. The property was sold by order of Chancery Court at Clarksville, Tenn., and the Federal Court in Alabama. The Postal company has lately acquired a line from Louisville to Decatur, Ala., and it is reported that it will extend the line to Huntsville, Ala., and open an office there.

In the list of old timers who have died during the past year which we published in our September 1 issue was the name of W. H. Glover. The person whose death was thus recorded was from a western city and was not the W. H. Glover who is employed in the Central cable office of the Western Union Telegraph Company at 16 Broad Street, New York. The latter gentleman is still very much alive and does not wish his friends to think that he has passed away.

Telegraphs and Telephones in New York State Under Public Service Control.

The public service commission of the second district of New York State assumed jurisdiction over the operations of telephone and telegraph companies operating in that state on September 1. All telephone companies, corporations, associations, partnerships or persons owning or operating any telephone line in the state for profit, whose property is in excess of the value of \$10,000, will come under the jurisdiction of the commission. All telegraph companies, however, are within the jurisdiction of the commission.

Telephone and telegraph companies are required to afford adequate service at just and reasonable rates, and discrimination in favor of any particular person or corporation, and in giving any unreasonable preference of any kind is prohibited. No free or reduced service or free pass or frank can be given except to the employees of the corporation and their families and persons engaged in certain lines of charitable work.

The corporations are required to file with the commission schedules showing rates, rental and charges for services, also all contracts and agreements in writing between companies affording telephone and telegraph service relating in any way to construction, rentals or use of lines of telephone or telegraph companies. The companies are required to file each year an annual report which is a public record, and may be examined at the office of the commission upon request.

Complaints may be made to the commission by any person or corporation aggrieved as to rates, rentals and service by petition or complaint. The commission may also, upon its own motion, make inquiry upon actions of telephone or telegraph corporations as to any act done or omitted to be done by any telephone or telegraph corporation. The commission has power to order necessary repairs and changes. All franchises and privileges hereafter granted must be approved by the commission before they can be lawfully exercised. Issues of stock, bonds and other forms of indebtedness must be consented to by the commission. The commission has power to enforce its orders, rules and recommendations, and failure to comply with same may result in actions to recover penalties.

Out of about 1,200 telephone companies in this state, 115 will come under the jurisdiction of the commission, all of whom have property in excess of \$10,000. The New York office of the commission which will have charge of matters pertaining to the telegraph and telephone in New York and vicinity is located in the Metropolitan Building.

Frank W. Stevens, chairman of the commission, issued a statement to the effect that the commission would proceed slowly with its new work, as it was unfamiliar with the subject. The telephone and telegraph companies had been circularized, so that the commission might obtain data on which to base investigations.

Edward B. Rogers, of Elmira, a telephone man of twenty-two years' experience, has been appointed chief of the division of telephones and telegraphs with an annual salary of \$4,000. Mr. Rogers commenced service as a clerk for the New York and Pennsylvania Telephone and Telegraph Company and for six years prior to its absorption by the New York Telephone Company was general manager of that corporation. At the time of his appointment by the commissioner he was special agent for the New York Telephone Company at Buffalo.

General Mention.

The Stock Quotation Telegraph Company has filed certificates with the Secretary of State increasing its capital stock from \$250,000 to \$3,000,000.

Mr. Klem Madden, of the Telepost Company, St. Louis, has been appointed manager of the Omaha, Neb., office of this company which has just been opened to the public.

Mr. Frederic Allen, formerly an operator of Washington, D. C., has been appointed Head Room Clerk of the Waldorf-Astoria, New York. Mr. Allen learned the hotel business primarily from observation while serving the Postal Company at a branch office in a hotel in Washington. He is a son of W. H. Allen, an old time operator and manager.

The postmaster-general of Australia at a dinner of telegraphers given recently in Melbourne took occasion to speak in commendatory terms of the telegraph service of that country, comparing it with that rendered by private companies. "Until recently," he said, "messages via the Pacific cable had to go over a privately owned land line in Canada. An investigation showed that while 1,000 mistakes were made on the privately owned line ninety-seven were made on the Government owned lines in Australia. That was one of the reasons why pressure was brought to bear to get that privately owned line transferred to the control of the Pacific cable board." He also stated that he was in thorough accord with the principle by which a man's fitness for an appointment was determined by a Commissioner, and he hoped the time would never come again when a man would get a position in the service or promotion simply because he had been longer in the service than some other officer.

Probably the smallest sum of money ever sent by telegraph was forwarded recently by a New York stock brokerage concern to Seattle. Having been advised by the post office authorities that there was an unstamped letter addressed to them in the Seattle office, the brokers immediately sent by wire the two cents necessary to have the letter forwarded. The letter when received was found to contain a good order together with a check, so they were well repaid for the extra expense involved in getting the letter.

The Military Telegrapher in the Civil War.

PART XLVI.

BY THEODORE E. MORELAND, PITTSBURG, PA.

Shortly following the end of the war, and knowing the important part played in it by the United States Military Telegraph, Mr. W. R. Plum began his collection of the individual parts performed by the operators of that corps. I was asked at that time to write up my experience but neglected to do so,—something I have regretted very much ever since, as at that time places and incidents were fresh in my memory and could have been more accurately stated, now I will have to trust alone to memory as to the part performed by myself and other comrades in that greatest of wars.

In September, 1861, I was the third choice from "OD", Pittsburg, to follow David Homer Bates and Samuel H. Brown to Washington, I being at that time operator in Mr. Andrew Carnegie's office on the Pennsylvania Railroad. Mr. Carnegie was superintendent of the western division but had been called away sometime before to assist Thomas A. Scott, who had been made Assistant Secretary of War by Simon Cameron. Mr. Scott knew Mr. Carnegie's great ability as a railroad man, hence his selection of him as an assistant in organizing the military railroad and telegraph service.

I might state at the beginning that I was not a number one operator or nearly a number one, in fact, I might admit now that some of us railroad fellows, were, at first, what Emerick, Dwight, and others of the eastern crowd dubbed "railroad plugs;" but as Uncle Samuel's optics were being closed by many, many others at that time, we also took chances and won out. Time brings around many changes and by the following March, J. Hervey Nichols, who had been my chum at Fort Lyon General Heintzelman's headquarters, since September 20, and myself, had become (in our opinion) ready and fitted for bonus or any other kind of telegraph work.

When I reached Washington on September 16, and reported to Messrs. Bates, Gilmore, Wilson and others, I was thought to be about the size to fit in at Fort Lyon, which place I reached and successfully opened the office amid the plaudits of an admiring crowd of staff officers who accompanied the general to the services of dedication, as it were, of that office. After getting "DI" or "WD" and asking if they had any rebellion crushing orders for the general and getting a negative, I settled down to the arduous duties and dangers of a war operator.

When I tell the present generation of operators, bonus and otherwise, they will hardly credit it that from September until March, J. Hervey Nichols and myself combined and unaided, took one message. Talk about halls of fame and missing names, Nichols and myself still live and look Uncle Samuel in the eye as men who have given an equivalent for their money, as all men should be able to do.

This one message was taken by me unassisted and brought around a little ill feeling on the part of J. Hervey as it came over the wire on his trick, but he was busy elsewhere and I received the message.

Early in March Nichols and myself were ordered to proceed to Baltimore thence to Fortress Monroe; we had noticed for a few days before the greatest activity around our headquarters and couriers galore reaching our place. At all events the orders did not come over the wires.

On our way down the Chesapeake Bay what a spectacle we witnessed, thousands and tens of thousands of soldiers, artillery, cavalry on all conceivable manner of boats, barges, schooners, etc., destined for the same place, Fortress Monroe. Such a sight might have been seen by Xerxes, Hannibal or some of the warriors of olden times, but it had never been seen in the United States before and will perhaps never be seen again.

Upon reaching Fortress Monroe, Nichols and myself found at once what it was to be soldiers, to forage for yourself, etc. We had thought that provision would have been made for our comfort at the Hotel Hygeia but such was not the fact.

Our assignment had not been made known to the Hygeia Hotel, George D. Sheldon or Richard O'Brien, and now came the tug of war, the first that we had sniffed.

I wonder if Nichols remembers that first night, there we were two orphans, homeless, without a morsel to eat and to add to this night of horrors to us, it began to rain, in fact it was a deluge.

Our first effort was to get shelter which was soon found. The ruins of a large church or hall in Hampton had been taken by some quartermasters for the storage of bales of hay, oats, etc. Between the apertures of the hay bales we got the snugest kind of beds and would have paid handsomely for the accommodations had it not have been we had unthinkingly taken berths very high up in the pyramids of hay bales which were fifty feet high. Our retreat was found by others and our lodging house was undermined by some enterprising soldiers below, and Major (as he was then), Thomas T. Eckert's United States Military Telegraph Corps came near being two short at roll call the next morning. Had it not been for the agility displayed by Mr. Nichols and myself in dodging hay bales, bags of oats, etc., we would not be on the pension roll to-day.

Nichols and myself are young yet and may live to get even with those great practical jokers, General Thomas T. Eckert (who was likely promoted for this practical joke on us), Charles A. Tinker, D. H. Bates and others.

The day following we got our first glimpse of war. General Lee's men began to fall back and we captured their camps with all their stores at Big Bethel with a lot of prisoners, who, by the way, were a much different set from those captured months later. No wonder the Southern girls bedecked them with all kinds of laurels when they sent

them forth to battle. Their uniforms were new, they were a handsome lot of fellows and like our men were proud of their trappings.

Nothing eventful occurred after Big Bethel until we reached Yorktown on the overland route;—there our army massed and the long siege of Yorktown began.

Within a radius of probably three to five miles, our army of possibly 150,000 men had been corralled and now the war was surely on. All efforts toward peace had failed and bloody war was to be ours for years to come, and the best, the very best, of our people both North and South were to yield up their lives.

I do not remember exactly, but we had possibly about thirty or forty operators in this Yorktown siege stationed at the headquarters of the different Major-General's, Brigadier-General's and sometimes Colonel's. We had enough operators to go around. During this siege we did not have much more telegraphically to do than Nichols and myself did at Fort Lyon. Some of us being poetically inclined amused ourselves on the wire by rhyming different names, etc. Among those names was that of A. H. Bliss, that giant of the West who helped entertain us last week in Chicago. I was sending out some of my stuff on that name when the flaps of my tent opened and I felt a stinging sensation around my ears. Looking up, Mr. Bliss stood before me, looking, I think, as George Washington looked when he told Cornwallis to give up that knife and sail abroad.

I had forgotten that I was the nearest neighbor, as I was but a block away, and would naturally be the first reached. Bliss was not as large nor as good a man then as he is to-day. I learned afterwards that he had traversed the entire block on his hands and knees determined that the poet should be found and he was, in me. All of us thereafter took off our hats to Bliss as this piece of detective work deserved the greatest praise and respect from us all. His name was never mentioned on the wire after that, at least not by myself.

After McGruder's evacuation of Yorktown and our occupation of that rat permeated place, thousands and thousands of the rodents occupying it jointly with us, all of the operators congregated in a large building occupied in part by General Van Allen, who had been appointed commandant. Some thirty or forty operators had established themselves in one room; we still had telegraph wires to Fortress Monroe and the North and were following our army overland with hastily constructed wires built by Dennis Doren and Levi D. McCandless. A day or two afterward a number of the operators had their assignments and had gone up the James River or overland with our army in pursuit of the retreating enemy; half a dozen of us were left to hold Yorktown. Among this crowd was J. H. Emerick, Charles Lithgow, J. H. Nichols, John Tinney, Henry Cowan and I think,

C. A. Tinker. Both Generals McClellan and Eckert knew that this force could hold the town or any other place as long as it was well provisioned.

The battle of Williamsburg occurred while we were at Yorktown and a great number were killed and wounded. I had two brothers in the One Hundred and Second Pennsylvania Regiment and as that regiment was engaged and lost heavily I was very uneasy, of course.

Just at this time luckily, General Eckert sent an order detailing me as an escort to Mr. O'Reilly, an old telegraph friend of General Eckert's whose son had been killed at the Williamsburg battle, to go with him to Williamsburg and give him all the assistance I could. Ambulance accommodations were secured and we reached our destination safely. We had very little trouble in finding the grave as his comrades had it plainly marked and we soon began our return journey to Yorktown. This country was sympathetic and was infested by guerrillas and bushwhackers. I learned on this trip that my brothers had come through the battle all right.

Later Lithgow and myself were detailed to take charge of the Williamsburg office and stayed there about a week. Nothing occurred while there except that it had become known among the contrabands that Lithgow had a diploma as a doctor and he afterwards figured successfully in a few cases and proved that he was not only a doctor but a number one operator and an all around good fellow.

While we were besieging Yorktown I was stationed at General FitzJohn Porter's headquarters and a rather thrilling incident occurred there. Professor Low, the aeronaut who was at our headquarters made almost daily ascensions and allowed some of us to ascend with him and overlook the Confederate camps. Early one morning General Porter went up alone and the balloon broke loose. The balloon sailed right over one part of the Yorktown fortifications and the general could have easily been picked off by their sharpshooters, but thinking they had a valuable prize they waited a little and lost their man. That brave and unjustly treated officer was equal to the occasion and in a couple of hours alighted safely in our lines. There was great rejoicing in the army as he was one of our best generals and much beloved by all.

After closing the Williamsburg office we were ordered to report to Chief Operator Harper Caldwell in front of Richmond. I was assigned to General Sedgwick's quarters and afterwards to those of General Warren.

The Fair Oaks and Gaines Mills battles occurred the day before our retreat was decided upon. At this time I was stationed at Dispatch Station on the railroad. The wounded by hundreds were brought in from the front and as we occupied part of a large mansion for telegraph purposes, part of this building was taken for the wounded, while the sanitary and Christian commissions camped along side

of us and cared for thousands; several of our operators were nearby and we gave a good deal of assistance to the wounded among whom were many Confederates.

A little incident occurred here which I have never forgotten. In helping the wounded to water, coffee, etc., I came across a wounded Confederate officer who had a badly injured arm caused by a shell explosion. After asking him if he needed anything, he thanked me for some coffee and told me that he was a North Carolinian. He asked me if I thought it possible to get word to any of his friends as to his fate as his wife and two babies would be glad to hear he was in good hands and not badly hurt. As the order had been given for our retrograde move then, I told him I would do all I could for him and thought he would soon be with his friends. This turned out to be the case next day, as thousands of our own men also fell into the hands of Lee's army as we had been badly whipped the day before. Our retreat was rather a hurried one and we did not stand on ceremony but began the seven day retreat and fight at once. During the seven days fighting on our retreat to the James River, we had some of the roughest experience I had met with up to this time. A Canadian operator who had joined us the day before, and who rather regretted having come at all, after witnessing the sights forced on him, was in my company. We were then going about as we pleased having lost McClellan's headquarters where Harper Caldwell our chief operator had ordered us to report, he having with him Charles W. Jacques, Jesse H. Bunnell, John Emerick, T. H. Fonda, W. H. Nichols, R. F. Weitbrech and several others whose names I have forgotten. My Canadian friend and myself had started with very light rations and we soon experienced the first pangs of hunger. Sitting down to rest under the shade of a large tree one afternoon, and as we thought in perfect safety, a battery of artillery out in front of us unlimbered and got ready for action. Scarcely had this been done when the Confederates opened up and that battery was working mighty lively. After that as my Canadian friend and myself were very green at artillery work we did not volunteer to give our batteries any help. Our branch of service at this time was the cavalry and we mounted horses and got out of danger as soon as possible. This was the opening of one of the heaviest fights during the retreat. I never met my Canadian friend after this. I saw a letter from General Eckert some days after to Caldwell that was very laughable. Caldwell had reported the Canadian and one of our Pennsylvania operators as missing—taken prisoner or killed. The general received later information from the absent ones which he put in the shape of a horse race, describing their positions in the race home; at Harrison Landing, the Canadian leading by a length, at Fortress Monroe the Pennsylvania man got his second wind and the Canadian was away to the bad. He finally landed both

individuals safely at home in Pennsylvania and Canada. (To be continued.)

Italy Reduces Telegraph Tolls.

The telegraphic service in Italy, like that in other European countries, is owned and controlled by the Government and is under the direct management of the Ministry of Posts and Telegraphs. According to consular reports, the rates in force were established by laws of 1870, modified in 1882. The cost of an ordinary telegram sent to any part of the kingdom is 1 lira (\$0.193) for a minimum of 15 words, including the address and signature, with a charge of 5 centesimi (\$0.01) for each additional word. These rates have been for many years considerably higher than those in other European countries, especially for brief telegrams of less than 15 words, and for a long time the commercial interests and the press have attempted to persuade the Italian Parliament to reduce them. Important obstacles to this action were that the lines, with their limited capacity, could not properly handle the increased business resulting from lower rates, and that diminished receipts were feared.

The ministry has overcome the first obstacle by adding fully 25,000 miles of wire during the past three years, with thirty-nine additional direct communications between the large centers of commerce and industry, and by installing over 1,200 new high-capacity instruments (262 Hughes and Baudot and 1,000 Morse). A careful estimate of the amount of increased business to result, based upon the experience of other European countries, showed that in the next five years from a total of 58,060,000 telegrams, yielding an income under existing rates of about \$14,000,000, the traffic probably will show a total of 86,990,000 telegrams, with an income of over \$16,000,000, a gain for the administration of fully \$2,000,000 in five years. Increased business will, of course, result in some additional expense for employees, but it is argued that the result of reducing the minimum number of words in a telegram from fifteen to ten will be proportionately less work for the personnel, and therefore the increase in expense for operators will be less in proportion than the increased income from additional traffic. These considerations have prevailed upon Parliament to approve a law granting a material reduction in the rates charged. The new law goes into effect on December 1 next.

The rates to be charged are as follows for messages sent anywhere within the Kingdom: Ordinary telegram, minimum 10 words, 60 centesimi (\$0.115), with \$0.01 for each additional word; urgent telegrams (former rate three times that for ordinary message), 1.8 lire (\$0.347), with \$0.03 for each additional word above 10. The rates for ordinary and urgent telegraphic money orders are respectively the same as above. Ordinary telegrams directed to newspapers or press agencies from 9 p. m. to 6 a. m. are charged \$0.115 for 20 words and \$0.01 for each additional two words.

International Association of Municipal Electricians Meets in Convention at Rochester.

The fifteenth annual convention of the International Association of Municipal Electricians was held in Rochester, September 6, 7, 8 and 9. It was undoubtedly the most interesting convention of the series and more points of information of value to the members were brought out than in any previous convention. In fact every business session of the four days was crowded with matters of interest to the members present. All of those in attendance agreed that they would go back to their respective homes much better equipped to carry out the duties of their positions. The visitors also carried away with them a good impression of Rochester, both as a thriving, progressive city and as a first-class host.

The papers presented showed great care and thought in the preparation and gave proof that the members of the association are fulfilling the object which the founders had in mind when it was organized, namely to be of assistance to each other in the solution of difficult problems.

The convention was called to order at eleven a. m., September 6, by President J. B. Yeakle, of Baltimore. The visitors were welcomed to the city by Mr. H. F. Ogden, secretary to Mayor H. H. Edgerton, that official being unable to be present and greet the guests of the city in person. Mr. Ogden, in the course of his remarks, advised all those engaged in municipal electrical work to try and do their best to make good in their positions irrespective of the way they were secured and as far as possible avoid political manoeuvrings. Mr. C. E. Diehl, of Harrisburg, Pa., who responded to the welcome, said that he expected that out of the meeting would come many things which would help the members to make good and would aid not only in the conservation of life and property, but in the safety of both life and property. President Yeakle then read his annual report which was as follows:

"Opening the fifteenth annual meeting of the International Association of Municipal Electricians, I feel that you may congratulate yourselves that we are making progress, and that the ambition to secure recognition of the value and importance of this organization to the communities represented promises a well merited future.

"During the year, from such limited correspondence as was afforded, I have no reason to abate my enthusiasm or confidence that we are moving forward to the time when the city or municipal electrician will be recognized as the source of knowledge on all subjects affecting electrical interests in which his town may be concerned.

"To succeed in this much work is to be done, many problems attacked and solved, many hours of study and experiment are to take the place of time given to the consideration of subjects of less im-

portance than the improvement of ourselves in technical knowledge.

"From the many text books and papers, moderate in price, but covering modern practice most thoroughly, the state of the electrical business of today, both in theory and practice, may be well enough mastered to inspire confidence in the most diffident and secure the esteem of those whose influence you may seek to help in your progress to the more desirable positions.

"In one of these periodicals which has been liberally distributed at our annual meetings, an excellent series of articles by a well informed writer will be found valuable to one anxious to improve his position by adding to his knowledge of the business in which he is engaged.

"I read these papers with interest and so would many of the members of this association if they would profit by the advantages they provide.

"I am anxious to see the municipal electrician recognized as meriting a place in that distinguished class known as engineers. You are equal to the task of securing that distinction and you will not measure up to the line of your capacity if you fail to show progress in this duty.

"Watch developments, not only in the fire alarm and police telegraph offices, or at the inspector's desk, but at every point where electrical work is going on. Secure catalogues and bulletins of the manufacturers of electrical devices, make such experiments from time to time as opportunity affords, do away with some of your unprofitable modesty and begin to exalt yourself in your own opinion, being assured that others will measure you by your own standard of worth.

"From some of my correspondents I am inclined to believe that too many drop their interest in the work of our convention with the close of the last session. The papers and discussions are not valued as containing important information to be considered at leisure hours in the office or at home.

"Some means should be devised to continue inquiry and criticism after the convention adjourns. It could be made interesting and profitable and we could have more papers and more discussions and find the association improving both as an organization and as individuals.

"Your work at Atlantic City has been commented on in the most complimentary manner. I believe the programme arranged for this meeting will still further your interests and those whom you represent."

At the afternoon session papers on "Underground Work" were read by Mr. Yeakle and by Mr. Clarence R. George, of Houston, Texas. In the discussion which followed many interesting facts were brought out. Mr. R. A. Smith, of

Norfolk, Va., told of his experience with a special type of underground cable made of rubber-covered wires with one bare copper wire in the center. It was found that this wire served admirably the purpose for which it was intended, that is if the lead sheathing was punctured at any point so that water could enter the cable a test on this bare wire would immediately reveal the defect while because the other wires were rubber insulated the defect might not appear in them until a long time afterward or until the rubber insulation had been destroyed and great damage done to the cable. Mr. Louis Gascoigne, of Detroit, Mich., told of a cable which he had used in which the same results were obtained by using a few pairs of paper-covered wire in the cable along with the rubber-covered wires. These wires were used for telephone purposes where a breakdown would not be disastrous, while for the police and fire alarm circuits the rubber-covered wires only were used. Messrs. A. C. Farrand, C. E. Diehl and several others also took part in the discussion of this paper.

Mr. T. C. O'Hearn, of Cambridge, Mass., then read a paper on "Hazard to Firemen from Live Electric Wires and Streams from Fire Hose," in which he told of tests which had been made to determine whether it was possible for a fireman to receive a shock by holding a nozzle and directing a stream of water against a live wire. As a result of these experiments and other observations it was concluded that a fireman may receive a shock when playing a stream on live wires. With the voltages found in our cities, however, the shock received in this way would not be sufficient to injure or even inconvenience a man under ordinary conditions. Nevertheless, since some unforeseen and unknown factor might exist at any time it is advisable not to play on live wires if it can be avoided.

Before adjournment President Yeakle appointed as nominating committee Messrs. W. Y. Ellett, Adam Bosch, R. A. Smith, J. L. Pierce and W. H. Thompson. Tuesday evening the fire alarm telegraph system of Rochester was inspected. This is undoubtedly one of the best fire alarm systems in the country, and Mr. H. G. Kennedy, who is the superintendent, may well be proud of the system over which he has charge.

Wednesday morning Mr. F. C. Mason, through whose efforts the association was organized and made a success, was present and gave some interesting reminiscences of the early days of the association. Mr. Mason extended to the association a cordial invitation to hold the convention at his home at Washington Mills, New York, whenever the time might be convenient. Mr. Frank P. Foster, secretary of the association, also told of the early days and paid Mr. Mason a high tribute for the energy which he displayed in his work of organization.

As Mr. H. G. Kennedy, superintendent of fire telegraph of Rochester, found it impossible to prepare his paper on "Mercury Arc and Other

Rectifiers" in time for presentation at the convention it was announced that his paper would be given later to the secretary for publication in the annual minutes. A discussion of this subject by Mr. Walter M. Petty, borough electrician of Rutherford, N. J., was read by the secretary. The paper which Mr. Petty had prepared on the subject of "Lightning Protection" was then read by Mr. A. L. Pierce, of Wallingford, Conn.

This evoked an interesting discussion, the question of grounding fire alarm or police boxes being the point upon which particular emphasis was placed. In order that the association might go on record on this subject in some way Mr. C. E. Diehl introduced the following resolution:

"Resolved that it is the sense of this association that in all fire and police boxes the shell should be grounded and the inside box and mechanism safely insulated from the circuit; and that the shell of telephone receivers on all police patrol telephones should cover the terminal connections to the receiver and the hook should be properly insulated."

This resolution was referred to a committee of five to investigate the subject during the coming year and report at the next annual meeting.

Wednesday afternoon at two o'clock the official photograph of the convention was taken after which special cars conveyed the party to Charlotte and Ontario Beach. After inspecting this resort the return to Rochester was made in time for dinner. In the evening Mr. John W. Kelly, Jr., of Camden, N. J., read a paper on "Wireless Telephone and Telegraph." At the conclusion of his paper Mr. Kelly showed some interesting experiments in wireless telephony and also gave an exhibition of the "Sonorophone," an instrument invented by him for transmitting music over wires to a distance and receiving the same by a telephone receiver attached to a phonograph horn. This was located on the stage and the music could be heard plainly and distinctly throughout the large hall.

Thursday morning a paper on "City and National Code Rules and the Relations of the City and Underwriters Inspectors," was read by Mr. R. A. Smith, of Norfolk, Va. Mr. Joseph B. Smith, of Rochester, was unable to prepare his paper on "Modern Police Signal System" in time for presentation at the convention, but this subject was discussed at some length by Mr. John W. Kelly, Jr., of Camden, N. J., and others. A short afternoon session was held, at which officers were elected and St. Paul, Minn., was selected as the place for the next meeting. The party then boarded special cars for Glen Haven, on Lake Ontario, from which place a boat took them to Newport. After an exciting ball game between the east and the west supper was served, followed by dancing.

Friday morning was devoted to the reading of a paper on "Inductive Loads of Low Power Factor," by A. S. Hatch, of Detroit, Mich., to concluding the business of the convention and to an

inspection of the exhibits. In the afternoon the visitors were taken for an automobile ride around the city and through the principal parks.

The officers for the coming year are as follows: H. C. Bundy, Watertown, N. Y., president; J. S. Craig, Toronto, Can., first vice-president; John W. Kelly, Jr., of Camden, N. J., second vice-president; J. G. Kraetz, of Buffalo, N. Y., third vice-president; John Berry, of Indianapolis, Ind., fourth vice-president; Clarence R. George, of Houston, Tex., secretary; C. E. Diehl, of Harrisburg, Pa., treasurer; executive committee, C. S. McCosker, of Mobile, Ala.; S. W. Manning, of St. Paul, Minn.; J. B. Smith, of Rochester, N. Y.; A. S. Pierce, of Wallingford, Conn.; R. A. Smith, of Norfolk, Va.; W. H. Thompson, of Richmond, Va.; W. Arbuckle, of Bayonne, N. J.; Robert Quain, of St. Louis, Mo.; Louis Gascoigne, of Detroit, Mich.

Finance Committee: J. G. Kennedy, of Rochester, N. Y.; P. H. McManus, of Wilkes-Barre, Pa.; W. H. Flandreau, of Mount Vernon, N. Y.

Committee to Investigate Grounding of Fire Alarm Boxes: T. C. O'Hearn, of Cambridge, Mass.; W. H. Thompson, of Richmond, Va.; P. H. McManus, of Wilkes-Barre, Pa.; James Grant of New Haven, Conn.; A. C. Farrand, of Atlantic City, N. J.

Among those who displayed exhibits at the convention or had representatives present were: Gamewell Fire Alarm Telegraph Company, of New York; Frederick Pearce and Company, of New York; W. N. Matthews and Brother, of St. Louis; Crouse-Hinds Company, of Syracuse; Safety Insulated Wire and Cable Company, of New York; Standard Underground Cable Company of Pittsburg; National India Rubber Company, of Bristol, R. I.; Bishop Gutta-Percha Company, of New York; National Metal Moulding Company, of Pittsburg.

The Gamewell Fire Alarm Telegraph Company distributed a very attractive souvenir of the convention in the shape of a match holder representing a fire alarm telegraph box mounted on an ash receiver of wrought metal.

Among those in attendance were:
Allentown, Pa.—P. J. Beisel.
Atlantic City, N. J.—A. C. Farrand.
Baltimore, Md.—S. R. Boone, J. B. Yeakle and wife and Mrs. J. H. Gildea.
Bayonne, N. J.—W. R. Arbuckle, wife and son.
Bridgeport, Conn.—F. O. Snow.
Bristol, R. I.—P. J. Lyons.
Buffalo, N. Y.—J. G. Kraetz.
Cambridge, Mass.—T. C. O'Hearn.
Camden, N. J.—J. W. Kelly, Jr.
Chicago, Ill.—Frank F. Stover.
Cincinnati, O.—O. P. Crocker.
Cleveland, O.—H. H. Bowen.
Corning, N. Y.—F. P. Foster and wife.
Detroit, Mich.—Louis Gascoigne.
Elmira, N. Y.—W. Y. Ellett.
Erie, Pa.—Wm. Crane and wife.

Harrisburg, Pa.—C. E. Diehl and wife.

Houston, Tex.—C. R. George.

Indianapolis, Ind.—John Berry and wife and O. C. Trusler.

Louisville, Ky.—C. F. Gall and Chester Gall.

Meadville, Pa.—A. J. Balizet and wife.

Montgomery, Ala.—B. A. Blakey and wife.

Mt. Vernon, N. Y.—W. H. Flandreau.

New Brunswick, N. J.—Robert Stewart.

New Haven, Conn.—A. L. W. Kittredge, Miss F. G. Kittredge, James Grant and wife.

Newark, N. J.—Adam Bosch.

New York.—W. J. Bagby, H. E. Dunham,

C. C. Johnson, W. J. Mundell, Frederick Pearce, R. L. Smith and wife, A. L. Tinker, and G. L. Wiley.

New Rochelle, N. Y.—A. J. Bell and wife.

Niagara Falls, N. Y.—F. Curry, M. J. Donahue, and M. McKinney.

Norfolk, Va.—R. A. Smith.

Northampton, Mass.—Nelson F. Tetro.

Peoria, Ill.—W. E. Wolgamott.

Pittsburg, Pa.—C. W. Abbott.

Portsmouth, Va.—W. M. Smith.

Richmond, Va.—W. H. Thompson.

Rochester, N. Y.—Courtney Alcott, H. G. Kennedy and wife, and J. B. Smith.

Scranton, Pa.—W. J. Neave.

St. Louis, Mo.—V. L. Crawford and Robert Quain.

St. Paul, Minn.—T. W. Manning.

Springfield, O.—L. S. Bosley.

Syracuse, N. Y.—E. Shannon.

Toronto, Ont.—J. S. Craig and wife.

Toledo, O.—Mark Winchester and wife.

Wallingford, Conn.—A. L. Pierce.

Watertown, N. Y.—H. C. Bundy.

Wilkes-Barre, Pa.—P. H. McManus.

Winnipeg, Man.—J. S. Henry.

York, Pa.—W. E. Fastnacht.

Underground Work.*

BY CLARENCE R. GEORGE.

City Electrician, Houston, Texas.

The object of this paper is more to continue the investigation of the problem of underground installations than for the purpose of presenting anything original on the subject.

Problems connected with underground service, which formed a part of very interesting proceedings at Atlantic City last year, may be adopted by this convention as a basis upon which the placing of wires below the surface shall receive proper consideration at successive meetings until we arrive at a point of understanding of the many important details connected with the work and develop, from a practical standpoint, a thorough knowledge of the methods, materials, cost, etc., from which the municipal electrician will be able to devise such plans,

* Paper read at the fifteenth annual convention of the International Association of Municipal Electricians, Rochester, N. Y., September 6-9, 1910.

with the necessary estimates, and execute the work from his own department without the necessity of calling upon and entailing on his city the expense of employing outside skill for the purpose of performing the very duty that he should be able to perform himself.

The paper prepared by Mr. Devlin, to which reference is made, shows commendable care and labor on the part of its writer. Many important essentials were gathered and arranged in such manner that the information imparted in this paper was so systematical that the paper may be considered a valuable reference for the members of this association.

It is evident from the number of inquiries that I have had during the past year that our smaller cities are awakening to the fact that the unsightly poles and wires must soon be a thing of the past, and their early removal is looked forward to—not only for the more desired purpose of removing that ever overhead danger to life and property, but for the purpose of clearing and beautifying the streets and public highways.

We all agree, without question, that the pole is a necessity, and at one time the overhead wires were the only method of construction, but the pole line, with its multitude of wires and other fixtures, is no longer a necessity in the business districts of either large or small cities; consequently the time is at hand when the city governments are asking that the unsightly and dangerous poles be removed and all wires be placed under the surface of the streets.

With this in view it is but natural that the municipal electrician comes in for his share of the work, and he should be equipped for whatever part his city government may call upon him to perform, and be able to devise plans, estimates and specifications that will add value to his department and place himself in such position that his work and efforts for the betterment of conditions electrically will show that he is ever ready to perform such duty as may be required by the city through his department, and that he is able to perform these duties.

It is sometimes necessary that the head of the electrical department of a city should place before his city council the existing conditions of the overhead wires and poles, especially as regards their danger to the public, and in so doing he should be able to advise the council with the proper reason and justice to the owners of such poles and wires why they should be removed and placed underground.

These reasons should be explained, I would suggest, in the several ways, such as immunity from storms, greater security in their maintenance, uninterrupted service electrically, the removal of the danger to the public and the elimination of the unsightly poles from the public thoroughfares. Either of the above reasons are in my mind sufficient to cause the removal of poles and wires from overhead to underground.

Now we come to a point where, in our positions as city electricians or superintendents of fire alarm

and police telegraph, it becomes our duty to care for our own wires, etc., as we know that this is a duty that we owe to our city and the public, and it becomes necessary as a part of our duty that we take advantage of the most skillful knowledge in the care and maintenance of the city wires and apparatus.

It is a natural trait of a great many fire alarm superintendents that I have come in contact with during my attendance at these conventions, especially those men whom I have found that are adapted to the positions they are in, to boast of the perfect service they give over their fire-alarm system or police system. However, you will find that these gentlemen are among those that are ever ready to give their system every advantage of improvement and proper maintenance. As an illustration I will quote you part of a conversation with a prominent member of this association regarding his system.

I asked him if he had much trouble with his system, and he replied that he never had any trouble, especially within the last two years.

Again I asked how he maintained the system in such way that he had had no trouble within the last two years.

His reply was that his system, both fire and police is underground, with the exception of a small part of it, and that it was also in cable.

Getting back to the subject of your city wires, it is natural in the management of your department that you should want to see the city that you represent advance, and it is your duty to see to it that all that applies to your department, electrically and mechanically, is placed before the proper authorities for the purpose of advancing with progress and advancements of the city government. If you fail to bring forward the advice and information and show the necessity of these improvements in your department as they are needed, there will come a day that some one in authority will want to know where you were, at a time when you were most needed, or was it that you feel that you were not competent to advise us or furnish the information that we should have had?

No doubt that there are a great many of you here that will be called on in the near future for plans, specifications and estimates for the installation of your fire or police telegraph system, or both, underground, and in that event it is but natural that you should want to provide your city with the most modern system devised to date, and it is the purpose of this association to secure and compile such information that will be beneficial and essential to you relative to underground.

While a general plan may be prepared, the foundation of which would be applicable to most any city, the general details would necessarily require modifications to suit the peculiar conditions arising, according to the city and the topography of the district to be covered.

The topography of the city, or that district to be covered by the underground, is a matter locally, and

the details should be drawn according to the use of the system to be installed, covering present needs and prospective developments.

Much of the information should be secured from time to time, in preparation for future use and to serve as a training period, becoming familiar with the subject by keeping in touch with the various phases of the work.

The manufacturers of cable, conduit, fibre and such other materials as are used in underground work will gladly furnish catalogues and other information pertaining to their products, which cover the ground so fully that a collection of them will furnish a valuable text-book on the subject, the study of which will not only furnish a considerable information of their own product, but will show its connection with other materials forming a part of the system, and the information gained thereby will be practical as well as technical.

From these sources preparation may be made by the superintendent of fire and police telegraph or city electrician, who further strengthens himself by the papers and discussions of the annual meetings and correspondence with the members who have had experience in the work, to the extent that if required to submit information to his officials regarding an underground system, in whole or part, he will be able to handle the matter so that his reputation will be benefitted and his municipality will profit by the application of his knowledge and the interest he has taken in the work.

This is one of the many subjects that this association is endeavoring to promulgate to its members, and the sooner that the work is accomplished the more appreciative will each become of their membership and the value of the association.

Underground Work.*

BY J. B. YEAKLE, BALTIMORE.

This is the most important of the several subjects that will engage your attention at this meeting. Modern construction and the future practice of the municipal engineer will have frequent opportunity for experiment and activity in this direction.

Although it may appear to the superficial observer that it is merely making a hole in the ground for the accommodation of a device that will render the opening permanently beneficial, it—like all other problems, seldom complete in themselves—compels a line of investigation which acquaints us with facts, the knowledge of which bears more or less upon the understanding of other features of our employment.

A proper knowledge of underground construction means some information regarding strength and ductility of armor, insulation and conductivity of conductors, proper means of drawing, splicing of joints, preparation of the metal and fluxes used to make joints water tight and other factors that are immediately concerned in underground work.

*Paper read at the fifteenth annual convention of the International Association of Municipal Electricians, Rochester, N. Y., September 6-9.

The question of strength and flexibility of the cable armor leads to a proper care in selecting material where other work is being considered and is a help in establishing a system that will lead to the best result in every department.

The lead armor common to all underground cable is strengthened by the addition of a small percentage of tin. Its flexibility is not reduced but its tendency to part from excessive strain is lessened.

Lubricating the armor by the application of soap-stone, tallow or common oil, prevents friction by which the protecting lead might suffer.

Cleaning the armor and sleeve, proper temperature of the lead to be used in wiping the joint, the quality of the solder is also important.

Careful handling of the molten solder, heating apparatus (to avoid injury to the men working in or around the manhole) and absolute cleanliness of all material used in making a splice.

All tools used in cable work should be set aside for that particular service and not used indiscriminately for line work, excepting, of course, shovels, digging bars and similar equipment, which belong to the inventory of construction and repairs.

The type and number of manholes is a factor in the lay-out to be determined after the territory has been selected and the accommodations to be provided. Concrete is becoming popular for this purpose and promises to give permanent and reliable service. The frames are easily prepared from inexpensive material and to one familiar with carpenter's tools, the construction will not be a difficult undertaking.

In very low places or where water is liable to settle, provision for drainage is important. Ordinarily, a small ship's pump will be sufficient to clear the manhole when necessary to enter.

Ventilation must not be overlooked. The practice for some time has not included special vents except in extraordinary cases.

The inner cover, at one time considered essential, has, for several reasons, been abandoned. They were found not to be essential. The interference from unauthorized entrance was rarely, if ever, a matter of concern and beginning with neglect to properly fasten them, they have finally been dispensed with.

The top cover is provided with vent holes near the edge where it lays in the supporting rim of the dome and although some dirt falls through, monthly inspection, even on streets of considerable traffic, is sufficient to keep them in good condition.

The person in charge should inform himself of the points most liable to the presence of gas and use the utmost care in entering manholes. In such places an exhaust pump should be in constant use while working in affected manholes, and no one should be allowed to go into them until after they have been open for ten or fifteen minutes and found to be clear of dangerous gases. Use of open lights for testing or working in manholes must be prohibited.

The presentation of a type of manhole is not in-

cluded in this paper. A number of maps of a system that has been referred to in complimentary manner by more than one interested, may be seen and perhaps some information obtained that will be of interest. Reliable maps of the territory involved should be the foundation of an underground system.

Test stations should be established at convenient points and observations made and recorded from the beginning of the drawing of the conductors. The testing device of Mr. Farrand will be found useful in connection with the voltmeter and milliammeter for keeping a close watch on the conductors and a speedy method of locating faults, especially to one who has the advantage of the early records suggested.

Nature of soil and the results of decomposition as it affects the materials of which the armor or conduits are composed should be a feature of the preliminary survey and subsequent information obtained from experience.

Electrolytic conditions are to be studied. Proximity of currents of abnormal strength. Their source and direction. The capacity of the return, whether track or bond wire. Frequent inspection to determine the polarity of the cable armor as compared with that of the leakage from the conductor likely to impair its efficiency.

For conductors, soft drawn copper wire is the standard. The insulation will depend on local conditions. Where only low voltages are to be provided for, the character of the compound and its diameter need not approximate the grade necessary where the cable is liable to interference from high potentials in its vicinity.

For fire alarm work a rubber compound only should be considered.

Paper, varnished cambric and other substances may afford the protection acceptable to some engineers, but only absolute conditions should be the rule for service of such vital importance as that in which we are engaged. A slight fracture of the armor in which rubber insulation is employed will give time for correction of the fault before it becomes obstructive. Paper is liable to cross or ground a loop, if armor is punctured or broken, before the fault can be reached.

This paper was written for the benefit of the cities and towns where underground work is only beginning to create attention and where the superintendent of fire or police telegraph has not had reason to devote any time to the consideration of the subject. But as much concern for the safety of the system during stormy periods and the increasing objections to overhead lines as disfiguring and dangerous spectacles in residential sections is becoming more frequent, it may contain some suggestion for those it is intended to serve which will give them some confidence in their ability to undertake the work which properly is a detail of their employment.

Subscribe for *Telegraph and Telephone Age*, \$2.00 per year.

Telephone Relays.

Editor *Telegraph and Telephone Age*:

There was evidently some misapprehension in the mind of the writer of the paragraph headed "Nothing New Under the Sun," in your issue of August 1, 1910. In the first place the paragraph has run off the rails in its patent references. The numbers and dates are mostly wrong. I took the trouble to look up Mr. Stephen D. Field's patents, and I could not find any resemblance in them to Mr. Brown's telephone relay except the resemblance in the problem to be solved. Mr. Field's patents show that he was hovering round one solution; but as "no practical use was ever made of Mr. Field's invention" (according to the paragraph) I assume that it was not a success. Mr. Brown's solution of the problem on the other hand, judging by the way that the relays are selling, is a very great success. Mr. Field in his patents uses a "thermal wire." There is nothing of the kind in the Brown relay. It is dead cold. One of Mr. Field's patents says expressly that there are "intervals when the circuit is open and other intervals when it is closed, thus varying the resistance within extremely wide limits." This is never the case with the Brown relay. Also the Field arrangement according to the patents, is essentially a vibratory relay, and he claims a "thermic vibrator." There is no vibration in the Brown relay, when properly adjusted, special means being employed to damp out vibration. Also the Brown relay does not use platinum contacts, though the paragraph in question says it does. Platinum contacts are unsuitable and the statement in the paragraph that Mr. Field used platinum contacts shows (if the statement is correct) that Mr. Field was a long way from Mr. Brown's solution. One of the essential features of Mr. Brown's invention is the use of the extremely hard and refractory rare metals osmium and iridium. Soft metals and carbon are practically useless. Mr. Brown's relay is a highly novel and remarkable instrument, and I do not like attempts to rob a very ingenious inventor of the credit that is justly due to him.

DONALD MURRAY.

London, August 22, 1910.

The conveniences of the night letter telegram are appreciated in many unexpected quarters and new uses for this service are being found daily. A southern negro whose wife had evidently been away from home for some time went to the telegraph office and upon stating that he wanted to send a telegram the advantages of the night letter were explained to him. He accordingly expressed himself in the following effective manner: "When iz you gwine ter come home honie. Iz getting lonesom fer yuse, iz ter tell you I aint gwine ter wait much longer. Ben hangin roun dis foam office all der week. I nose yuse got nother nigger and iz coming down there wid my smoke pole to see about dat bisnes."

A History of New York and Pennsylvania Telephone Consolidation.*

BY U. N. BETHELL.

President of the New York Telephone Company.
TERRITORY.

First, I want to say a word about what our system is. As you know, the telephone system which we are all engaged in operating and running covers the two great States of New York and Pennsylvania, and the neighboring States of New Jersey, Maryland, Delaware and a part of West Virginia and Ohio. It has an area of about one hundred and twenty-four thousand square miles. It contains a population of about twenty millions. We have invested in it in plant alone over one hundred and seventy-five million dollars. The number of telephones is about a million two hundred and seventy-five thousand, and the number of employes over thirty-two thousand.

You will perhaps get a better idea of the extent of our system if I tell you that it is about one-third of the entire Bell plant in the United States; that we have over one-fourth of the Bell stations in the United States, a little less than one-third of the Bell employes in the United States and produce more than one-third of the Bell revenue from associated companies in the United States, both gross and net. Broadly speaking, our system is one-third of the whole Bell system of the United States.

Our territory is about equal in size to Great Britain. We have about one-half of the population in our territory that is in Great Britain. We have in our territory more than double the number of telephones in Great Britain. Our development, therefore, is about four to one of Great Britain. Our system is as large as the telephone systems of Great Britain and Germany combined, and about equal to all the telephones in the rest of Europe. In other words, our system is in size about fifty per cent. of all the telephone systems of Europe combined. It is the largest telephone system under one operating management in the whole wide world.

CONSOLIDATION.

If you will permit me, I will tell you a little as to how it came about. Only a few years ago—about four years ago—there were seven Bell companies operating in the State of New York alone. There were four Bell companies operating in the State of Pennsylvania. One of the New York companies referred to, and one Pennsylvania company, were operating in the State of New Jersey. A separate company operated in Delaware and another company in Maryland and the District of Columbia.

Now, it was desired to bring together all these companies into one organization in order that the business might be more efficiently handled and more economically administered, and the commencement

was made here in this territory. Some years ago, when Mr. Cutler, the then head of the New York Telephone Company, was in Florida, I was in the City of Washington one evening, with nothing to do. I wrote to Mr. Cutler, urging the importance of consolidation and concentration, feeling that the future success of this vast territory depended upon bringing its various parts into one strong unit. I happened to find the other day an old map on which, in 1906, I had, with great presumption, perhaps, drawn some broad lines around different areas in the United States. I found, somewhat, to my amusement and much to my gratification, that one broad line was drawn about the system which I, a moment ago, described to you—our system as it is to-day. I was connected with the Chesapeake and Potomac Company then, but not with your company—the old Pennsylvania Company—in a small way with the Bell or Philadelphia, and with the New York, but not with the New York and New Jersey or any of the other companies operating in New York State. We began about two years ago with an attempt to acquire the capital stock of the Chesapeake and Potomac Telephone Company, offering to exchange for that stock shares of the Bell of Pennsylvania—or rather Bell of Philadelphia, as it was then—at two shares of the Bell of Philadelphia, for three shares of the Chesapeake and Potomac. I had previously worked out a similar plan, but was unable to convince others that it should be carried out. With a great deal of trepidation, I presented the plan to Mr. Theodore N. Vail soon after he returned to the active management of the Bell companies. He took the plan and after a few days handed it back to me, saying, "Do you think you can do this?" I said, "Yes, I think so."

His only comment was, "You cannot do it too quickly for me." A little later he said, "What do you think of taking in the Pennsylvania Company?" Well, our covetous eye had not been cast upon this beautiful territory up to that time; we did not know Mr. Crosman and Mr. Kinnard and the rest of you as well as we do now. We had looked upon the territory as rather poor, and felt that it would be a burden on the other companies. We found very soon that you folks up here reciprocated by thinking that the Philadelphia Company might be a burden.

I was asked what I thought of taking in the Pennsylvania Company, share for share. I replied that I knew very little about the territory, that I would find out something about it and answer later. Then I took what to me has ever since been a memorable automobile trip—I had twelve blowouts in three days and was running my own car. I spent about a week running through the territory and, stopping in this beautiful city of Harrisburg, met Mr. Kinnard. I don't think he suspected that I was spying out the land, and therefore was as courteous and gracious as he always is. When I had gone through the whole splendid territory,

*An address delivered before the Western Pennsylvania Telephone Society at Harrisburg.

through its thrifty towns, its cities of wealth, its splendid agricultural and mining regions, I said to myself, "And they have only about five millions invested up here. All this territory needs is development." When I got back to New York there was no hesitation or uncertainty about the answer. The old Bell of Philadelphia by a change of name then became the Bell of Pennsylvania; the old Pennsylvania Company was acquired on the basis of share for share, and the Chesapeake and Potomac as well as the Delaware and Atlantic Company, which was practically owned at the time, came into the sisterhood of our happy family.

This narrative may be very dull, gentlemen, but I am stating plain facts, not attempting a word picture of any sort. These great properties were brought together in such a way that there was no increase in capitalization whatever. The old shares of the Bell of Philadelphia were represented by shares, dollar for dollar, in the Bell of Pennsylvania; old Pennsylvania shares were also represented by Bell of Pennsylvania shares, dollar for dollar. The Chesapeake and Potomac shareholders received two shares of the new issue for three shares of the old.

And thus was brought about the first great step in the building up of our system. Then it was necessary to bring together the companies in New York State. There was the Hudson River, the New York and Pennsylvania, the Empire State, the Central New York, the Bell of Buffalo and the New York and New Jersey, which was operating both in New York State and New Jersey. The Bell of Buffalo let us leave out for a moment. We proceeded first to get the Central New York and the Empire State to come into the family, because they operated in the very heart of the State. These shares were bought for cash at 65 for Central New York, and 40 for Empire. Then came Hudson River and New York and Pennsylvania. Many plans were discussed but no conclusion was reached. Mr. Vail was about to sail for Europe, and I urged him to give me authority to buy the stock of both companies at figures which I thought were fair. He finally said, "You can pay that if you take all or none." I knew that this all or none condition, with a scattered stock list numbering several thousand people, killed the proposition, and I felt quite disheartened. The next day Mr. Vail sailed. As I was coming in on the train to the office the next morning it occurred to me, "Why not trade Bell of Pennsylvania stock for Hudson River and New York and Pennsylvania." Then it also occurred to me that it might seem strange to Mr. Vail that that particular thought should flash into my mind the moment he got on a steamer bound for Europe. However, I thought it over carefully, and concluded that the matter would not wait, and then made the offer. It was, of course, necessary to have the stock to offer, so I went to Philadelphia and bought the stock from the Bell of Pennsylvania, paying one hundred dollars cash for each share of

it, and then offered it in trade for the stock of the up-State companies on a basis which was worked out with a great deal of care, taking into consideration the value of the properties, their earning power, their future, and all that sort of thing, and I am pleased to say that over ninety-nine per cent. of the holdings in each one of those companies came in. The basis of the trade was one share of Bell of Pennsylvania for one and one-half shares of Hudson River or two shares of New York and Pennsylvania. Having thus acquired practically all of the stocks of the Hudson River, the New York and Pennsylvania, the Central New York and the Empire State, it required only a rather simple legal proceeding to make the Central New York the owner of all the properties of these four up-State companies. Upon completion of this transaction, we still had four companies in New York State, the Bell of Buffalo, the Central New York, the New York and New Jersey and the New York Company and two in Pennsylvania—the Bell and that splendid company with the euphonious and significant name, the Central District and Printing Telegraph Company.

A plan was then worked out to bring the Bell of Buffalo, the New York and New Jersey and the Central District and Printing Telegraph Company into our growing family. We had our eyes on you, Mr. Buehler—we thought you were a good thing to get. We thought that the property you were so ably managing and the rest of the property could and should be mutually helpful and strengthening.

On the 1st of July last year, I was going to the Adirondacks with my boy. When about ready to start, Mr. Vail called me from Boston, and asked me to come over to explain and discuss the plan. I tried to beg off urging my engagement with the boy, but he said, "Bring the boy, and go from here to the Adirondacks." Mr. Vail has a faculty of telling you not only what to do, but also how you can do it, that is, if you tell him that you have other plans and cannot very well arrange it. The plan was discussed and approved, and then Mr. Vail quietly remarked, "That's two years' work cut out for you." I went up to Buffalo, and spent an entire day discussing the matter with the Board of Directors of the Buffalo Company, and our proposition was so fair that they accepted it, and recommended it to their stockholders. I went from Buffalo to Pittsburg, and Mr. Buehler will remember the strenuous day that followed. Fortunately, all the directors were in town and could be gotten together on short notice. We argued back and forth until the shades of evening fell, and then continued to argue, and the thing was not finally settled until the next morning, but it was settled then upon fair terms, terms that were acceptable to the Pittsburg people and acceptable to us. The terms also proved acceptable to the stockholders: all but a very few shares of the stock came in promptly. Practically all of the Bell of Buffalo shares came in also. The New York and New Jersey was brought

in by an exchange of one share of American Telephone and Telegraph Company for each share of that company's outstanding stock.

ONE HOLDING COMPANY.

Now, I have told you as briefly as possible how this great system was welded into one organization, having an investment to-day, including its working capital, of approximately two hundred million dollars. A feature of the broad plan was to have one operating company own the stocks of the other companies where it was impossible to amalgamate and put the properties under direct ownership because of the legal requirements of the different States in which we operate. To carry out this feature, a mortgage was placed on the property of the New York Telephone Company for seventy-five million dollars. Fifty million dollars of bonds were sold, and with the proceeds, the New York Telephone Company bought the stock of the Bell Telephone Company of Pennsylvania. As the matter stands to-day, the New York Telephone Company with a capital of one hundred and twenty-five million dollars, and a bonded debt of a little more than fifty million dollars, holds among its other assets, that is, besides its own telephone lines, plant and properties, the capital stock (all but a small part of it) of the Bell Telephone Company of Pennsylvania, which company in turn holds the Central District and Printing, the Chesapeake and Potomac, the Diamond State and the Delaware and Atlantic, a glorious grand division in that splendid national organization which proudly floats the banner of the Bell.

To expeditiously and effectively carry out a plan so complex and involving so many widely varying interests, it was necessary to acquire the stock of the New York Telephone Company held by others than the American Telephone and Telegraph Company. The Western Union Company owned about sixteen millions par value of the stock. The stock was encumbered by an issue of bonds which Kuhn, Loeb and Company had placed for the Western Union. The sale of the stock rested entirely with the board of directors of the Western Union, but that company referred the matter to Kuhn, Loeb and Company, of which firm Mr. Jacob Schiff, one of the greatest financiers in the world, and personally a most delightful man, is the head. It fell to my lot to endeavor to buy that stock. I went down one morning and called on Mr. Schiff. About the first thing he said was, "Well, what is in your mind?" I thought but did not say, "It is in my mind to find out what is in your mind first, if such a thing is possible." We had a very pleasant conversation for about an hour, when the matter was left in such shape that I could return later, if need be, after seeing some of the other directors and the President of the Western Union Company. I had come down from the Adirondacks, leaving my family there, and was very anxious to get back. I wished very much, therefore, to close the matter that day if possible. Well, that could not be done,

but next morning we were able practically to close it. The deal involved about twenty-three millions and it was closed satisfactorily to both of us and without the scratch of a pen. He said "We understand one another?" I said, "I think we do." Mr. Schiff then called his son Mortimer—Mr. Schiff, by the way, was sailing for Europe the next day—and turning to me inquired, "Will you need any money to carry out your plans?" I said, "I think not, Mr. Schiff, but possibly so." He turned to his son and said, "Mort, if Mr. Bethell wants any money while I am gone, you may let him have whatever he wants." Upon the opening of that door I felt about as near great wealth as I ever felt in my life. But when I reached the sidewalk, I felt as Hamilton did the other day when he went over in his biplane from New York to take his afternoon nap in Philadelphia. When Hamilton came to earth his first words were, "I am dying for a cigarette." I crossed the street, entered a cigar shop, went into my pocket, and found three cents.

REDUCTION IN OUTSTANDING.

I do not expect you to carry all these details in your mind, and I may not have told all that is necessary to make a complete story. I dare say there are a number of things which I have forgotten to mention, but what I have wanted to convey to you is this fact, that there has been the building up of a great financial organization with a capitalization of some one hundred and seventy-five or one hundred and eighty-five millions, a real investment you may say, of about two hundred millions of dollars, and in the process the capitalization, as represented by its capital stock and its bonds and its notes, was actually reduced, so that at the end of the transaction there were less securities outstanding as a burden upon the industry, and ultimately as a burden upon the public, than there were at the beginning of the transaction by more than seven millions of dollars. I am tempted to say that this is a unique feat in the building up of great corporations.

(To be continued.)

The delivery of telegrams by telephone which has been tried by the British Post Office in some sections of London for several months past has given very satisfactory results and this service is being gradually extended.

An exhibition was given to invited spectators at the Edison laboratories in West Orange, N. J., recently of the Edison kinetophone, a combination of the effects of the phonograph and kinetoscope, to which problem Mr. Edison has given attention for some years. A moving picture man appeared on the screen, who after announcing the subject of the demonstration performed a number of experiments. A plate was thrown on the floor and the sound when it was dashed into fragments coincided with the impact. Other similarly successful experiments were made.

The Chicago Reunion of the Old Time Telegraphers' and Historical Association and of the Society of the United States Military Telegraph Corps.

The twenty-ninth annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps will go down in history as one of the best in attendance and from the standpoint of interest in entertainment of any in the long series of these annual functions. Mr. William J. Lloyd of Chicago, the president of the Old Timers, together with his many able assistants was indefatigable in his efforts to make everyone comfortable and happy, and that he was eminently successful was attested to by everyone who was fortunate enough to be present.



COL. WM. B. WILSON, HOLMESBURG, PHILADELPHIA.
President of the Society of the United States Military Telegraph Corps and President Elect of the Old Time Telegraphers' and Historical Association.

The visiting ladies were especially well taken care of under the able guidance of Mrs. William J. Lloyd, together with her committee associates.

The weather was clear and cool throughout the reunion which added greatly to the pleasure of the various functions. The program of entertainment was so extensive that every moment of the visitors' time that could be spared from necessary sleep was occupied with visits to the many points of interest including art institutes, observatories, ball games, theatre parties, dinners and suppers, automobile rides, excursions to Highland Park and the great stock yards and terminating with a banquet at which three hundred members and friends participated. Every section of the country, including Canada, was well represented.

BUSINESS MEETING.

Promptly at ten o'clock on the morning of September 8 the retiring president, Mr. George A. Cellar, of Pittsburg called the meeting to order in the parlors of the Auditorium Hotel and with a few appropriate remarks pinned the insignia of his office, a gold mounted miniature portrait of Professor Morse, on the breast of Mr. William J. Lloyd

the president-elect of the association. After thanking those present for the honor conferred on him President Lloyd introduced Mr. George M. Bagley, assistant corporation counsel of the City of Chicago, who on behalf of the municipality, cordially welcomed the delegates to the city. The response to the welcome was made by Mr. M. J. O'Leary of New York who took occasion to refer to the commanding position occupied by the City of Chicago; its rapid and ever increasing development as the inland capital of what is now a mighty empire and the influence it exerts on the commerce of the world and that in honoring the Societies of the Old Time Telegraphers' and Historical Association and the United States Military Telegraph Corps the city honored itself as many names famous in the world's history have been and are now on the roll of membership of both associations. Colonel William Bender Wilson, president of the Society of the United States Military Telegraph Corps, then assumed the chair to conduct the business meeting of that Society. He began the proceedings by reading his annual report, which recited the progress



W. A. SAWYER, PHILADELPHIA.
Vice-President-Elect of Old Time Telegraphers' and Historical Association.

made in congressional legislation in behalf of the members since last year's reunion. He deplored the fact that so many of the members were passing away, twenty having died since the reunion last year at Pittsburg. He called on all the members to redouble their efforts with their congressional representatives in behalf of favorable action on the measures now pending before both houses at Washington.

Mr. Marion H. Kerner of New York in the absence of the secretary and treasurer, David Homer Bates, read various communications and reports, all of which received favorable action. The roll call showed that thirty-eight of the war veterans were present, the largest number in attendance for many years. Resolutions of thanks to the various congressmen and senators for their earnest interest in promoting the pension legislation in behalf of the military telegraphers; also resolutions of thanks to President Lloyd and his associates for their splendid program of entertainment were passed.



C. E. BAGLEY, PHILADELPHIA,
Vice-President-Elect of Old Time Telegraphers' and Historical Association.

Mr. Andrew Carnegie was also the recipient of a resolution of thanks for favors received by the society. All of the old officers were re-elected as follows: Colonel William Bender Wilson, Holmesburg, Philadelphia, president; William L. Ives, New York, and Charles A. Tinker, Brooklyn vice-presidents; David Homer Bates, 658 Broadway, New York, secretary and treasurer. The executive committee of the society was reappointed by President Wilson.

Mr. T. E. Moreland, of Pittsburg, called the attention of the Society to the fact that the names of the Civil War telegraphers from Allegheny County, Pa. were duly inscribed in bronze on a tablet which occupied a prominent place in the new memorial hall located at Pittsburg.

Mr. William J. Lloyd, president of the Old Timers, then resumed the chair and called on the Secretary and Treasurer, Mr. F. J. Scherrer of New York to read the various reports, all of which were duly received and ordered printed in the minutes. Treasurer Scherrer's report showed an increased balance on hand over the previous year and the affairs of the association to be in a most gratifying condition.

Mr. E. P. Griffith of New York read a resolution to establish a monument at Turner, N. Y., to commemorate the sending of the first telegraphic

train order. This resolution was passed by the Association of Railway Telegraph Superintendents at their annual meeting in Los Angeles in June and was printed on page 448 of our July 1 issue together with some interesting historical facts relating to the sending of the first train order.

Mr. M. J. O'Leary in moving the adoption of this resolution moved that the names of the president and secretary be added to the list of members of the committee having the erection of the monument in charge and that the sum of at least ten dollars be appropriated as the contribution of the Old Timers' Association to this historical and worthy object.



FRANK E. MAIZE, PHILADELPHIA,
Vice-President-Elect of Old Time Telegraphers' and Historical Association.

The committee now consists of: E. P. Griffith, superintendent of telegraph, Erie Railroad, Jersey City, N. J. chairman; C. Selden, superintendent of telegraph, Baltimore and Ohio Railroad, Baltimore, Md.; E. A. Chenery, superintendent of telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railroad, Montreal, Canada; J. B. Taltavall, editor Telegraph and Telephone Age, New York; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia, Pa., and F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York.

The resolution was as follows:

Whereas, the fact has been established that railroad operation by telegraph was conceived by Charles Minot, general superintendent of the Erie Railroad, in the autumn of 1851, and the first telegraphic train order was issued from Turner, N. Y., station in that year, it is befitting the Association of Railway Telegraph Superintendents, and

the Old Time Telegraphers' and Historical Associations to recognize that great epoch in railroad and telegraph history. And, whereas the story of the passing of the old Turner, N. Y., station on the Erie Railroad is now going the rounds of the press, awakening in the minds of the pioneer railroad and commercial telegraphers, fond recollections of their early days. Therefore,

Be It Resolved, that the Association of Railway Telegraph Superintendents, and the Old Time Telegraphers' and Historical Association, the latter concurring shall appoint a joint committee of five to raise a sufficient fund by popular subscription, to erect, and shall erect, a monument with suitable inscription commemorative of the event, on the site of the original Turner, N. Y., Erie Railroad station.

And Be It Further Resolved, that John B. Taltavall, editor of *Telegraph and Telephone Age*, shall be a member of that joint committee, and is hereby authorized to receive and acknowledge subscriptions through the columns of his journal or otherwise.

The committee on time and place consisting of John B. Taltavall and W. L. Ives of New York, H. W. Plum of Denver and Jos. Uhrig of Chicago, reported in favor of Atlantic City, N. J. as the place for next year's reunion and recommended the following to be the officers for the coming year. Colonel William B. Wilson of Philadelphia, president; William A. Sawyer, Chas. E. Bagley, F. E. Maize, vice-presidents, and Mr. Franklin J. Scherrer of 195 Broadway, New York, secretary and treasurer. The report was unanimously agreed to and the convention after transacting routine business was then declared adjourned.

ENTERTAINMENT.

After the adjournment of the business meeting the visitors were conducted by the various local committees to the Art Institute and through the shopping district until 3 p. m. when the base ball grounds were reached. The delegates then witnessed an exciting base ball game which resulted in the victory of Chicago over Cincinnati. In the evening the entire party which consisted of over two hundred and fifty members and friends attended the Majestic Theatre where a very enjoyable vaudeville entertainment was presented at the close of which the party repaired to the Hofbrau where refreshments were served.

On Friday morning, September 9, a special train on the Chicago and Northwestern Railroad conveyed the party to Highland Park, Ills., where they were the guests of Mr. and Mrs. Frederick W. Cushing at their beautiful Moraine Hotel which with its spacious and beautifully laid out grounds is one of the finest hotel properties in the United States. The buildings are situated on a high bluff overlooking Lake Michigan and commanding a magnificent view. After an opportunity was afforded for a minute inspection of the buildings and grounds, a reception was held, the entire party being presented to Mr. and Mrs. Cushing after which a

sumptuous dinner was enjoyed. At the conclusion Mr. D. G. Ramsay of Chicago, a former telegrapher but now a member of the legal profession, in behalf of those present thanked the host and hostess for their generous hospitality.

Mr. Cushing who is also a former telegrapher, many of his old associates being among the delegates feelingly responded stating that it was a great privilege to Mrs. Cushing and himself to in any way contribute to the enjoyment of the visitors. He also recited some old time experiences while employed in telegraphy, stating that one of the delegates to the reunion, Mr. George M. Eitemiller, now of Detroit, Mich., one of the finest operators the country had ever produced, made him do some strenuous work while he manned the New York end of the Philadelphia local in 1876, centennial year, with Mr. Eitemiller, in the Quaker City.

The return to Chicago a distance of twenty-five miles was made in time to attend the Cort Theatre where the musical comedy "Jumping Jupiter" with Richard Carle in the leading role was presented. At the conclusion, the delegates to the number of two hundred and fifty were entertained at supper at Rector's restaurant.

At 9 a. m. on Saturday, September 10, a special train on the Lake Shore and Michigan Southern Railroad conveyed the visitors to the Union Stock Yards where many of the plants of firms engaged in the meat industry were inspected. In the afternoon the party was toured in automobiles for several hours through the magnificent parks, parkways and residential sections of the city, returning to take part in the crowning event of the reunion.

THE BANQUET.

When President Lloyd called on the Rev. Dr. Wm. D. Gentry now a divine of Chicago, a forty-niner of the telegraph who also served his country as an operator in the Civil War, to say grace, three hundred persons were seated at the forty tables arranged in the large banquet hall of the Auditorium Hotel. The floral decorations were of palms and gladioli. The electrical decorations were very extensive and tasteful, the prominent features being the large motto "73" in red, white and blue incandescent lamps at one end of the room which shone forth during the festivities, at the conclusion of which the symbol "30" in red incandescent lamps was displayed at the opposite end of the banquet hall.

After coffee had been served President Lloyd read telegrams of regret from many of the telegraph officials of both companies and others all of whom expressed the hope that the occasion would be one long to be remembered. Mr. Lloyd introduced as toastmaster, Mr. Bernard E. Sunny, of Chicago. The toastmaster who was also an old time telegrapher made most elaborate and appropriate addresses in introducing the various speakers.

Mr. B. J. Mullaney responded to the toast of "Representing the City of Chicago"; Colonel William B. Wilson of Philadelphia on "Heroes of the

War"; Mr. W. R. Plum of Lombard, Ills., on "A Few Thoughts"; Mr. Charles S. Holt of Chicago on "Legal Reminiscences"; Mr. A. H. Bliss of Chicago on "An Experience"; Mr. Frank J. Loesch of Chicago on "What the American Operator Has Accomplished"; Mr. M. J. O'Leary of New York on "Fraternity"; and Mr. J. B. Taltavall of New York on "The Press."

Resolutions were unanimously passed thanking Mr. William J. Lloyd and associates of Chicago, the Chicago and Northwestern Railroad Company, Lake Shore and Michigan Southern Railroad Company and Mr. and Mrs. Frederick W. Cushing of Highland Park for courtesies extended. During the dinner the party joined in singing the "Ode to Morse" written by Marion H. Kerner of New York, and also "The Signal of the Key" composed for the occasion by Mr. A. S. Hibbard of Chicago and arranged to the air of "Tramp, tramp, tramp, the boys are marching." At the conclusion of the singing of "Auld Lang Syne" the Chicago reunion of 1910 passed into history.

Among those in attendance were:

Buffalo, N. Y.—L. M. More and wife; N. Hucker.

Butte, Mont.—Mrs. W. H. Plum.

Chenoa, Ill.—A. H. Copeland.

Chicago.—Melvin J. Adams; D. S. Anderson and wife; C. M. Baker; R. C. Baker; W. A. Baker and wife; Miss Theda Baker; Henry Behl and wife; Miss Ada M. Behl; Miss Elizabeth Behl; W. E. Bell; A. W. Biedler and wife; Thor J. Benson; A. H. Bliss; Mrs. B. M. Bracken; A. D. Brewer and wife; C. E. Brown; E. A. Bryson and wife; John F. Butler; A. B. Carroll and wife; David A. Carroll; T. W. Carroll; John L. Corey; M. H. Clapp; M. T. Cook; T. P. Cook; A. B. Cowan and wife; Miss Anna Belle M. Cowan; Miss Mary Cowan; J. A. Cummins and wife; Alexander Crow; G. W. Dailey and wife; John R. Dixon; P. W. Drew and wife; A. C. Duffey and wife; Miss Grace Dugan; C. H. Finley and wife; C. Gallagher and wife; Geo. McGann; Rev. Dr. W. D. Gentry and wife; C. F. Gross and wife; Morgan G. Gross; H. B. Hamilton; F. W. Hans and wife; W. P. S. Hawk; J. S. Henderson; Mrs. M. K. Holligan; Charles S. Holt; John Hutchinson and wife; F. L. Jacobs and wife; J. G. Jennings, wife and daughter; C. H. Kehnroth and wife; M. T. Kenyon and wife; E. J. Knecht and wife; G. A. Kiel; Richard Ledwith; W. J. Lloyd and wife; Miss Bessie M. Lloyd; T. DeQuette Lloyd; Frank J. Loesch; C. S. Lowenthal and wife; Chas. M. McCann and wife; M. McCulloch; W. F. McDonald and wife; H. G. McGill and wife; A. J. McGrath and wife; A. R. McGrath; E. W. McKenna; J. R. Magill and wife; C. D. Meserve; F. V. Moffitt and wife; J. F. Morgan and wife; C. Moxam; Bernard J. Mullaney; A. C. Murphy and wife; W. H. Murphy; Miss E. M. Murphy; Frank Murphy; J. H. Pendry, wife and daughters; Leo Peters and wife; C. W. Potter

and wife; W. T. Plummer and wife; T. N. Powers; H. T. Price; D. G. Ramsay; Miss Estella W. Ramsay; Fred M. Randolph and wife; C. W. Ray; Wm. Record; H. T. Reneau; J. E. Schank and wife; G. D. Seward and wife; Mrs. Ora Sharp; Chas. A. Shedd; E. G. Sheckler and wife; C. H. Shell and wife; A. F. Sherwood and wife; George Smallbone and wife; E. M. Stanton and wife; Henry D. Sturtevant; B. E. Sunny and wife; Miss Helen T. Sunny; Joseph Uhrig and wife; H. G. Waters and wife; J. J. Welch and wife; F. T. Wilbur and wife; E. S. Williams, and Joseph K. Witzell.

Cincinnati, O.—R. C. Bliss and wife.

Cleveland, O.—Fred J. Dayman; John Fitzpatrick and wife; J. T. Hanford; Oscar F. Stow and H. W. West.

Columbus, O.—Otis H. Newell and H. E. Rawson.

Crater, Colo.—H. W. Plum.

Dallas, Tex.—Frank B. Knight and J. E. Rockwell.

Denver, Colo.—J. W. Brunton.

Des Moines, Ia.—Thad M. Schnell.

Detroit, Mich.—G. M. Eitemiller; Alfred Lowther; J. McArdle; Thos. A. Mears and J. Moxam.

Dowagiac, Mich.—E. M. Showerman and wife.

Dubuque, Ia.—James Leary and wife.

Geneva, Ills.—Harry D. Sloat.

Harvey, Ills.—F. M. Crittenton and wife.

Highland Park, Ills.—F. W. Cushing and wife;

Hyde Park, Ill.—F. G. Brown.

Indianapolis, Ind.—J. R. Klippelt; C. S. Rhoads; J. F. Wallick and A. A. Zion.

Jersey City, N. J.—J. B. Bertholf.

Kansas City, Mo.—G. W. Brownson and wife.

Keokuk, Ia.—W. H. Dolbear and wife.

Knoxville, Ia.—Cambridge Culbertson.

Lockport, Ills.—S. C. Mason.

Lombard, Ills.—Wm. R. Plum and wife.

Louisville, Ky.—Miss Henrietta L. Dugan; P. G. Kern and wife.

Memphis, Tenn.—B. Weeks.

Milwaukee, Wis.—Charles Dean, U. J. Fry, and W. C. Williver.

Montreal, Que.—W. J. Camp and wife.

Muskogee, Okla.—J. R. Brown.

Nashville, Tenn.—A. H. Stewart.

New York.—Lewis Dresdner and wife; Clendenin Eckert; Whitney Eckert; E. P. Griffith; C. M. Holmes; Wm. L. Ives; M. H. Kerner; T. M. King; F. E. McKiernan and sister; J. McRobie, wife and daughter; R. J. Murphy and wife; D. F. Mallen; Miss M. T. Mallen; M. J. O'Leary; F. J. Scherrer and wife; Miss Edith Scherrer and J. B. Taltavall.

New Orleans, La.—E. J. Knecht and wife.

Oak Park, Ills.—Miss Hazel A. Hauter; A. N. Hauter; Miss Alice Pettit, and Harry I. Promer.

Ogden, Utah.—J. Hutchison and wife.

Omaha, Neb.—L. H. Korty.

Oskaloosa, Ia.—F. B. McCagg and wife.

Petoskey, Mich.—Mrs. Edward Olcott Chase and S. L. Robinson.

Peoria, Ills.—J. B. Hammatt.

Philadelphia, Pa.—J. W. Crouse and Col. Wm. Bender Wilson.

Pittsburg, Pa.—George A. Cellar; Miss Jane L. Collins; D. Kelly; Mrs. G. H. Kendrick; Miss Bessie G. Kendrick; Theodore E. Moreland; Miss Virginia E. Moreland; S. C. Moran; John B. Stewart and wife; Charles R. Stough; J. W. Stump and wife; James Allen Wilson; J. W. Yealy, wife and daughter.

Salt Lake City.—D. W. Phelan and wife.

Springfield, Ills.—H. H. Matlock and wife.

St. Louis, Mo.—R. H. Bohle and wife; L. N. Boone; W. R. Chapman; E. A. Chenery and wife; James H. Gallagher and wife, and James P. McClure and wife.

St. Paul, Minn.—W. Weisel and wife.

Swissvale, Pa.—Miss Martha Brown.

Tip Top, Ky.—George M. Dugan.

Titusville, Pa.—D. Colestock.

Toledo, O.—W. G. Brownson and wife, and Miss Grace Shultz.

Topeka, Kans.—W. C. Carswell.

Vincennes, Ind.—J. C. Watts.

Warren, O.—F. J. Jones and wife, and H. R. Jones and wife.

Washington, D. C.—Harry McKeldin and wife.

White Fish Bay, Wis.—T. E. Callahan.

Wilkesburg, Pa.—Miss Carrie E. Good, and W. I. McQuown and wife, and Wm. C. McQuown.

NOTES OF THE CONVENTION.

The long military training of Captain William J. Lloyd formerly identified with the signal service of the State of Illinois and Captain W. E. Bell, formerly of the cavalry arm of the State stood them in good stead during the long and arduous duties which the arrangement of the details of the convention entailed.

Among their efficient lieutenants to whom various duties were assigned were T. W. Carroll, Jos. Uhrig, F. V. Moffit, A. C. Murphy, A. B. Cowan, C. W. Potter, G. Smallbone, J. J. Welch, and many others.

Owing to the regrettable illness of Mrs. W. E. Bell the duties of the Chairman of the Ladies Committee devolved on Mrs. William J. Lloyd who was untiring in her efforts to anticipate every wish of the visiting ladies. Her beautiful home in northern Chicago saw but very little of her during the entire week of the convention and she did not leave the hotel after the banquet until she had exchanged parting greetings with all the visitors. Mrs. Lloyd was very ably assisted in her efforts by Mrs. Moffit, Mrs. Uhrig, Mrs. Cowan, Mrs. Potter, Miss Bessie Lloyd and the other ladies of the committee did yeoman service and many warm expressions of admiration for the painstaking and thorough manner in which they conducted their work were heard on all sides from the visitors.

Colonel Wilson was the recipient of many hearty congratulations on his election to the presidency of both societies and on the selection of Atlantic City, N. J., for the meeting place of the convention in 1911. He has already placed himself unreservedly on record to arrange such plans for the entertainment of the visitors that no part of the Boardwalk will remain unexplored and that extra guards will be provided for the safety of the many daring swimmers like Messrs. Bliss, Bell, Ives, Dugan, Matlock and Plum, all of whom have promised to be present.

Among the youngest old timers in attendance were three forty-niners of the telegraph, namely Rev. Dr. W. D. Gentry of Chicago, Nat Hucker of Buffalo and G. W. Brownson of Toledo.

It is also worthy of note that four generations of Brownsons, three of them identified with the telegraph, were assembled in Chicago during the reunion.

The report of Secretary Scherrer showed that sixty names of telegraph people were added to the list of members during the past year. Among these was Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, as well as many others prominent in railway and telegraph circles.

Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway Company's telegraph appeared at the convention minus the luxuriant moustache which he usually wears. The disguise was so effective that many of his best friends failed to recognize him. He succeeded in making one prominent New Yorker believe he was a Mr. Johnson of Chicago.

Strenuous work and late hours gave many of the visitors unaccustomed to Chicago activity a sleepy appearance in the mornings owing to having to arise early to commence the active work of each day.

Mr. Theodore P. Cook displayed in a striking manner his warm genial nature by mingling freely with the convention delegates, contributing much to the pleasure of the occasion by renewing acquaintances of frontier days and placing his automobile at the disposal of the committee.

The distinguished resident of Tip Top, Ky., Colonel George M. Dugan, was present with an unusually large fund of interesting stories of war days. Many wordy pleasantries passed between him and Colonel William B. Wilson as to the merits of the respective telegraph service of the south and north during the four years of the Civil War.

Mr. L. E. Rudd, manager of the Western Union Telegraph Company at Knoxville, Tenn., in a recent letter states: "You did exactly right in renewing my subscription for the ensuing year and I wish to thank you for your action, so that I will not miss any of the copies of your publication."

American Telegraph Engineering—Notes on History and Practice.

[Discussion by Mr. Ralph W. Pope, Secretary of the American Institute of Electrical Engineers, on the paper on the above subject, which was presented by Messrs. William Maver, Jr., and Donald McNicol at the twenty-seventh annual convention of the American Institute of Electrical Engineers at Jefferson, N. H., June 28-July 1, 1910, and which appeared in our columns July 1 to September 1, inclusive.]

I might indulge in reminiscences on the historical part of this paper, but I will not trespass upon your time to the extent that might be necessary. I note, however, that the early introduction of the Morse system was followed by what purported to be improvements, and that these improvements have practically passed out of existence. I refer more especially to the House and Hughes, and the "combination" printers, which followed, leading off with the House printer in 1847 and 1848. I was familiar with the work of that printing instrument, although I did not operate it. My printing telegraph work was confined to the Hughes printer, which was introduced, as you may say, experimentally in 1858, although it did not come into general service until the "combination" printer, so-called from the combining of certain features of the House and Hughes printers by the late George M. Phelps.

One of the defects of the House printer, which was an ingenious machine, was the limited distance over which it would operate, and I would call the attention of the author of the paper presented to the possibility of an error in regard to this having been operated on lines 1,000 miles in length. While that might be true, in a sense, as a matter of fact, it was not usually operated between New York and Boston, a distance of perhaps 225 miles, except in very fine weather. The ordinary practice was to repeat at Springfield, which was about half way.

One of the difficulties of the early printers in regard to their general adoption was their failure to meet the requirements for way-station work. This was met in the case of the House printer, as is not generally known, by the use of a simplified form of the printer. As the type wheel stopped the exposed letters could be followed by an expert operator without the use of the printing device—a simpler form was introduced which operated as a dial printer, the operator reading from the wheel, instead of the printing mechanism being used to print on the tape.

The question of high speed and the use of the chemical telegraph created considerable interest in telegraph circles at the stage referred to by the author. It is interesting to note that in one of the important experiments made, which is referred to in this paper, that the time consumed in perforating, in transmitting and translating, was more than would have been required by four Morse operators in transmitting the President's message referred to, a difference between seventy-

two minutes as against fifty-two minutes. The use of the chemical system raised so many objections that it is not strange it went out of use, but it was at one time quite successfully established in New England, but not using the perforated tape, simply hand transmission, the same as with the Morse system.

The improvements in the Morse telegraph have been largely due to the increased skill of the operators. The use of the typewriter, which has been referred to, brings to mind a rather peculiar relation between the rapidity of transmission by hand and the rapidity with which the operator could receive the same message with a pen. They kept hand and hand, or rather neck and neck, for years, until the introduction of the typewriter enabled the receiving operator to copy much faster than the sending operator could send by hand, and this has led to the use of a code for press despatches, which standardized abbreviations, but the use of the code is not permissible in ordinary private messages, and for this reason the typewriter is still ahead. When we consider the adoption of the mecograph, as it is called here, by the Morse operator for improving the rapidity of his sending, it appears quite possible that the introduction of the Continental code may be brought about some day, as it would require less time, perhaps to learn to operate by the Continental code used in the wireless system, than it does to learn to operate by these mechanical devices.

The improvements in insulation to my mind have not been so great as the improvements in the conductivity of the line. The early lines, as I recall, used No. 8 iron wire, and then No. 9, and with the introduction of the duplex and the quadruplex, as referred to by the author, wires of greater conductivity were introduced. The form of glass insulator now used has persisted for about thirty or forty years.

The possibility of the utilization of a more rapid system, with the introduction of the night lettergram practice, appears to be quite possible. I have talked with some of the telegraph men about that, but they do not see any probability of it yet. It must, however, take the form, in order to be practicable, of some system of perforation like the Barclay printer which transmits with only one repetition, that is, the perforation producing at the other end a page printed telegraph blank. It is rather remarkable that, although the objections to the form of printing tape were so well known in the early days, there appears to have been no attempt to bring about the introduction of a page printing system. When we consider the ingenuity of those early inventors, House and Hughes, it seems to-day as though, if their attention had been directed to this defect, that they might have invented a page-printer, and thus perhaps prolonging the life of the printing telegraph system, which has practically gone into disuse.

[In reply to Mr. Pope's question as to an error in

the statement that places the distance of transmission of the House telegraph system at 1000 miles Mr. Maver says: "This statement was made on the authority of the officials of the original House company, and may be found on page 112 of 'Electric Telegraph,' Jones, 1852, as follows: 'The longest line we have is about 1,000 miles, extending from New York to Cincinnati. Messages are transmitted that distance with ease.'"]

The Virginian Railway's Telephone Despatching Circuits.

BY K. W. ENDRES.

A telephone despatching circuit extending from Roanoke, Virginia, to Deepwater, West Virginia, has recently been put into operation by the Virginian Railway. The extensions of this system contemplated in the near future will cover the whole of the railroad.

The line construction has been installed in first-class shape throughout and is built of copper, weighing 210 pounds to the mile over a distance of 193 miles, with a branch twenty-four miles in length. Transpositions are installed at half-mile intervals, as is usual on all telephone train despatching circuits.

The dispatcher's office is located at Princeton, West Virginia, ninety-seven miles east from Deepwater. The dispatcher, therefore, has this stretch of line on one side of him and a ninety-six mile stretch east to Roanoke in the other direction, in addition to the branch mentioned.

On the line from Princeton to Deepwater, including the twenty-four mile branch, are fifteen selector stations and eighteen stations equipped with telephone sets. On the eastern end of the line, eleven selector stations are installed and nine stations with the telephones alone.

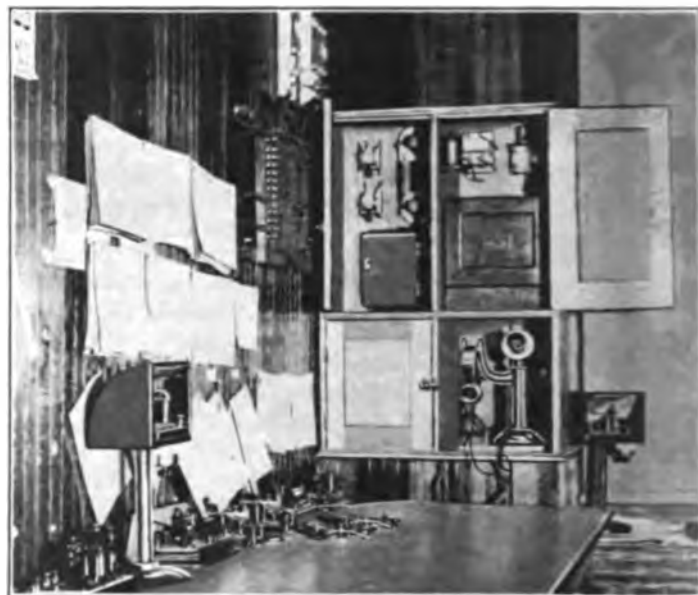
As the Virginian Railway is a comparatively new road, a number of the way stations on the line are not yet built and section tool houses, used as telephone booths, are temporarily taking the place of stations. Conductors and train crews are thus enabled to get in direct communication with the dispatcher at all times, as the telephone stations are only from three to five miles apart, and in a few instances less than this.

It would be difficult to operate this road by means of the telegraph, and it would be forced into a heavy additional expense in the way of operators and stations solely for the purpose of stationing telegraphers at certain points. With the telephone all this is avoided.

Mr. G. N. MacDougald, signal engineer of the road, solved the problem of having many stations which were not open at all times and some of which did not have operators in them at all, by building a special type of cabinet for mounting his apparatus. This cabinet shown in the accompanying illustration is divided into four parts or sections. The upper portion is equipped with glass doors and contains in one section the desk set box, a protector and

two knife switches, the latter to cut off the line east or west. The right hand section contains the selector, a choke coil arrester, and a single knife switch. This switch when opened cuts the telephone apparatus off of the line and leaves the line cut straight through. The two lower compartments contain the batteries and desk stand.

The section which contains the desk stand has no back and is arranged so that it is mounted on the wall of the station, and a hole is then cut through the wall, leaving a locked door on the outside. Thus, when a station agent goes home at night and locks up, any conductor can open this door, reach the telephone set and get into communication with the dispatcher without further trouble. The tele-



Way Station Telephone Equipment, Virginian Railway.

phone set switching key, which is used on all despatching circuits for the purpose of increasing the transmission efficiency of the line, has been mounted in conjunction with the telephone desk stand itself on a felt-covered board, so that when the set is handled by people outside the station everything required is available on it. This also is Mr. MacDougald's idea.

The dispatcher's equipment at Princeton was mounted on a board in the usual fashion and is enclosed in a glass cabinet which keeps out dust from the apparatus. A loop has been run from the dispatcher's wire to the superintendent's and the chief dispatcher's desk. This is for the purpose of supervision and enables either of these officials to listen on the despatching circuit at any time they may desire. The effect of this feature in telephone train despatching equipments has been of marked advantage in improving the character of service given on such lines.

In addition a loop has been run to the private branch exchange switchboard and terminates in a

jack at this board. In this way it is possible for other parties in the offices of the Virginian Railway to have access to the train wire in cases of emergency, but this wire is at all times under absolute control of the dispatcher on duty.

In planning the installation of this equipment, everything was mounted in the cabinets at the work-shops of the company in Norfolk. All apparatus was tested out here previous to installation under exactly the same conditions as would be met with on the line, and when everything was in final shape, it was put into a special car and installed at the various offices along the line in a remarkably short time, and at comparatively small expense. All the line wires leading into the office had, of course, previously been installed. The equipment covers the third and fourth divisions of the

ner in which the work has been done, and the high-grade apparatus which is employed, and has added much to the popularity of the telephone with the men who are handling it.

The maintenance man on the line—as a matter of interest—is perfectly able to hear a watch tick over the distance of 157 miles between Fagg, Virginia, and Page, West Virginia.

Mr. MacDougald was supervisor of signals on the Long Island Railroad for thirteen years. Later he became signal engineer with the Chicago and Alton Railroad, which place he left to take up his present position with the Virginian in 1906. He has charge of the signals and interlocking department and cares for the maintenance of the telephone and telegraph systems as well. Mr. MacDougald has installed all the automatic signals and a number of interlocking plants on the Virginian Railway. He also has charge of all of the electrical equipment on the road, with the exception of power plants, including draw-bridges, and storage batteries for signals and Pullman service.

[We are indebted to the courtesy of the Western Electric Company for the cuts to illustrate this article, the system described having been installed by that company.]



G. N. MACDOUGALD, NORFOLK, VA.
Signal Engineer, Virginian Railway.

Virginian Railway. An order has been placed for some time now for a similar equipment to cover the first and second divisions. This will be installed about September 15, and will complete the equipment of the whole road. These divisions extend from Norfolk to Roanoke and are about 250 miles in length. The same size of copper wire will be employed and along this route there will be thirty-one stations equipped with selectors and twenty-seven with telephones only.

The dispatchers have expressed themselves as being very well pleased with the working of the new telephone system. They had been using the telegraph and a code system telephone. One of them remarked, "It is like taking a vacation." The splendid transmission that is being obtained over the circuit is due undoubtedly to the careful man-

Municipal Electricians.

Mr. Arthur T. Stewart has been appointed superintendent of the bureau of fire alarm and police telegraphs at Los Angeles, Cal. Mr. William Morton has been appointed as his assistant.

A new fire alarm telegraph system has been installed at Penn Yann, N. Y. Plans have been prepared at Winnipeg, Man., for a new fire proof building for the fire alarm telegraph headquarters.

Allentown, Pa., is planning the installation of a new fire alarm system and a committee from that city has been inspecting methods in use in other cities before deciding upon the system to be adopted.

San Antonio, Texas, has appropriated \$11,000 for improvements in the fire alarm system. The contract for this work has been awarded to the Gamewell Fire Alarm Telegraph Company.

Among recent New York visitors were R. A. Smith, city electrician of Norfolk, Va.; W. N. Smith, superintendent of fire and police telegraph, Portsmouth, Va.; C. F. Gall, chief operator, fire department, Louisville, Ky., and his son, Chester Gall, inspector in the commercial news department of the Western Union Telegraph Company in that city.

The thirty-eighth annual convention of the International Association of Fire Engineers, which was held at Syracuse, N. Y., August 23-26, was the most successful and best attended convention ever held by that organization. Milwaukee was chosen as the place of the next annual meeting.



No matter where or how you use

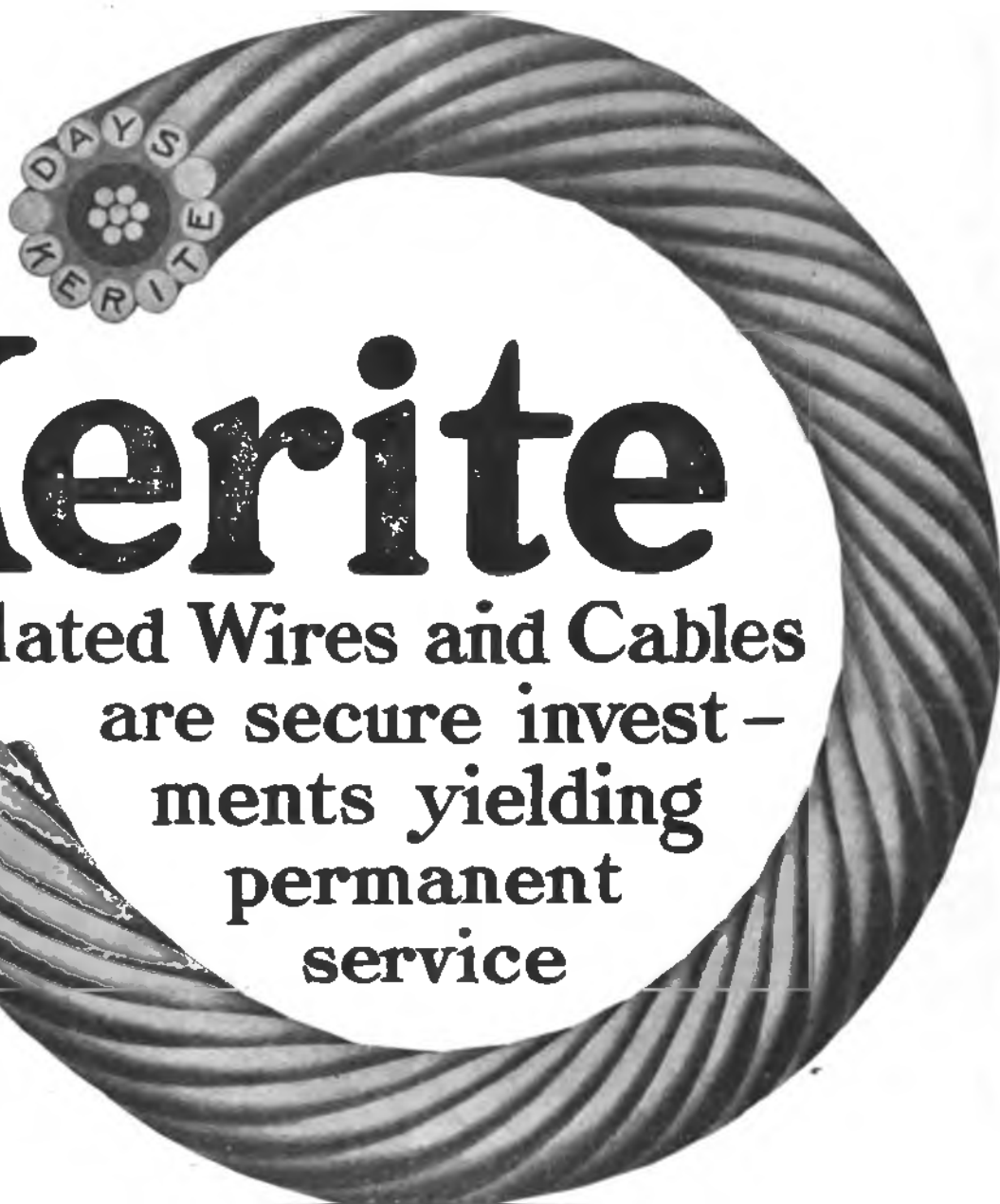
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The Railroad.

Mr. W. C. Walstrum, superintendent of telegraph of the Norfolk and Western Railway, Roanoke, Va., was a recent New York visitor.

Mr. J. S. Stevens, superintendent of telegraph of the Chesapeake and Ohio Railroad Company, Richmond, Va., has had his jurisdiction extended to include the Chesapeake and Ohio of Indiana.

Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad, Los Angeles, accompanied by his family has been enjoying a vacation in northern California and Oregon.

An interesting application of the telephone in freight train operation was tried recently on the Vincennes division of the Vandalia Railroad on a train of 123 cars loaded with coal from the Indiana coal field to Mattoon, Illinois. The train was one and a half miles long and drawn by two locomotives. A telephone wire was run along over the top of the cars from the caboose to the engines and telephones connected. The movement of the train was directed by the conductor giving telephone orders from the caboose to the enginemen.

The Delaware, Lackawanna and Western Railroad now has 271 telephone stations along its lines and over 2,500 miles of wire devoted to telephonic purposes. The first trial of the telephone for despatching purposes on that system was made in 1908 and the change to telephonic despatching was entirely completed by the end of 1909. All of the officials of the road agree that a great saving of time and labor has been effected by the change and also agree with the opinion of Mr. L. B. Foley, superintendent of telegraph, expressed recently that the telephone is no longer an experiment but an established fact with them and has come to stay.

The September meeting of the western division, Association of Railway Telegraph Superintendents, will be called to order in the Chicago and Northwestern Railway general office building, 215 Jackson Boulevard, Chicago, at 10 a. m., Thursday September 22. The minutes of the annual meeting are expected to be distributed before that date and all members are urged to give them due consideration and come prepared to discuss such matters as may be brought up. A chairman and secretary of the division are to be selected for the ensuing year. The question of better interchange of telegraph facilities between connecting lines at Chicago is again suggested as a matter deserving of immediate solution. Arrangements have been made whereby representatives of the Western Union Telegraph Company will be present and will be given an opportunity to discuss with and explain to the Railway Telegraph Superintendents such matters as may be suggested for the benefit of the service generally. Such an opportunity should be productive of much good. It is also expected that the wire crossing agreement will be discussed.

Mr. Joseph H. Schaefer, formerly in the plant department of the Chicago Telephone Company, is now connected with the telegraph department of the New York Central and Hudson River Railroad Company at Syracuse, N. Y.

Mr. W. E. Harkness, well known in railroad and telephone circles and identified with the United States Electric Company, New York, will have conferred on him the third degree in Masonry on Wednesday, September 28, in Hope Lodge, East Orange, N. J. Many of his Masonic electrical friends will be present on this occasion.

Mr. George Alfred Lawrence who has been appointed assistant superintendent of telegraph of the Atchison, Topeka and Santa Fe Railroad with headquarters at Los Angeles as briefly announced in our September 1 issue, was born at Quebec, Canada, March 20, 1875. He entered the telegraph service at Los Angeles, October 4, 1892, as messenger and has steadily advanced in his chosen profession, becoming successively operator, wire chief and manager of the relay office of the Santa Fe at Los Angeles.

Mr. Charles W. Kouns, formerly general manager of the western lines of the Atchison, Topeka and Santa Fe Railroad, who has lately been appointed general manager of the eastern lines to succeed James E. Hurley, deceased, began his railway career in 1871 as a telegraph operator on the Kansas Pacific, now part of the Union Pacific Railroad. He next became train despatcher on that system and later on the International and Great Northern Railroad. His connection with the Santa Fe dates from 1888 when he became superintendent of transportation of that system.

Mr. John Matthews, whose appointment as telegraph manager of the Gulf, Colorado and Santa Fe Railway was briefly mentioned in our September 1 issue, was born at Clarence, Mo., April 27, 1875. He entered the telegraph service in 1891 on the Brookfield division of the Hannibal and St. Joseph Railroad, part of the Burlington system, and served as operator and agent at various places between Kansas City and St. Louis and as clerk to the superintendent of telegraph of that system. He later transferred his services to the Santa Fe and has been in the employ of that company as operator, despatcher, manager and wire chief, being located at Temple, Tex., as wire chief and manager at the time of his present promotion.

Mr. F. E. Patrick for many years identified with the Western Union Telegraph Company at St. Louis, now in the hardware business at Olvey, Arkansas, in renewing his subscription says: "The evolution of the telegraph as set forth in the news items of your journal is certainly interesting reading to one who has been connected with the telegraph for a span of years. Please accept my best wishes for your success."

THE NEW MURRAY MULTIPLEX.

I have pleasure in announcing the completion of the new Murray Multiplex page-printing telegraph. It is a companion system to the Murray Automatic, and the two together form one printing telegraph organization, the first and only thing of the kind in existence. The general principles are the same in both systems, and many of the instruments are the same and interchangeable. The same perforated tape is used for transmission over either system, and the same perforated tape may be reproduced at the receiving station by either system and retransmitted by either system. Both systems used the Baudot, the shortest and best printing telegraph alphabet or code of signals. The Murray Automatic is designed and is best suited for long lines with heavy traffic, for underground cables, and for press messages. It excels all other systems in the speed of transmission over long distances. Unfortunately it is too costly for use on average aerial lines.

The new Murray Multiplex has been designed specially for saving labor on average lines with average traffic. It is much less expensive than the Murray Automatic. It is extremely simple and most of the actions are mechanical. As many as six transmissions are possible simultaneously on one line without the duplex balance, and with the duplex balance 12 transmissions are possible, though not commercial. Four transmissions simplex or eight transmissions duplex on one wire simultaneously are easy and commercial on lines of not too great length. As many as 100 messages an hour have been transmitted by one girl on one of the channels of the Murray Multiplex on one wire. The maximum was 126 messages. Although there are enormous possibilities of shifting traffic on one wire with the new multiplex, the intention is to confine the system for the present to a "double" working duplex, giving four simultaneous transmissions on one wire with immense latitude of adjustment and very simple equipment. By sacrificing some of this latitude it will be possible to work commercially with the "double duplex" on a 1,000-mile line with an ordinary duplex repeater half way. The Murray Multiplex worked double duplex will be able to shift twice as much traffic as the Morse quad with the same amount of labor, and, unlike the quad, it does not suffer from rheumatism during bad weather. It will work through any weather that the Morse polar duplex will work through.

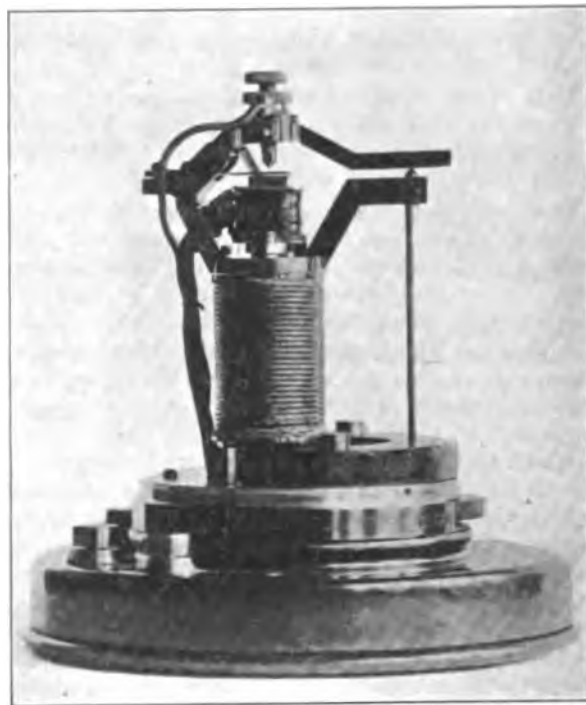
Tape transmission is used with the new system. There is no separate transmitter attendant. There is a tape transmitter for each keyboard and the keyboard operator looks after it. Transmission can be started or stopped instantly by pressing a lever without affecting the appearance of the printed message at the other end of the line. Errors in the transmitting tape can be corrected instantly and invisibly so that there is no trace of the correction in the printed message, not even a blank space. The transmitting tape, after running through the automatic transmitter, is automatically wound up on a spool so that there is no mess of tape on the floor. At the receiving station printing is direct from the line signals at a speed of 40 words a minute for each of the transmissions on one wire, and one attendant can look after two printers up to 150 messages an hour. Page-printing is completely automatic, and the attendant just pulls off the finished messages at his convenience. Also he can read them as they are being printed. If a message is being sent from city A through city B to city C, the sending operator at A can send a signal switching in a receiving perforator at B which will reproduce the sending tape.

If all goes well I hope to be able to exhibit the new Murray Multiplex and possibly also the improved Murray Automatic in New York either towards the end of this year or early in 1911.

Donald Murray

THE BROWN TELEPHONE RELAY.

This remarkable instrument, which is attracting attention in technical circles throughout the world, magnifies exceedingly feeble undulatory or alternating currents, greatly increasing the amplitude without affecting the form of the wave. It will successfully magnify and render clearly audible currents that are silent in a telephone receiver. It practically doubles the distance over which wireless telegraph and telephone signals can be heard. It is full of promise for telephone work not only by reason of its magnifying power but also on account of its clear articulation. In connection with an electrical stethoscope it magnifies to a remarkable degree the sounds of the heart's action. By



suitable tuning it can be made to select and render audible sounds resulting from other bodily actions hitherto not appreciable by the ear. By its aid the human heart has been heard over a telephone line clearly beating more than 100 miles away. It has given excellent results in connection with submarine bell signaling, and a modified form of the instrument has given remarkable help in assisting the deaf.

The Brown telephone relay, which is shown in the adjoining illustration with the cover removed, is closely analogous to an arc lamp. The "arc" in this case, however, is only a millionth of an inch long, and gives out neither heat nor light. The relay is self-adjusting on similar lines to an arc lamp, and in place of carbons it has osmium-iridium contacts. The contacts, when at work, are never open and never closed. They are self-adjusting so as to preserve an air-gap or conduction-space of approximately one millionth of an inch (by actual measurement). Extremely feeble currents vary the length of this extremely minute "arc," if we may so describe it, and in this way greatly vary the resistance and therefore the current flowing through the contacts. The relay is not vibratory and there is no heating effect or spark to cause trouble.

BROWN & MURRAY, LTD.

Mildmay Park Works, London, N., England.

Makers of the inventions of Mr. S. G. Brown and Mr. Donald Murray.

Radio-Telegraphy.

Mr. J. A. Mooth, formerly of Wichita, Kans., is now located at Denver, Colo., with the United Wireless Telegraph Company.

It is reported that three wireless telegraph stations will soon be erected in China, one at Canton, another near Kuong Chow Wau and the third on Protus Island.

The North German Lloyd Steamship Company has ordered wireless equipment for fifteen of their vessels engaged in the Eastern Asia and Australasian trade.

The bill introduced in the British Parliament, making it compulsory for all vessels of a certain class to be equipped with wireless telegraph apparatus, has been withdrawn.

It is reported that the Turkish Government is negotiating with the Marconi Wireless Telegraph Company for the equipment of all of the vessels of the Turkish Navy with wireless.

It is reported that a French inventor has devised a means for receiving wireless messages from sea directly on land lines and thus sending them on to their inland destination without requiring a receiving operator at the shore station.

About one hundred and fifty of the wireless operators employed by the United Wireless Telegraph Company recently presented their superintendent, Mr. H. J. Hughes, of New York, with a chest of fifty-four pieces of silver and twenty-two pieces of cut glass on the occasion of his marriage.

Although the wireless station at Durban, Natal, has been in service but a short time it has already been found to be of assistance to shipping in African waters. A merchant vessel from London suffered an accident while off the coast of Natal, and being equipped with wireless communicated the news of its trouble to a British warship which happened to be in the vicinity. This vessel rendered assistance and then communicated news of the accident to the wireless station at Durban, from whence it was sent by cable to the owners of the ship in London within a few hours after the accident occurred.

There are now twelve wireless stations on the Pacific Coast of Canada and Alaska. Of these twelve stations two owned by the United States Government are at Sitka Island and at Tatoush Island, eight owned by the Canadian Government are at Digby Island, Prince Rupert, the terminus of the Grand Trunk Railway in the Pacific; Ikeda Bay, Queen Charlotte Islands; Triangle Island; Esteven Point, on the west coast of Vancouver Island; Point Lazo, on the east coast of Vancouver Island; Tatchu Point, on the west coast of Vancouver Island, Point Grey and English Bay, Vancouver; and Victoria City; and two owned by the United Wireless Telegraph Company are at Vancouver and at Frida Harbor. The Canadian Government stations are all equipped with Marconi apparatus, the plant of these stations being of two kilowatts capacity and of 200-mile range.

The Telefunken Wireless Telegraph Company is installing for the government of Uruguay five land stations having a range of from 50 to 500 miles, three ship stations having a range of 60 to 250 miles and six portable military stations.

During the recent experiments which were conducted at Sheepshead Bay race track, Brooklyn, in sending wireless messages from an aeroplane Mr. J. A. D. McCurdy, one of the aviators who was a former telegrapher, succeeded in sending a message from his aeroplane while in flight which was received without difficulty at a receiving station placed on the grandstand. This is the first time that such a feat has been accomplished.

The wireless outfit which will be used on the dirigible balloon America, in which an attempt will soon be made by Walter Wellman to cross the Atlantic, will be of the Marconi portable type. Power will be supplied by a storage battery and the amount used in operation will be about 250 volts. The framework of the balloon will be used for the antenna and a steel drag rope trailing in the water will furnish a ground. The apparatus used will have a range of from 50 to 75 miles. In case it is found necessary to launch the life boat which will be carried, a large kite will be used to provide an aerial so that communication may still be maintained with transatlantic steamers.

In a recent paper read before the Physical Society of London, on "The Energy Relations of Certain Detectors Used in Wireless Telegraphy," Dr. W. H. Eccles gives a record of the results of an experimental examination into the physical properties of the electrolytic detector, the zincite rectifier, the carborundum rectifier, and a thermoelectric detector consisting of a light contact between graphite and galena. The conditions of the experiments have been generally identical with those arising in the ordinary employment of the detectors; in particular the quantities of energy given to the instruments, in the form of electrical oscillations, have been of the same order in these experiments as in actual practice. Three ways of investigation are followed. The first way consists in applying to the detector an e.m.f. which is gradually increased, and measuring the current at each step. The second way is to fix the e.m.f. at some particular value, to send trains of oscillations of various energy values through the instrument, and to measure the intensity of the sound produced in the telephone on each occasion. The third way is to send trains of constant energy value through the instrument while the steady electro-motive force applied to it is varied, and to measure at each step the intensity of the sound produced in the telephone. These modes of investigation give curves that may be called respectively the steady current curve, the power curve, and the sensitiveness curve. The chief fact brought to light is that the power curves of all the detectors are straight lines, which suggests that all the detectors are fundamentally thermal in their action.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Mavor and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XVI.

In what two points is the operation of the Postal and Western Union quadruplex systems the same?

Draw a diagram of the transmitter and pole-changer connection of the Postal quadruplex.

What is the path of the current from the large dynamo when the pole-changer and the transmitter are closed?

What is the path of this current when the pole-changer is open?

How does the opening of the pole-changer cut off the negative machines and connect the positive dynamos?

How does the closing of the transmitter cut off the short end machines and substitute the large dynamos?

Draw a diagram of the improved pole-changer arrangement of the Postal and trace the paths of the various currents through this apparatus.

What is the construction of the neutral relay employed by the Postal company?

What is the action of the inductorium used in this relay?

How does this differ from the device invented by Mr. Gerrit Smith?

CHAPTER XVII.

How is the use of a second dynamo for the short end current of the quadruplex avoided in the later apparatus of the Postal?

What is the construction of the pole-changer used with this apparatus?

Why is this system peculiarly adapted for variations in the speed of the sending operator?

Draw a diagram of the connections for this arrangement of dynamos, pole-changer, transmitter and relays.

What does Edison's "bug trap" consist of?

How does the Diehl "bug trap" arrangement differ from Edison's?

What is the action of the Diehl "bug trap"?

What signaling method is generally used to enable branch offices or broker offices working on loops from a main office to make their troubles known to the wire chief at headquarters?

What modification of this method is used for offices in which this is not practicable because they are situated at the end of the line?

What is the method devised by the author of this purpose?

Obituary.

S. B. Lee, a well known press operator of Jackson, Miss., died August 19.

S. W. Tise, aged thirty-five years, manager of the Western Union Telegraph Company, at Winston Salem, N. C., committed suicide on August 26 by shooting himself. The cause of the act was poor health.

Isaac W. Hallam, aged eighty-two years, a member of the United States Military Telegraph Corps and an employe of the Western Union Telegraph Company at Wilmington, Del., for fifty-two years, died August 31 at that place. During the Civil War Mr. Hallam relayed the telegrams between the War Department at Washington and the Army of the Potomac in Virginia.

Harry J. Daly, aged thirty-three years, of the Department of Agriculture, Washington, D. C., a former telegraph operator for the American Telephone and Telegraph Company at New York and Troy, N. Y., and wire chief for the Southern New England Telephone Company at New Haven, Conn. died recently at Trinidad, Colo. He was the son of D. W. Daly, quadruplex chief of the Western Union Telegraph Company at Washington, D. C., who was with him at the time of his death.

Letters From Our Agents.**WASHINGTON, WESTERN UNION.**

Roy Marean, forty-four years of age son of the late Morell Marean, for many years, manager of this office, died suddenly on August 24. He was employed in this office at one time and was a first class electrician.

Mr. A. L. Buchanan, repeater chief at Cincinnati, was a recent visitor at this office, coming to Washington on his wedding trip.

Mr. Wm. Dulin, an old time operator, who lost his position in the Pension office some time ago, has been reinstated.

Miss Stella McDuffie, secretary to Chief Operator Collins, has returned from a visit with friends in New York.

The Electrical Society has been holding only two meetings a month during July and August. The meeting on August 26 was well attended and Professor Mortimer gave a very interesting lecture.

PHILADELPHIA, WESTERN UNION.

Superintendent C. F. Ames and Manager Allan Woodle of the Boston office were recent visitors in this city and complimented the fine appearance of the main office since its renovation.

Mr. W. W. Charles, cashier in this office, has been appointed transfer agent.

Mr. W. E. Vanarsdale, for many years with this company but for some time past engaged in other business, has been appointed chief clerk vice Henry Wobensmith, deceased.

Mr. Frank R. Webb, chief operator, has been absent from duty several days with an attack of hay fever, but is now improving. Mr. R. C. Murray is acting chief in his absence.

Mr. Edward Smith, operator at the "Record" office, has been appointed manager of the branch office in the Land Title Building to succeed Mr. Sheldon Custer, appointed district commercial manager at New Haven.

Business continues unusually heavy, and the force at 936 Chestnut Street has been increased by the addition of Frank Baker, Jr. Mr. Harry Hahl is manager of this office, which is the busiest branch in the city.

Miss Elizabeth Cogley, one of the oldest woman operators in the country, visited in this city last week, and was welcomed by many friends while here. Miss Cogley was in the service of the Pennsylvania Railroad for over fifty-five years but is now on the retired list and is living with her brother at Lewistown, for whom she frequently substitutes allowing him a vacation. She is now seventy-seven years of age.

At the time of the announcement of Mr. J. W. Reed's promotion from the managership of this office to the superintendency at New Haven, Conn., there was not an opportunity to give any testimony of his popularity and kindness to his subordinates while here, but as soon as it became known that he was going to leave, a movement was put on foot to present him with a suitable testimonial. As a result a handsome diamond ring was sent to Mr. Reed and in appreciation of the gift Mr. Reed said in part: "I wish to thank you for the beautiful token and expression of good wishes contained in your letter. I can think of nothing that would have pleased me more than the handsome gift you sent me and it goes without saying that it will ever remind me of the loyal support and the earnest manner in which you assisted me while I was manager of Philadelphia office. I cannot remain unmindful of the fact that without your co-operation I could not have been successful in my undertaking."

NEW YORK, WESTERN UNION.

Mr. Charles S. Pike, assistant city chief, has been advanced to division chief of that department, vice Mr. W. A. McAllister, who has been promoted to be general traffic chief.

R. W. Chapman, head of the bookkeeping department of this company in New York for many years until last fall when he was retired on a pension, died suddenly of heart failure, on August 28, aged sixty-five years. Interment was at Chicago, in which city he was employed by the Western Union from 1862 to 1902.

Leslie T. Miller, aged fifty years, a well known New York telegrapher, where he has been employed for the past thirty years in this office and by brokerage interests, died suddenly, August 30, of heart failure.

Mr. Marion H. Kerner, the well known old time and military telegrapher of the commercial news department, was married on September 14. Mr. Kerner's friends extend hearty congratulations.

Commercial Telegraph Operators in Demand in Canada.

The telegraph companies in Canada are having considerable difficulty in securing an adequate supply of operators. Many operators have gone from this country to Canada during the past few years and found very satisfactory employment, none of them returning to the United States after they had once become settled in their new home. Because of the remarkable commercial development of the past few years, however, the supply has not kept pace with the demand and good operators now have little difficulty in finding employment in the Canadian service at perhaps better wages than obtain in this country when living conditions are taken into consideration.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, pays five per cent. interest on deposits. Although paying this high rate of interest its business is managed in such a safe and conservative manner that it has received special commendation from the New York State Banking Department. The association will assist any telegrapher to acquire a home, being conducted in their interest.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, combines fraternalism with sound business principles; it offers to the telegraph and telephone employe an absolutely safe form of protection, at a cost within the reach of all and lower than can be found elsewhere. Membership only open to employes in commercial or railroad telegraph or telephone service, and it is manifestly to the interest of those who are eligible and wish to secure life insurance within their means, to secure without delay a certificate for \$1,000 or \$500, or both, at rates based on present age.

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Telegraph and Telephone Age

No. 19

NEW YORK, OCTOBER 1, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Study of Telegraph Apparatus.

PART III.

MULTIPLEX RELAY.

The student has been shown the importance of a close observation of the mechanical construction of each piece of apparatus in order to be able to thoroughly understand its operation.

In the case of multiplex relays he is at a disadvantage owing to the fact that in some types, and particularly the standard Western Union patterns, the magnets and coils are concealed within a box-shaped casing.

The accompanying diagram shows the constructions very clearly, and while both types of polarized relays operate on the same fundamental principle they are constructed in a totally different manner. It is for the student to seek the object aimed at in each pattern. By so doing he will learn a few facts which are very instructive.

Of course the average student understands that in the old camel-back or horse-shoe shaped relay the long lever bar which plays between the contact points as shown in Figure C is simply the extension of the other pole of the large steel magnet and is attracted to one contact point because the latter is placed in close proximity to the opposite pole of the magnet. Each end of the large magnet being of opposite polarity the lever must necessarily move

from one side to the other whenever the main line current flowing through the coils of the two spools (not shown) overpowers the horseshoe magnet and changes its polarity. This is the principle of operation, but an alteration in the connection of the movable lever with the large magnet to which it is hinged is required which probably very few have observed. The lever and the magnet are not con-

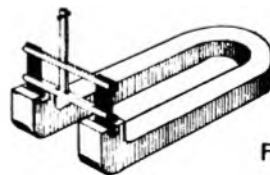


Fig. A

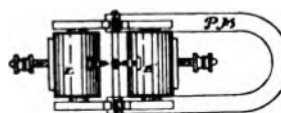


Fig. B

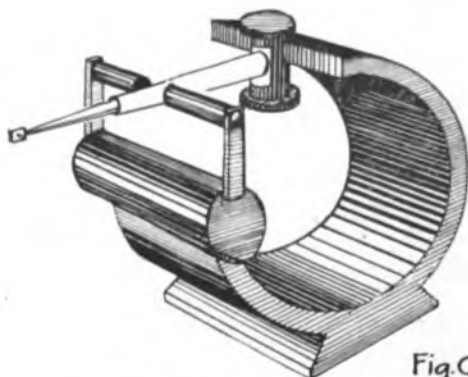


Fig. C

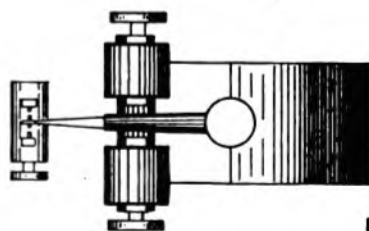


Fig. D

nected magnetically, although they are joined mechanically. In other words the lever is not pivoted on a shaft of iron, but on one made of brass or some other non-magnetic metal, and is therefore practically detached from the horseshoe so far as magnetic continuity is concerned. The lever simply becomes polarized through induction from the horseshoe magnet across the air gap and the space the brass shaft occupies.

The object of thus mounting the lever is to diminish the permanent contact which the horseshoe magnet would otherwise hold over the armature against the action of the line current, and also to render it

more sensitive to the influence of the magnets around which the line coils are wound.

It is doubtful whether the relay would work at all if the armature were connected directly by means of a magnetic substance. At any rate the lever would have a tendency to stick to one side, and would be slow in action. Furthermore under these conditions if by accident the lever should happen to come into contact with the polepiece of one of the spools it would stick there with the tenacity of a keeper for an ordinary steel magnet and would require a greater force than the coils could produce to remove it from the polepiece.

THE FLAT TYPE POLARIZED RELAY.

The student will now realize the fact that magnetic strength alone is really not the most essential feature of a magnet, but that a means for controlling a suitable amount of magnetic force is of more importance.

It has been said by some that the camel-back type described is a stronger relay, magnetically, than the flat design now almost universally used. This is probably true, but a study of the construction of the latter shown in Figures A and B, will demonstrate why a weaker magnet may yet be more efficient in many respects than the former. One of the undesirable features of a strong relay is the possession of a large amount of self-induction. This means slow action in building up to its full strength. In other words it possesses a high time constant.

In the flat pattern nearly every alteration in its construction is made with a view of reducing the time constant, for, as previously stated it is not of so much importance to obtain a strong magnetic force as it is to be able to control it.

In the first place self-induction is reduced four-fold by eliminating the yoke which in the old relay connects the cores of the two spools. Magnetically, of course, the relay is weakened, but owing to the diminished retarding effect secured the magnetic action is greatly increased. Again the omission of the yoke creates shorter cores, hence there is a slight increase in the number of magnetic lines of force flowing owing to a diminished reluctance in the core itself. Magnetism, it should be remembered, like an electric current varies inversely with the length of the conductor. Hence shorter cores give a greater volume and quicker action.

Figure A shows the steel magnet with two iron armatures pivoted to the respective poles. The lever is connected to two non-inductive bars which are riveted to the two armatures. The two iron armatures although metallically connected are thus not joined magnetically.

Figure B shows this shaft and two armatures brought up between the four polepieces of the two spools containing the line coils. As the armatures stand in an upright or vertical position the mechanical inertia is very small, and they readily respond to the actions of the four polepieces the two pairs of which each act in unison.

(To be continued.)

Recent Telegraph and Telephone Patents.

A patent, No. 969,393, for a combined telephone and protective alarm system, has been granted to J. G. Nolen, of Chicago, Ill.

A patent, No. 969,403, for a holder for telephone receivers, has been issued to C. R. Phillips, of Philadelphia, Pa.

A patent, No. 969,498, for a protective means for electrical circuits, has been awarded to C. G. Scott, of Pittsburg, Pa. Means for neutralizing and preventing disturbances due to electromagnetic induction for protecting telephone and telegraph circuits from railway currents. The feeder and the rail return are divided into sections which are connected to conductors for a short distance parallel to the signaling conductor and nearer to it than the distance between the signaling conductor and the feeder conductor.

A patent, No. 969,499, for means for neutralizing induced disturbances in intelligence transmission circuits, has been taken out by C. G. Scott, of Pittsburg, Pa. Two electrical circuits are located within a magnetic field and a transformer with a primary winding is located in one of the circuits and a secondary winding in the other with an ohmic resistance in shunt with the primary winding and an inductive resistance in series therewith.

A patent, No. 969,527, for a printing telegraph, has been secured by A. C. Crehore, of Yonkers, N. Y. The transmitter and receiver are keyboard mechanisms and two line wires are used operating independently with a ground return for each. Each wire selects and operates one of six secondary relays.

A patent, No. 969,774, for an intercommunicating telephone system, has been granted to H. D. Currier, of Chicago, Ill.

A patent, No. 969,818, for a telephone drop, has been issued to A. H. Weiss, of Chicago, Ill.

A patent, No. 969,832, for telephone apparatus, has been taken out by G. Babcock, of Rochester, N. Y.

A patent, No. 970,066, for a telephone transmitter, has been awarded to O. M. Leich and N. Pedersen, of Genoa, Ill.

A patent, No. 970,169, for electrical protective apparatus, has been secured by J. A. Birsfield, of Rochester, N. Y. For telegraph lines to protect from sneak currents by means of a lightning arrester and ground springs and a thermal device or fuse operating between the apparatus spring and the second ground spring.

A patent, No. 970,288, for a telephone repeater, has been granted to C. Adams-Randall, of New York.

A patent, No. 970,449, for a telephone attachment, has been awarded to A. C. Hewitt and W. C. Thomas, of Philadelphia, Pa.

The following patents have expired:

A patent, No. 504,367, for a condenser telegraph system, issued to Charles H. Rudd, of Evanston, Ill.

A patent, No. 504,454, for a telephone transmitter, granted to Nathaniel Parks, of Deansville, N. Y.

A patent, No. 504,464, for a switchboard for telephoning purposes, issued to Upton H. Balsley, of Philadelphia, Pa.

A patent, No. 504,636, for telephone apparatus, issued to Alfred Stromberg and Andrew Carlson, of Chicago, Ill.

A patent, No. 504,732, for a printing telegraph, granted to Samuel R. Linville, of Philadelphia, Pa.

A patent, No. 504,801, for a telephone transmitter, issued to James A. Brown, of Moline, Ill.

Personal.

Mary Frances Baker, aged seventy-nine years, mother of Mr. William H. Baker, vice-president of the American District Telegraph Company, New York, died September 23, at the home of her son, at Bayside, L. I., with whom she had resided for many years. Interment was at Greenwood Cemetery, Brooklyn.

Mr. Arturo Montequin of the Government telegraph service at San Juan, Puerto Rico, who has been in this country for some time past in Washington, D. C., and in New York, has returned to San Juan to take up his duties in the Government service.

Mr. S. S. Garwood, of Philadelphia, for many years a member of the executive committee of the Telegraphers' Mutual Benefit Association, and a prominent ex-telegrapher of the Quaker City, was in New York a few days ago and made his visit the occasion to call on numerous old friends.

Mr. C. M. James, of the Hulit Transmitter Company, Topeka, Kan., has been spending some time in New York recently, and was in attendance at the National Encampment of the Grand Army of the Republic at Atlantic City, September 19 to 23.

Mr. Stanley MacNider, Guatemala, Guatemala, a former telegrapher, having worked at the key in Montreal, New York, and other places, has contributed his extensive library of electrical books to the school of telegraphy established at Guatemala by the government of that country.

Mr. Levi S. Wild, manager of the Western Union Telegraph Office at Butte, Mont., who is an old time telegrapher, was the operator at Corinne, Utah, at the time of the driving of the golden spike when the Union Pacific and The Southern Pacific lines met in 1869, thus forming the first transcontinental railway.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay, president of the Company, accompanied by his wife, returned to New York September 27, after a two months' European trip.

Mr. E. J. Nally, vice president and general manager, and Mr. S. B. Haig, superintendent of traffic, have returned from a trip of inspection to Chicago, St. Louis and other western cities.

Mr. Charles C. Adams, second vice-president of the company, returned from a month's trip to Europe, on September 24 on the steamer St. Louis.

Among recent executive office visitors were Mr. S. M. English, of Dallas, Tex., president and general manager of the Postal Telegraph-Cable Company, of Texas.

Mr. L. Lemon is acting as superintendent for Mr. E. Kimmey, of New York, while the latter is absent on a two weeks' vacation, which will be spent in the rural districts.

Mr. E. B. Pillsbury, general superintendent of the eastern division, was in Pittsburg recently on business connected with the service.

Mr. William Bernard Dunn has recently been appointed assistant secretary of the company. Mr. Dunn, although still a young man, is one of the oldest employes of the company in length of service, having started as a messenger boy at the old 187 Broadway office on June 30, 1889. His intelligence, alertness and diligence even then attracted attention, and he was soon regarded as a "star" messenger, and while still on the messenger force was always assigned to special work of more than usual importance.



WILLIAM B. DUNN,
Assistant Secretary, Postal Telegraph-Cable Company, New York.

In July, 1894, he was assigned to duty in the supply department, and was transferred to clerical work in the executive offices in 1895. In May, 1898, he joined the clerical staff in the office of the Vice-President and General Manager, where he became familiar with the files and the work of preparation of documents and correspondence. In March, 1908, he was appointed chief clerk in Vice-President Bruch's office, and now, has been appointed to the assistant secretaryship, for which office he is unusually well qualified by reason of his training, experience, reliable memory and good judgment.

Mr. H. L. Carpenter, manager of the Asbury Park, N. J., office, has had a strenuous season this year. The aviation meets and the usual general influx of visitors to this popular seaside resort which was greater this year than ever before, caused an unusually large volume of telegraphic and press matter to be filed at that point.

The new line of two copper wires connecting Salt Lake City, Utah, with San Francisco, which has been in course of construction for several months past, will be placed in commission by November 1. This will establish another transcontinental route connecting the Atlantic with the Pacific.

RESIGNATIONS AND APPOINTMENTS.

Mr. Frank E. Healey has been appointed manager of the Nashua, N. H., office, vice Mr. G. L. Lynch, who has been transferred to the Boston office.

Mr. C. A. Francis, manager of the office at 853 Broadway, New York, has been appointed manager at 1397 Broadway, vice J. P. McBurney, deceased.

Mr. J. J. Alcock, manager at 263 West 125th Street, has been appointed to succeed Mr. Francis at 853 Broadway.

Mr. H. J. Reinhardt, manager at the Thoroughfare Building at 58th Street and Eighth Avenue, has been appointed to succeed Mr. Alcock, at 263 West 125th Street.

Mr. F. W. Daly, formerly night operator at 42nd Street and Fifth Avenue, has been appointed to succeed Mr. Reinhardt at 58th Street and Eighth Avenue.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee, and Messrs. E. B. Hall and S. M. Williams, special agents of the company, attended the convention of the contract and commercial men of the Associated Bell Telephone companies at the Windsor Hotel, Montreal, September 20-23. Mr. Williams read a paper on "Supplementary Relations of Telephone and Telegraph."

Mr. B. Brooks, general manager and Mr. E. M. Mulford, division commercial superintendent, addressed a meeting of the special agents and district commercial managers of the first district eastern division, held in New York on September 21. Mr. Brooks' remarks on departmental courtesy, etc., were well received and struck a responsive chord. Mr. Mulford's address was on modern methods of creating and securing new business.

At a meeting of the board of directors held September 14, a quarterly dividend of three-fourths of one per cent. was declared, payable October 15, to stockholders of record September 20.

The annual meeting of the stockholders for the election of directors will be held October 12. The annual election of officers will occur October 19.

On the occasion of the National Conservation Congress at St. Paul, which lasted from September 5 to 10, a large amount of press matter incident to the visits of President Taft and Ex-President Roosevelt, was handled. Manager C. A. Crane had direct wires to the Auditorium and the State Fair Grounds, where speeches were made by both of the distinguished visitors, and the extra traffic was easily taken care of. Mr. Crane prepared for distribution among the newspaper men a folder giving the program of the events of the two days when Taft and Roosevelt were in the city, together with a list of the press representatives who were covering the affair.

Miss Edith M. Scherrer, daughter of Mr. Franklin J. Scherrer, assistant secretary of the company, is a member of the freshman class at Vassar College.

Mr. J. H. Gates, manager of the office at Quincy, Ill., has been appointed assistant superintendent of the American District Telegraph Company, with headquarters at Columbus, O.

Mr. R. W. Whitehead has been appointed division superintendent of the Mountain division of this company, with headquarters at Denver.

Mr. L. B. Thompson has been appointed electrician of the Southern division, with headquarters at Atlanta, vice S. R. Crowder, transferred to the office of the engineer of equipment at New York.

Mr. L. H. Beck has been appointed division plant superintendent of the Southern division of this company, with headquarters at Atlanta.

Mr. A. H. May, superintendent at San Francisco, has been appointed district commercial superintendent of the first district, Pacific division, with headquarters in that city.

Mr. H. J. Jeffs, assistant superintendent at Seattle, has been appointed district traffic superintendent of the first district, Pacific division, with headquarters at San Francisco.

Mr. E. Boening, superintendent at Seattle, has been appointed district commercial superintendent of the second district, Pacific division, with headquarters at that point.

Mr. G. D. Hood, formerly chief clerk in the office of the superintendent of telegraph of the Atchison, Topeka and Santa Fe Railway, Topeka, Kan., has been appointed district traffic superintendent of the second district, Pacific division, with headquarters at Seattle.

Mr. Hugh McPhee, who was recently appointed manager of the San Francisco office, has been advanced to the position of district commercial superintendent of the third district, Pacific division, with headquarters at Los Angeles. Mr. McPhee has had twenty years' experience in the telegraph service, starting as operator for the

Western Union Telegraph Company. After serving in that capacity and as wire chief and manager, he became chief despatcher on the Norfolk and Western Railway, later transferring his services to the Santa Fe at Emporia, Kan., where he was located at the time of his return to the commercial service as manager at San Francisco.

Mr. Ralph H. Miller, manager of the Los Angeles office, has been appointed district traffic superintendent of the third district, Pacific division, with headquarters at that point.

Mr. F. H. Lamb, superintendent at Los Angeles, has been appointed special commercial agent for the company at that place.

Mr. W. P. Davis, chief operator at Dallas, Tex., has been appointed division traffic supervisor of the Gulf division, with headquarters at Dallas.

Mr. Norman Ringer, manager at El Paso, Tex., has been appointed acting superintendent of the first district, Gulf division, with headquarters at Dallas, Tex.

Mr. J. G. Hilbert has been appointed division plant superintendent of the Gulf division, with headquarters at Dallas, Tex.

Mr. O. L. Turner has been appointed chief clerk to General Superintendent L. McKisick, at Dallas, Tex.

Mr. F. H. Gurnoe has been appointed a special agent of the company at Dallas, Tex.

Mr. Robert Edward Griffey, whose appointment as chief operator of the Memphis, Tenn., office was announced in our September 16 issue, was born at Clinton, Ky., November 29, 1867. He entered the telegraph service as clerk and operator on the Illinois Central Railroad at Holly Springs, Miss., in 1886, and was at one time chief clerk to George M. Dugan, when that gentleman was superintendent of telegraph of the Illinois Central. For the past ten years he has been employed in the Memphis office of this company as operator, repeater chief and wire chief, which position he held at the time of his recent promotion.

New and beautiful offices are being arranged for at Atlanta and Memphis. The Atlanta office will be located in the new Constitution Building, which occupies one of the most central locations in the city. The first floor will be given over to the business offices of the company, the second floor to the Division and District headquarters offices, and the top floor to the operating department. Abundant light will be furnished through windows on three sides of the structure. The new office at Memphis will be located in the new Cotton Exchange Building. The receiving office will be on the ground floor on the corner of two of the principal streets, while the operating department will be located on the seventeenth floor. The equipment is being installed in these new offices, under the direction of the staff of Mr. W. E. Athearn, engineer of equipment. That gentleman has recently returned from a trip of inspection

of the two offices and states that they will be in every respect the equal of any offices in the country.

RESIGNATIONS AND APPOINTMENTS.

Mr. G. A. Lawrence, formerly assistant superintendent of telegraph of the Santa Fe system, has been appointed manager of the Los Angeles office of this company, vice Mr. R. H. Miller, appointed district traffic superintendent.

Mr. H. L. Burross, manager at Waco, Tex., has been appointed manager at El Paso, vice Mr. Norman Ringer, appointed acting superintendent at Dallas. Mr. A. S. McCollum, has been appointed manager at Waco to succeed Mr. Burross.

Mr. W. L. Strawbridge has been appointed chief operator at Dallas, Tex., vice Mr. W. P. Davis, promoted to be division traffic supervisor.

Mr. W. Y. Nolley has been appointed manager at Fort Worth, Tex.

Mr. J. J. Flanagan, manager of the Rockland, Me., office, has been advanced to the managership of the Bangor, Me., office, vice Mr. John H. Fahey, transferred to the Boston office. Mr. A. N. Saylor has been appointed manager at Rockland to succeed Mr. Flanagan.

Mr. W. E. Bellman, chief operator of the St. Louis office, has resigned to engage in other business.

Mr. W. D. McDonald, chief operator at Salt Lake City, Utah, has resigned to engage in other business at Hastings, Neb.

Mr. Frank L. Titus, formerly and for many years employed by this company at Chicago, but for several years past connected with the Santa Fe Railway at Los Angeles, has been appointed manager of the office at Reno, Nev.

The following appointments have been made in the commercial department of the first district, eastern division: M. W. Hamblin, special agent at 195 Broadway; P. J. Casey, special agent at 26 West 31st Street. District commercial managers: in New York City, J. Vietch, at 16 Broad Street; M. E. Pierce, at 91 Wall Street; J. J. Riley, at 323 Greenwich Street; J. Simmonds, at 195 Broadway; F. Spree, at 854 Broadway; J. W. McMahon, at 270 West 23rd Street; C. B. McCann, at 26 West 31st Street; J. Carberry, at 1363 Third Avenue; P. Kinman, at 263 Columbus Avenue; for Northern New Jersey, W. H. Spry, at Newark, N. J.; for Long Island, M. J. Hayden, at Brooklyn; for Northern Pennsylvania, G. R. Daniels, at Scranton; for New York State, E. A. Reynolds, at Albany, and A. O'Connor, at Syracuse.

Mr. R. J. Murphy, of the New York operating department, has been assigned to special work in the office of Mr. James F. Nathan, district commercial superintendent.

The following appointments have been made in the traffic department of the first district, eastern division: Mr. T. J. Meade, manager of the Albany, N. Y., office, has been appointed district

traffic manager in charge of the traffic in Northern, Central and Western New York, with headquarters at Syracuse.

Mr. Richard O'Brien, assistant superintendent at Scranton, Pa., has been appointed district traffic manager in charge of the traffic in Northeastern Pennsylvania and Northern New Jersey, with headquarters at Scranton, Pa.

Mr. P. J. Tierney has been appointed district traffic manager in charge of the traffic in the Central cable office at 16 Broad Street, New York.

Mr. B. F. Griffith, of the quadruplex department in the New York main office, has been appointed district traffic manager in charge of the traffic between Canal and Grand Streets, New York, and Sixtieth Street.

Mr. G. F. Smith, inspector, has been appointed district traffic manager in charge of the traffic from Sixtieth Street, north to Newburgh, New York.

The following appointments have been made in the plant department of the first district, eastern division: C. C. Lever, general wire chief and R. H. Morris, electrician at New York; H. F. Whetzel, district plant chief at Buffalo; F. H. Barth, district plant chief at Syracuse; A. G. Pettit, district plant chief at Albany; W. H. Collins, district plant chief at Scranton, Pa.

The Cable.

Mr. George Gray Ward, vice-president and general manager of the Commercial Cable Company, New York, accompanied by his wife, returned September 25 from England, where he has been for the past four months.

Mr. James Gordon Bennett, of Paris, France, proprietor of the New York Herald, and a director of the Commercial Cable Company, was a recent New York visitor. He has now returned to France.

Mr. A. S. Baxendale, manager of the Pacific Cable Board at London, who was in Canada for some time supervising the transfer to the Board of the Vancouver-Montreal wire leased from the Canadian Pacific Railway, reports that a considerable increase in the accuracy of transmission has already resulted from the change. It is stated by the London Electrical Review that the Board pays the Canadian Pacific £11,000 per year as rental, the latter company to maintain the line. The agreement made covers a period of five years.

Canadian Notes.

Mr. W. A. Cow has been appointed night chief operator of the Vancouver office of the Canadian Pacific Railway's Telegraph, vice Mr. A. J. Clarke, promoted to the managership.

The Canadian Board of Railway Commissioners has ordered a general investigation of telegraph rates throughout Canada.

Echoes of the Old Timers' Convention.

There are always items of interest connected with any great undertaking that are overlooked during the hurry and the confusion which always prevails when a large number of people from various parts of the country come together in one place. We present herewith a few such items which have been called especially to our attention in connection with the Chicago reunion of the Old Time and Military Telegraphers and which were brought to our notice too late to appear in our September 16 issue.

Messrs. A. H. Bliss and Joseph Uhrig, of Chicago were the choir leaders, whenever the occasion required music and that was very often.

Mr. D. W. Phelan, of Salt Lake City, was the tallest man at the convention, his measurement being over six feet.

Among those present at the convention whose names were omitted from the list given in our previous issue were W. W. Ashald, of Montreal, and A. G. Hancock of Chicago.

Mr. W. J. Lloyd, of Chicago, the genial president of the old timers, seemed to be everywhere at the same time. Everyone kept his eyes on him and he proved to be a good leader, especially when he led the way from the theatres to the Hofbrau and Rector's.

Some of the New Yorkers journeyed all the way to Chicago to attend the baseball game, and to many of them this was the first ball game they had ever seen, but, as one of the delegates of this number who is seventy-three years old said, it is never too late even to enjoy a game of baseball.

"Senator" W. L. Ives, of New York, was one of the best behaved men in attendance at the convention and amply sustained the dignity of his position as vice-president of the society of the United States Military Telegraph Corps.

Mr. C. M. Holmes, who was for many years executive office messenger at 195 Broadway, New York, did his part in making the convention a success. On one or two occasions when he arose to lead the singing everyone else remained quiet and Mr. Holmes had to sing alone.

The music at the banquet at the Auditorium Hotel was furnished by the distinguished violinist, Signor Antonio Frosolong and his orchestra, and was greatly appreciated by all present.

Colonel George M. Dugan, of Tip Top, Ky., reports his safe arrival home from the convention and states that he considers it the best of the series. Colonel Dugan was one of the founders of the Old Time Telegraphers' Association and a large amount of the credit for its successful formation is due to him. Of those who attended the first reunion at Cincinnati in 1880 there were present at Chicago, besides Colonel Dugan, Nat Hucker, John F. Wallick, E. W. McKenna and W. R. Plum.

The Child Labor Question Applied to the Messenger Service.

One of the reform waves which sweep over the country at intervals is now in progress and at present the attention of the reformers is directed toward improving the conditions of child labor with special reference to the employment of boys under twenty-one in the night messenger service. It is contended that the boys who are engaged in this service are constantly exposed to temptation to do wrong and thrown into contact with and made witnesses of vice of the worst description. As a result it is claimed that a large majority of them lose all desire to engage in honorable pursuits and become moral degenerates. If conditions are as bad as the reformers would lead their hearers to believe, they are engaged in a most worthy cause. There is no more useful service to humanity than the protection of children from injury, mental, moral and physical, incidental to unsuitable labor. The boys of to-day will be the men of to-morrow and the future of our nation depends upon the type of manhood into which they develop. In this instance the reformers seem to have pursued their specialty with such eagerness that they have lost their sense of proportion. In singling out boys employed by telegraph and messenger companies they have neglected to consider that there are hundreds of boys employed by tradesmen coming into contact with the evil side of city life for every boy employed in the telegraph messenger service. Perhaps it is the messenger's conspicuous uniform which causes them to choose him as the object of their reform. Nor do these reformers seem to recognize the impossibility in city life as at present organized of keeping unemployed boys from acquiring knowledge of evils that are deplorable, but which exist and will continue regardless of the age fixed for employment of boys, and the conclusion can scarcely be avoided that the same energy expended in correcting the evils would be productive of more far reaching benefits and would avoid the hardships that will follow to poor families of the boys whom it is proposed shall be refused permission to earn a livelihood and help support in many cases widows and those depending on them. They also overlook the fact that only a small percentage of the business of the telegraph comes from the so-called red light districts of our cities, and hence in the natural order of things, but a small percentage of the whole number of boys employed could be exposed to the evil condition which they point out. There are thousands of boys who have to begin to earn their living at an early age and it would hardly seem just to deprive them all of the opportunity to do this work for which they are well fitted and at which they can make as good wages as in any employment which they might obtain. What would the reformers have these boys do for a living if debarred from this work?

When we consider the subject from a physical

point of view it would be difficult to find an occupation for a boy which is as conducive to a sturdy physical development as is the messenger service. Even the reformers must concede that from this standpoint the work is infinitely better for the boys than the confinement which hundreds of thousands of children suffer who are required to work in mines, factories and the sweat shops of our large cities. From the mental standpoint the messenger boy is constantly thrown in contact with business affairs and with the methods of great leaders of industry and can always be learning new things and storing up facts which may be of great value to him in the future. In no other occupation does a lad have as great an opportunity for broadening his mind. For a boy who is necessarily deprived of the privilege of attending school it would be hard to find an employment in which he would have as good a chance to acquire a liberal education. This fact is amply proved by the great number of men prominent in political and business affairs to-day who began their careers as messengers.

The companies engaged in messenger service are common carriers and as such are required to accept any business offered to them. If, as the reformers contend, the messengers are asked to do things which are in violation of the laws it would seem that the evidence of such misdemeanors should be submitted to the guardians of the law that such conditions might be prevented. It is hard to see how that aspect of the situation would be improved by having men instead of boys to do the work. The companies, however, do not cater to this sort of business, and it is inconceivable that the conditions to which night messenger boys are exposed are as degrading as the reformers would have the general public believe.

As to the contention that this work makes moral degenerates of the boys and unfits them for future useful employment, we only have to turn again to the long list of our most prominent and highly respected citizens who started in life as messengers. Among the graduates of this service we find the great majority of our telegraph officials of to-day, railroad presidents, publishers and editors of many of our leading newspapers, captains of industry, United States Senators, Governors of States, Congressmen and thousands of men prominent in the professional and business world, all of whom are entitled to and receive the respect of their fellow men. It is hard to believe, too, that more messenger boys than idle boys are contaminated by immoral surroundings.

After all has been said in support of the present messenger system, however, if conditions are one-half as bad as the reformers contend there is need for reform. It seems probable, however, that in their efforts to secure evidence the reformers have allowed their zeal to overbalance their good judgment and have accepted as facts the tales told them by some imaginative

youths who, when they found what was wanted, invented from their fertile brains tales sufficiently thrilling to satisfy the most ardent searchers for the sensational.

Radio-Telegraphy.

Sir Charles Euan-Smith, chairman of the board of directors of the Marconi Wireless Telegraph Company, died recently in London.

The Russian Government is conducting extensive tests with various systems of wireless telegraphy with a view of establishing wireless communication across Siberia.

It is announced that the British Government authorities have made arrangements to establish high power wireless stations at Gibraltar, Malta, Aden and Perim Island, and that they are considering the establishing of stations at Cyprus, Alexandria and other Mediterranean points.

Experiments are being conducted by the British Navy with a view of developing a system of wireless telegraphy for communication with submarines. It is stated that messages have been successfully received by the submarine, although as yet no messages have been transmitted from the latter.

The New York Herald has installed an up to date high power wireless station in its ship news office at the Battery, and is thus able to receive direct news from ships at sea. It is claimed that the Herald is the first newspaper to install a wireless station of its own, the apparatus which has been installed in numerous other newspaper offices being owned by the wireless companies.

In a recent paper before the International Society of Electricians at Paris, Mr. A. Tosi gave a description of some of the results accomplished with the Bellini-Tosi system of directive wireless telegraphy at the Boulogne station. Messages have been regularly exchanged at night between Boulogne and Algiers, a distance of over 900 miles, with the use of only one half kilowatt of energy at Boulogne. Experiments made to determine the strength of received signals from a station two miles distant showed that such signals were six times as strong when received on the directive aerial as when received on the ordinary aerial.

The annual report of the directors of the Compania Marconi de Telegrafia sin Hilos del Rio de la Plata, of Buenos Ayres, shows that the income of the company for the past year was \$11,998, and the expenses amounted to \$24,640, making a deficit of \$12,642 for the year, which, together with \$52,526 from the previous year, makes a total deficit of \$65,168. The station at Punta del Este is working regularly, but it has been decided to install new and more powerful apparatus there in order to keep in communication with fast steamers at sea three or four days before arrival at and after departure from Buenos Ayres.

The Telephone.

The Pacific Telephone and Telegraph Company reports gross earnings of \$6,776,662 for the first six months of 1910 and net revenue of \$1,497,653.

The Chicago Telephone Company now has 285,691 stations in service, an increase of 14.9 per cent, during the first eight months of the year.

Mr. H. C. Brownlee has been appointed manager of the office of the Pacific Telephone and Telegraph Company at Oakland, Cal., vice T. E. Delury, who has been appointed district commercial superintendent.

Mr. H. N. Tyler, formerly architect for the Southern Bell Telephone and Telegraph Company, has been appointed to a position on the staff of the chief engineer of the American Telephone and Telegraph Company with headquarters in New York.

The British Post Office has recently placed in service at Willesden in the London metropolitan district a new telephone exchange which differs from all others in that district in that it employs a forty-volt battery instead of the usual twenty-two volt battery.

Professor Alexander Graham Bell, who is at present engaged in a tour of the world, has been recently entertained by the postal, telegraph and telephone service of New South Wales. While there Professor Bell pointed out to the administration that they were trying to run the telephone service at less than the actual cost and that much of the inefficiency of the service was due to the delay of subscribers in answering calls.

Officials of the contract and commercial departments of the Associated Bell telephone companies met in convention in Montreal September 20 to 23. One hundred representatives from all parts of the United States and Canada were present. The proceedings consisted of a series of papers on technical and commercial subjects, each followed by critical discussion of the points raised. Hospitable entertainment was provided by the Bell Telephone Company of Canada for the visitors, which included a smoking concert at the Snow Shoe Club, a luncheon on top of Mount Royal and shooting the Lachine Rapids.

Mr. Henry P. Thomas, division superintendent of traffic of the American Telephone and Telegraph Company, Atlanta, Ga., has been appointed a special agent in the office of General Superintendent of Traffic J. L. R. Van Meter, New York, to have general supervision of field traffic work throughout the country. Mr. G. A. Watson, who was recently transferred from Pittsburg to Atlanta as district traffic chief, has been appointed division superintendent of traffic to succeed Mr. Thomas. Mr. George B. Bayly, district traffic chief at Baltimore, has been transferred to Pittsburg to succeed Mr. Watson, and Mr. E. J. Padmore succeeds Mr. Bayly at Baltimore.

Inauguration of the Morse Statue.

Mr. J. J. Fowler, an old time telegrapher but at present secretary of the Board of Civil Service Commissioners of the City of New Orleans, sends us some very interesting historical documents in the shape of a ticket admitting the bearer to the inaugural ceremonies attendant upon the unveiling of the statue to Professor Samuel F. B. Morse in Central Park, New York, on June 10, 1871, and the reception in the Academy of Music which followed the same in the evening, together with the program which was carried out at the two functions. Mr. Fowler was sent as a delegate to the affair by the telegraphers of West Tennessee.

Governor Hoffman of New York presided over the unveiling ceremonies and made the introductory address. The ceremony of unveiling the monument was performed by Governor Claflin of Massachusetts and Mr. William Orton, president of the Western Union Telegraph Company at that time. William Cullen Bryant then made the inaugural address presenting the statue to the care of the city of New York in behalf of the telegraphers of the country by whose contributions the monument was erected. Mayor A. Oakey Hall, in behalf of the city accepted the trust. After prayer by Rev. Stephen H. Tyng, D. D., the ceremonies were concluded by the singing of the doxology. The inaugural committee consisted of Cyrus W. Field, Wilson G. Hunt, and General Thomas T. Eckert.

William Orton presided over the reception at the Academy of Music which commenced at 7:45 p. m. After the invocation by Rev. Howard Crosby, D. D., Chancellor of the University of New York, President Orton delivered the introductory address. Dr. George B. Loring, of Salem, Mass., then spoke on "The Telegraph, International Intercourse and Commerce." Rev. G. W. Sampson, D. D., president of Columbia College, Washington, the next speaker, took as his subject, "The Telegraph, Literature and Journalism." "The Telegraph as a National Defense," was the theme of an address by General Nathaniel P. Banks.

Direct connections by wire from the stage having been arranged by Mr. George B. Prescott, electrician of the Western Union Telegraph Company, with all of the principal cities of the United States and Canada and with foreign countries, a message was then transmitted by Miss Sadie E. Cornwell, conveying a brief sentiment from Professor Morse at the end of which he personally sent his name. After responses to this message had been received John W. Watson read a poem composed for the occasion.

Rev. H. M. Gallaher then spoke on "The Telegraph, Christianity and Civilization." Mr. G. K. Walcott, a prominent New York telegrapher, spoke for the operators and Mr. James D. Reid, who was chairman of the fund for the erection of the monument, spoke on behalf of the ladies of the telegraph. Miss Antoinette Stirling sang "Auld Lang Syne" and after an introductory address by Hon. Charles

P. Daly, Professor Morse spoke to the assembled thousands telling them of his early struggles and thanking them for the honors bestowed upon him. After the benediction had been pronounced a public reception was held and many of the telegraphers present embraced the opportunity to shake hands with Professor Morse. The committee of arrangements for the reception consisted of General Marshall Lefferts, chairman; John Horn, Jr., W. K. Applebaugh, J. W. Burnham and W. I. Reid. The ushers were: Messrs. W. K. Applebaugh, J. B. Page, J. W. Burnham, Charles Willis, F. H. Marsh, J. B. Oltman, W. C. Chapman, A. H. Watson, W. I. Reid, M. C. Lefferts, E. S. Sanford, Jr., Gerrit Smith.

The vice-presidents of the occasion were as follows: Messrs. A. Oakey Hall, E. D. Morgan, W. D. Dodge, William Kelly, Ezra Cornell, W. H. Kent, Sam Sloan, John A. Griswold, Horace F. Clark, William M. Evarts, Horace Greeley, Fernando Wood, F. O. J. Smith, Governor R. F. Bullock, of Georgia, Governor Jewell, of Connecticut, Major General Joseph Hooker, Major General McDowell, General E. S. Sanford, General Anson Stager, General Jefferson C. Davis, General Marshall Lefferts, General T. T. Eckert, General Charles Roome, Major J. M. Bundy, Cyrus W. Field, W. H. Aspinwall, Geo. W. Sampson, C. H. McCormick, Geo. H. Thurston, G. Granville White, A. A. Low, C. Livingston, C. Rathbone, Hugh Allan, S. B. Chittenden, W. B. Dinsmore, W. B. Ogden, Howard Potter, Hiram Sibley, J. H. Wade, Moses Taylor, Peter Cooper, Geo. B. Prescott, W. Cullen Bryant, Geo. Walker, A. B. Cornell, Wilson G. Hunt, M. O. Roberts, Lewis Roberts, E. H. Vankleeck, O. H. Palmer, Prof. B. S. Hedrick, A. T. Stewart, W. E. Dodge, Jr., James Stokes, A. S. Hewitt, James Lennox, P. C. Cornell, E. Creighton, Samuel J. Tilden, Thomas A. Scott, Andrew Carnegie, Henry Hilton, William H. Vanderbilt, David M. Stone, Chas. A. Dana, Samuel Sinclair, George H. Mumford, Manton Marble, George Jones, James Gordon Bennett, Oswald Ottendorfer, Dr. L. D. Gale, William H. Abel, Dr. C. C. Cox, W. S. Woodward, Frank Leslie, Fletcher Harper, Jr.

The First Woman Operator.

In our July 1 issue we recorded the death of Mrs. Helen M. Mills, who was said to be the first woman regularly employed as a telegraph operator. A brother of Mrs. Mills, Dr. P. S. Plummer, president of the Plummer Drug Company, of Portland, Ore., and himself an old-time telegrapher, in a recent letter gives the following facts concerning his sister and his own telegraph experience:

"My sister, Mrs. Mills, took the office at Greenville, Pa., near the end of the year of 1850, and as I recall she became a good paper operator. I did the delivering and line repairing and began to operate in 1851. Whether she was the first woman operator or not I cannot say. I do recall that

there was a woman operator at Conneaut, Ohio, in 1853. My sister was born July 4, 1831, and at her death was almost seventy-nine years of age.

"The salary at Greenville was \$125 a year. In March, 1852, I succeeded Mr. George T. Williams, at New Castle, Pa., at the munificent compensation of \$26 a month with no Sunday work. For that salary I attended to two instruments and a Grove main battery, which I took down every night and put up fresh every morning and did all the delivering of messages. I paid \$1.62 a week for board, room and washing, doing the marketing for the old lady, who had boarded Williams, and saved money. After spending eight months in New Castle I returned home to Greenville well clothed, had been well fed and took pride in handing my father \$64.

"The next salary I received was in Cleveland, Ohio, at the rate of \$400 a year, but I had to pay \$2.25 a week for board and had learned to be otherwise more extravagant.

"There were two Speed wires between Cleveland and Buffalo, Fred H. Tubbs and myself did the operating. The next spring I went west and my salary was increased to \$500 a year at Rock Island. I studied medicine as opportunity offered, during odd hours, and earned my support and tuition until I graduated in medicine. After coming to the Pacific coast I again entered the service, first at \$125 a month, but thirty-six years ago I resigned the superintendency of what was then known as the Oregon district because I felt that I could not afford to put in my valuable time for the compensation of \$2,000 a year and expenses when traveling or absent from home.

"Among the operators of the earlier times whom I recall G. T. Williams always heads the list as a dear good friend who was very patient with me when I was a green young plug operator, always assisting and encouraging me. Mr. Williams was superintendent of the Western Union at Cincinnati for many years, was superintendent of telegraph of the Nickel Plate Railroad, and is now living in retirement at Cleveland, O. I recall seeing a young man in the service in Pittsburg by the name of Andrew Carnegie, also a lineman in the Wade service, at Cleveland, by the name of Thomas T. Eckert. Fred H. Tubbs, until recently superintendent of the Western Union at Chicago, was a young man in 1853 and a very excellent operator. Marvin Hughitt, of Chicago, now president of the Chicago and Northwestern Railroad, was another good operator in those days.

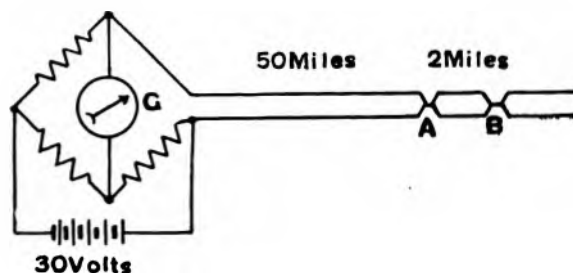
"I transacted business with Robert Clowry, at St. Louis, quite extensively. He was a good operator and always a pleasant man to work with on the wire. I might name several others, very many of those in the earlier times with whom I was intimate, and whose memory I recall very pleasantly, but as they have long since joined the majority perhaps the present generation would not remember them."

A Problem in Telephone Line Testing.

Editor Telegraph and Telephone Age:

I note the communication of Mr. S. R. Beatty in your issue of September 1. Had it been a ground that was being tested, the action of positive and negative currents would have been as he states; but in the case referred to in my "problem," there was no ground, and of course the polarity of the battery used cut no figure. As a matter of fact, the results obtained were the same with two 90-volt taps + and - of grounded battery as with the 30-volt dry battery ordinarily used with the galvanometer. In both tests, the resistance of the original cross rose as soon as the lineman's cross was put on, and the measurement was higher to the latter cross.

The following will perhaps make my explanation clearer, it being assumed that no other wires are available for the test except the pair in trouble.



If the cross at A is a light one, and there has been no friction sufficient to break the film of oxide which forms on wires when exposed to the weather, there will be more or less resistance in the cross. This film may be punctured by the pressure of the battery current at A and an almost perfect connection formed measuring say 510 ohms, assuming the pair to be No. 12 copper measuring 10 ohms per mile. If the lineman is two miles beyond the cross at A and puts a good cross on at B, approximately one-third of the battery current will be diverted to B, thus relieving the pressure at A, which is not now sufficient to keep the path through the oxide film open, and a measurement will now show a reading to B. of 520 ohms. In this particular case the resistance of the cross at A after the oxide film had been broken down, is shown to have been 10 ohms. In such cases, it is impossible to know how much resistance there is in the cross. Therefore we know only that the lineman is beyond the trouble but how far beyond we cannot tell. In the case cited he was two miles beyond and there were 10 ohms resistance at A, but the measurements would have been the same, had he been ten miles beyond with 90 ohms resistance at A.

While these cases are not frequent, there are probably few wire chiefs who have not had them at some time in their experience, and the explanation here given seems to me the only reasonable one.

D. B. Grandy.

St. Louis, September 5, 1910.

Telegraph and Telephone Age

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October 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

More Opportunities for Promotion.

The extensive changes which are taking place in the organization of the Western Union Telegraph Company are no doubt meeting with general approval. Many have already been advanced and have thus reaped the reward for their perseverance in the past in promoting their employer's interest and there are a large number of good positions yet to be filled. New officials are being appointed almost daily and possibly some of those who feel that they deserve promotion are afraid that they will be overlooked in the readjustment of the methods of directing the operation of their company's great system. To those who are well acquainted with the situation which confronts the executive officials, however, such fears seem to be groundless. The difficulty at present seems to be to find men in the ranks who are able to satisfactorily meet the requirements of the new positions. This difficulty is

probably due more to the fact that under the system which has been in vogue in times past the officials have not been able to form an accurate opinion of each man's ability than to a lack of suitable material for the positions of greater responsibility. Under the new regime this condition will be improved. A closer supervision will hereafter be exercised over the existing force and as far as possible each member will be assigned to that one of the three branches of the service in which he can work to the best advantage. His energies will then be concentrated in a specific direction rather than along general channels and he will be able to accomplish more satisfactory results than under the present system. Those who are capable of assuming more responsible positions will then be given the opportunity. It will take some time to carry this plan into effect, but when it is actually in operation every employe may rest assured that he will have a chance to demonstrate his ability to his superior officials.

The management of the company is fully alive to the fact that in order to achieve the highest measure of success in their undertaking they must have the co-operation of all of their employes. In order to secure this they must first have their good will. The best way to obtain this is to make each individual responsible for the work which he does and reward him accordingly. Because of the fact that individual responsibility has been limited in the past many who are undoubtedly worthy of promotion have not had the opportunity to show their capabilities to their employing interests. Heretofore many telegraphers have argued that the difference in pay between a skilled telegrapher and a chief operator is so small that it did not pay the skilled operator to study for advancement. The result was that good telegraphers were content to remain at the key. All of this will now be changed and the operator will find it to his advantage to study the technical side of telegraphy to prepare himself for advancement to a position as wire or traffic chief or chief operator, which positions will be sufficiently additionally remunerative to repay him for his efforts. The results should be an improved service and the better the service the more the public will use the telegraph. With an increase in the business there will be a corresponding increase in the opportunities for promotion. Hence, every employe upon the staff of the company ought to look with satisfaction upon the new order of things resting assured that his employing interests have a care for his welfare, are anxious that he should advance and will promote him as soon as they can consistently do so.

Quadruplex Operation.

The paper which appears in another column of this issue "On the Resistances to Use in the Field Key System," by Mr. Frank F. Fowle, of Chicago, will be of special interest to students of

telegraphy. The question which Mr. Fowle discusses is one which most wire chiefs and quadruplex chiefs have to answer at one time or another, and Mr. Fowle has shown by a comparatively simple mathematical process how a solution can be arrived at very easily under any working conditions. To those of our readers who are making use of the questions which we print in each issue covering chapters in Jones' "Diagrams" in their study of telegraphy, this article comes at an opportune time as the questions which appear in this issue as well as in several preceding issues deal with the quadruplex. From present indications quadruplex operation is coming into service again more generally than it has been used during the past few years, as the hindrances to quadruplex operation in the way of excessive earth currents and the presence of high tension power transmission lines in the vicinity of the telegraph wires seem to have been surmounted in the latest apparatus which has been placed in service.

Mr. Fowle has long been recognized as an authority on matters pertaining to the telegraph as well as upon general electrical questions, and our readers are fortunate in being able to profit by his experience and knowledge as shown in the paper which he has contributed to our columns.

New York Public Service Commission News.

The newly created division of telegraphs and telephones of the Public Service Commission of the second district of New York State is being organized preparatory to beginning active work in exercising the jurisdiction over telephone and telegraph companies which was conferred upon the commission last spring by legislative action. Mr. Walter I. Sweet, of Port Richmond, N. Y., has been appointed assistant chief of the division and is in charge of the New York office. Mr. Sweet is forty-five years of age, and has had an extensive experience in telegraph, telephone and railroad work. He entered the service of what is now a part of the Erie Railroad system in western New York as telegraph operator at the age of eighteen. He spent the next five years in the employ of that road as operator, station agent and traveling excursion agent. Twenty-two years ago he became chief clerk to the district superintendent of the New York and Pennsylvania Telephone Company, at Jamestown, N. Y., and since that time has been engaged in the telephone service. In 1906 he became district manager of the Jersey City district of the New York and New Jersey Telephone Company, and two years later, because of the merger of the functional and territorial organization with the New York Telephone Company, he was appointed local agent in charge of the Commercial Department of the Company, and was the senior officer of the Company in that district. Mr. Sweet has charge of the work of the commission in connection with telegraphs and telephones in the Metropolitan

district, including New York City, Long Island and some of the territory immediately adjoining New York on the north, reporting to Mr. Edward B. Rogers, chief of the division, whose headquarters are at Albany. Both of these gentlemen are well qualified to carry out the work which has been entrusted to their care and will undoubtedly be able to solve the problems with which they will be confronted in a manner satisfactory both to the public and to the corporate interests involved.

Telegraphs and Telephones in Mexico.

According to the annual report of Mr. Camilo A. Gonzales, director general of the Mexican Government telegraphs, for the year ending June 30, 1910, there were at that time in Mexico 491 government telegraph offices, six wireless stations and twenty-three telephone offices. The system embraced 22,402 miles of lines and 46,038 miles of wire, 462 miles of submarine cable, 11 miles of sub-fluvial cable and 47 miles of underground cable. During the year which the report covers 4,443,519 messages were handled, containing 70,108,888 words and 23,337 telephonegrams, containing 328,982 words. The total revenue of the telegraph system for the year amounted to \$2,205,646. A report of the private telephone enterprises in Mexico on August 31, 1909, shows 20,772 miles of wire in such systems and 15,789 subscribers. The majority of these systems use iron wire. Pine, cedar, oak, eucalyptus and other woods are used for poles, as well as iron in some instances.

Cuban Telegraphs and Telephones.

According to the official report of the Cuban Government Telegraph authorities, for the year ending February 1, 1909, there were in Cuba at that time 171 telegraph offices with 6,180 miles of wire, a gain of 14 offices during the year. During that period 643,059 messages were handled, of which 467,429 were private and 177,130 were official. In addition to these 21,275 messages were turned over to the cable companies, or received from them. Five new telegraph lines were built during the year and all of the offices were equipped with up to date apparatus. The central office at Havana was entirely refurnished and the general condition of the system was considered excellent. Although several severe storms visited the island during the year, causing much damage to the lines, all interruptions were speedily repaired. Extensions of the system at several points are contemplated.

The Government owns telephone systems at Havana, Santiago de Cuba and also at Cardenas. The two former systems have all together 435 miles of wire and 180 telephone stations. There are in addition 388 private telephone systems in Cuba.

A History of New York and Pennsylvania Telephone Consolidation.*

BY U. N. BETHELL.

President of the New York Telephone Company.

(Continued from page 635, September 16 issue.)

We were very fortunate, I think, in our efforts to make the general plan fair to all interests. There were so many interests involved—so many different companies—so many different lists of stockholders—so many different prices to offer, that it was a very difficult thing to get not only what was fair in our own judgment, but what would be fair and look fair to the other people. That is, that each offer would look so fair to each group, that that group would accept it, without at the same time swelling the total of securities beyond proper dimensions. I think the fact mentioned as to the up-State New York companies, which may now be stated as to all the companies, that ninety-nine per cent. or more, somewhere between ninety-nine per cent. and one hundred per cent. in each group of stockholders, accepted the offer made to it, shows that the several offers made were fair and reasonable. The fact that there was no overcapitalization, and nothing that looked like overcapitalization, made the plan proof against criticism from the public.

There was another thing. There was no question of "stifling competition" involved. Now I have no objection to blotting out competition, because I believe that two telephone systems in any place impose an unnecessary annoyance and burden on the public. I have no objection to buying a competitor's plant where the laws permit it if the competitor is willing to sell at a fair price and we can agree on terms, but the public does not always look at it in that way. Public sentiment in this matter is rapidly changing, but the fear of monopoly still exists to a surprising extent in many quarters. We had a decided advantage in bringing this great aggregation of companies together in the fact that the question of competition was not involved. True, we bought the Maryland Company, but that was a separate transaction, and had nothing to do with the consolidation. When we began the work of laying the foundations for a great system in Baltimore, the two companies operating there were neck and neck, and we found it necessary to do something that would tell. We simply pursued the constructive methods that have been followed with such excellent results here in our Pennsylvania territory, and the first thing we knew, the counsel for the Maryland Company said in one of his arguments for increased rates that the Maryland Company was losing money fast—and losing more per station as its stations grew—but that it was nevertheless putting in stations and was growing. When asked why, if growth increased its losses, it continued to grow, he replied

that it was like Uncle Remus's rabbit. Uncle Remus, you remember, was telling the boy that Br'er Rabbit when hotly pursued by Br'er Fox, in order to escape, had climbed a tree. The little boy interrupted, saying, "Why, Uncle Remus, a rabbit can't climb a tree." "Honey," said Uncle Remus, after a pause, "dis here Rabbit was 'bleeged' to climb."

Now I only know one place, and that was in Pennsylvania, where I think one of our friends on the other side has sized the thing up right—has said the right thing in regard to a place afflicted with two telephone systems, and that was down here at Coatesville. In a famous circular sent out by this Independent Manager to the public when the Bell people were getting busy down there, he said, "Competition is a good thing if it is not too keen." When it gets too keen the suffering public calls a halt and in some way the thing stops—or at least slows down.

Now, gentlemen, I simply want to say a word about the progress made in this division since it came over into the greater family, and I want only to point out that it has been able to do this because it has had the money to invest to develop its territory. The business was already here, you men were all ready to do the trick, but it was impossible with these little companies all standing alone and each attempting to do its financing, going out and peddling a little stock here and a few bonds there and raising some money on notes elsewhere, to do the thing in the great broad way that it ought to be done, and this particular part of the country has blossomed like a rose.

Your total plant—I am using only rough figures—your total plant in about four years has increased fifty per cent.; your total stations seventy per cent.; your plant per station has decreased twelve per cent.; your gross earnings have increased practically sixty per cent.; your total expenses have increased, excluding depreciation, fifty-five per cent., and including depreciation, ninety per cent.; the net earnings for the four years have increased eighty per cent.; and the net earnings to investment have advanced from about six and one-half per cent. to about eight and one-quarter per cent. A splendid showing.

I have here a copy of a report made in January, 1910, respecting the work of the Harrisburg Division in 1909. It is written by a man who deals in superlatives. He says, "The following facts are of extreme interest." I admit that they are of extreme interest. I will not read all this report because it would be like carrying "coals to Newcastle" or to Scranton, or to almost any other place in this territory. "New towns or communities reached, 470." Think of that in one year. "New towns or communities reached, 470." "Gains in stations, over 14,000, or twenty-four per cent."

Now this wonderful document closes with this

*An address delivered before the Western Pennsylvania Telephone Society at Harrisburg.

statement: "Taking it all in all, I think we have every reason to be thoroughly gratified with the results of last year, and I am, I think, well within bounds when I promise you an even better showing for the current year."

Now, gentlemen, all I have to say is that I hope that the Harrisburg Division will—I don't know whether to say be or become, or remain—I will say remain—that the Harrisburg Division will remain the pacemaker for the others under the gallant leadership of J. Highspeed Crosman, Jr.

In the statistics I gave you previously I said there was something more than thirty thousand employes in our organization. That is quite a large aggregation. How many girls there are in it I do not know, but I always welcome every opportunity to say a word about the American telephone girl. She is just as essential to the success of our enterprise as any other factor in it. Some years ago, when I was making my first study of telephone conditions in Europe, I remember that in one great city I went into a telephone office where a lot of men were sitting before the switchboard listlessly switching traffic, and graphically before my mind's eye now I see the picture of one ancient citizen, whose hoary beard fell flowing to his waist line and whose feet were encased in beautiful carpet slippers. He looked the very picture of the reverse of accuracy and expedition. I remember at another place seeing a girl operator leave her position at the board, run down the room and have a quarrel with another operator in language that was astounding. The toll operators in that room were shut off in a glass case at one end of the room because the din and turmoil were so great that they could not perform their work without being caged off from the others. That was on the other side and several years ago, but here in America for years and years, practically from the very beginning, we have had the efficient and able assistance of, in my opinion, the best corps of female workers that are engaged in any enterprise anywhere.

An illustration of loyalty came to my attention not long ago in Philadelphia. There had been a severe snow storm. The roads were blocked, the street cars could not move, but operators who were not expected to be on duty, in some way—in some way—managed to reach the offices and helped to handle the swollen traffic. That is what I call great loyalty. Even girls who were not at the time in the service of the Company; girls who had previously left the service, graduated from it as it were, came back to meet the emergency and offered their services, which were gladly accepted. Such loyalty you do not often find.

Not long ago—as I look back at it it was only a few years ago—I received a hurry call one Sunday, and leaving my home in New Jersey went down to Baltimore. The great city was

afame. There we had an exhibition of nerve, fidelity to duty, loyalty and courage seldom witnessed. In the St. Paul office the girls were busy handling traffic which meant perhaps life or death, and certainly the safety of great property interests. The fire was rapidly approaching, great firebrands were dashing against the windows, and the room was filled with smoke, yet those girls sat faithfully with their faces to the board, and with deft hands and quavering voices handled the traffic that meant so much of weal or woe. They worked faithfully until the final signal was given, and then, like the good soldiers they were, retreated in order. But one individual was left, a man, a brave man, a man who realized that in a very few moments that building perhaps, at least all that equipment, would be in ruins. He was there to obey orders. He drew the cord which let the tarpaulin down, closed the iron fire door, passed out of the switch-room and hastened to the street. That man was none other than the present efficient Plant Superintendent of this division, Burdette Stryker.

Now, gentlemen, I will detain you only a minute or two more. I see a great galaxy of talent here and I know they are all anxious to talk, especially Mr. Kinnard. In one of his beautiful works, a little book called "Through Nature to God," John Fiske points out that everything obtains its identity by contrast with something else. For instance, if the roar of Niagara were continuously beating upon the ear it would produce the same effect as absolute and continuous silence; if the tongue knew no taste except that of sugar there would be no such thing as sweetness and bitterness, and if all the eye ever beheld were red there would be no such thing as color.

I want to point a contrast between the olden days and the present. You know for years intelligence was transmitted between remote points only by the hand of man. It might go by a swift runner—in fact, way back in the days of Aztecs they had runners that could beat the American District messenger boy of to-day, and that is saying a good deal, but all news went by the hand of man. When Cornwallis surrendered a swift ship was sent to Europe with the news and in thirty-seven days King George was walking the floor. Thirty-seven days and the ship was swift. And when following that surrender a treaty of peace was concluded, it required sixty-two days for the news to get from Paris to Philadelphia. At the close of the war of 1812, in 1814, after the treaty of Ghent was signed, it took so long for the news to reach this country that the battle of New Orleans was fought and more lives were lost than in any battle of the Revolutionary War.

During what may be called the news-by-hand period which continued for many years, there was what you might call a lack of solidarity in this country. Local prejudices existed everywhere—one part of the country had little sym-

pathy with another, one section could not understand another and all were more or less critical and unfair. There was naturally great opposition to expansion. When in 1843 the Oregon Bill was under discussion in the United States Senate the very idea that we could have an interest in a country so remote, so far away, so difficult to reach or communicate with as Oregon, was declared to be preposterous by many leading statesmen, and yet in the following year, in 1844, there was the beginning of a change which one may fairly say has revolutionized the world, for in that year there came across the wires those thrilling words, "What hath God wrought."

That was the beginning of an era—the era of the transmission of intelligence by electricity. Lines of magnetic telegraph spread over the land and soon cables spanned the Atlantic. Then came the Civil War. John Fiske has said in one of his histories that except for the railroads and the telegraphs the Union could not have been preserved. I think we all realize, in a general way, what a tremendous influence in the preservation of the Union the telegraph must have had during those trying years, but if anyone wants to know something of how it was done and at the same time read a thrilling book, let him read "Telegraphing in Battle." Let him also, in "Lincoln in the Telegraph Office," read of the wonderful men, young telegraphers, who manipulated the keys and translated the ciphers in that little room in Washington, which Abraham Lincoln, when his soul was most sorely tried, was wont to frequent. Such names as Chandler, Tinker, Bates and Eckert will be immortal in that connection. But no name stands out and will stand out more brilliantly for heroism and bravery, for intelligence and patriotism as a military telegraph operator than that of a man who belongs to this division, who is a part of it, who has been a part of it for years, Richard O'Brien, of Scranton.

The spread of intelligence, the destruction of prejudices, the cementing of our vast country into a National unit, and the advance of civilization received a tremendous impetus in the invention and development of the telephone. It is not necessary to rehearse in this presence what the world has gained through the wonderful gift of the man whose name we have emblazoned on our banners—Alexander Graham Bell. To-day, for example, it is such a simple matter to get the election returns from all parts of our great country within a few hours after the ballots are cast, that we take it as a matter of course. Let any event of wide human interest occur and the eyes of the whole civilized world are concentrated upon it. Take, for example, the sinking of the Republic. Through the agency of the wireless telegraph, that is the electrical transmission of intelligence, aid was summoned, and through the telegraph and the telephone, the whole world

knew from moment to moment what was going on and was able to concentrate its mind and its eyes upon the tragic scene—and the inspiring display of heroism. When it was all over, thousands widely separated rejoiced together and the heart of mankind was softened and made better.

I have spoken of the slowness with which the knowledge of certain peace treaties concluded years ago came to this country. Think what happened after the close of the recent war between Russia and Japan. When the peace conference was being held at Portsmouth, the great African hunter, who has just returned to our shores, then the peace-loving and belligerent incumbent of the White House, was doing all he could to bring about peace, and the nations of the earth stopped, looked and listened. As soon as the articles were signed the whole wide world knew it and in a moment the wires were busy, were overloaded, carrying back messages of congratulation to the man who had done so much to bring about the peace,—the man who at that hour was perhaps the most widely known and popular individual in the universe—Theodore Roosevelt.

From the beginning of historic times, nations, principalities and cities have grown great only as they have paid attention to the development and proper use of means of transportation and communication. Damascus, the oldest city in the world, grew great because of the caravans that passed within her gates and tarried there to trade. Venice mounted her pinnacle of glory by sending her ships over all the known highways of the sea. Great Britain owes her greatness to her long sustained mastery of the sea, and what has enabled the United States to achieve her greatness among the nations of the world but her wonderful development in transportation facilities—transportation facilities broadly considered—that is, facilities for transporting people, things and ideas? These facilities are as essential to commerce and civilization as nerves, arteries and veins are to human existence. They cannot be crippled without crippling the whole country. Let each of us do what he can, however small it may seem, to accelerate the growth of that spirit of fairness and consideration which should actuate both the public and the men who are devoting their time, their intelligence and their energies to these public agencies.

Gentlemen, you are identified with a great and important industry. I congratulate you and thank you for your attention.

Mr. Harry Morlan, manager of the Postal Telegraph-Cable Company at El Paso, Texas, in renewing his subscription recently, says:

"The 'Age' has been a great source of pleasure to me, not only from an instructive point but from the fact that I meet many friends of bygone years in its pages. Success to you."

On the Resistances to Use in the Field Key System.

BY FRANK F. FOWLE, CHICAGO.
Consulting Engineer.

The extensive use of the Field key system in quadruplex work, for the purpose of deriving both the "long" and the "short" voltage from one dynamo or generator, makes it desirable to have a simple rule for finding the proper resistances to insert in the line and the leak. Most wire chiefs and quadruplex chiefs are familiar with this system, so that it need not be described in great detail. But it has perplexed many to know what values of resistance to use to obtain any desired ratio of voltages or currents. I have worked out a very simple rule in what follows and have also given a table showing some of the values that should be used.

It was originally the practice to employ two different E. M. F.'s for quadruplex working, one for operating the polar side and one for operating the neutral side. The ratio of the latter to the former is very commonly 3 to 1, and sometimes $3\frac{1}{2}$ to 1, or even 4 to 1. This necessitated four sources of E. M. F. in all, two of the higher value, one being positive and one negative, and two of the lower value, positive and negative. The Field system makes it possible to reduce the total number of E. M. F. sources from four to two, with consequent reduction in the number of dynamos necessary. In considering how this system works, the E. M. F. of one sign only will be used, because the actions are identical with either positive or negative E. M. F.'s.

The generator furnishes an E. M. F. suitable for the "long" or neutral side, and by means of suitable resistances it can be reduced to a proper value for the "short" or polar side, at will, by the manipulation of a key. The essential portions of the Field system are shown in theory in the accompanying Figure 1. The armature *a* which carries the make and break contacts is operated by an electromagnet not shown, which in turn is operated by the sending operator on the neutral side, by means of a battery and a key in a local circuit with the electromagnet. The resistances which comprise part of the Field system are designated *A* and *B* in the figure. The resistance *A* is arranged to be inserted in or removed from the line circuit, while *B* is arranged at the same time to be connected from line to earth or to be opened, respectively, by the movement of the armature *a*. When *A* is removed from circuit, *B* is open, which corresponds to closing the operator's key and sends to line the full value of the generator E. M. F. When *A* is placed in circuit, *B* is connected from line to earth, which corresponds to opening the operator's key and reduces the line E. M. F. to a value sufficient only to operate the polar side.

The problem here is to find the proper values of the resistances *A* and *B*, which, used in conjunction with particular resistances of the lamp in the generator tap, will produce the desired ratio of effective E.M.F.'s or line currents. This can be done with

the aid of Ohm's Law and simple algebra. The circuit is shown, stripped of keys, contacts, etc., in Figure 2, where the letters designating the different resistances are the same as in Figure 1. Let it be supposed, also, that these letters stand for the number of ohms in each of the resistances, respectively.

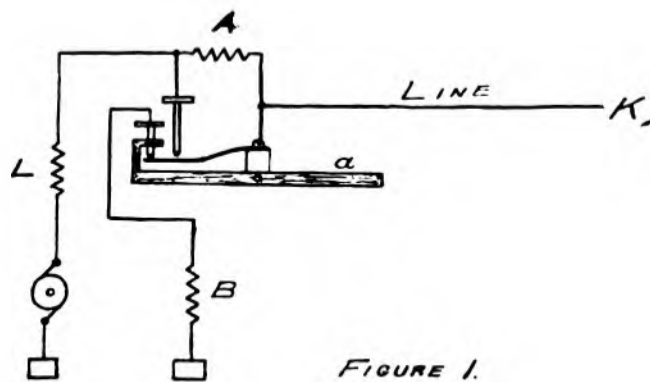


FIGURE 1.

There are two known conditions upon which the solution of the problem must rest. First, a certain ratio of long to short E.M.F. is desired, or what amounts to the same thing, a certain ratio of maximum to minimum line current. Second, whatever the position of the resistances *A* and *B*, in or out of circuit, the whole or joint resistance of the terminal must remain unchanged, or it will throw the artificial lines out of balance. We can proceed from these two conditions to solve the problem. No particular E.M.F. will be taken, but let it be supposed that the generator supplies *E* volts.

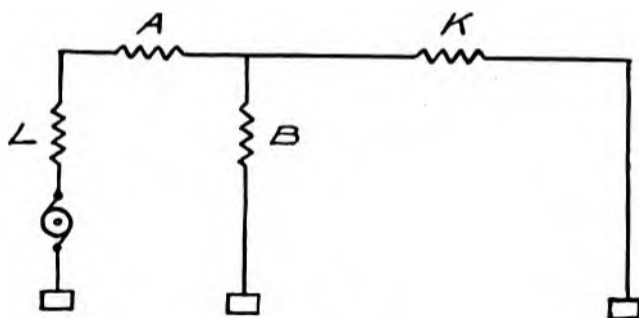


FIGURE 2.

When the resistances *A* and *B* are out of circuit, there are only the lamp and the line resistances in series with the battery, and by Ohm's Law the current is

$$I = \frac{E}{L+K} \quad (1)$$

When *A* and *B* are in circuit, we have first the resistance *L* and *A* in series, in the wire from the generator. The leak *B* and the line *K* are in multiple, however, and we must find their joint resistance, which is

$$\frac{B K}{B+K} \quad (2)$$

and the whole resistance in series with the generator is therefore

$$L+A+\frac{BK}{B+K} \quad (3)$$

In divided or multiple circuits, the total current divides itself among the branches inversely as their resistances. The current which goes to the line K will be only a part of the whole current coming from the generator, and the ratio of the line current to the generator current will be

$$\frac{B}{K+B} \quad (4)$$

The whole current flowing from the generator will be, by Ohm's Law,

$$I = \frac{E}{L+A+\frac{BK}{B+K}} \quad (5)$$

and the proportion flowing to line, or the line current, will be

$$I_2 = \frac{B}{B+K} \left[\frac{E}{L+A+\frac{BK}{B+K}} \right] \quad (6)$$

If we express the ratio of the maximum line current to the minimum as n , the value of n will be found to be

$$n = \frac{I_1}{I_2} = \frac{\left(\frac{E}{L+K} \right)}{\frac{B}{B+K} \left[\frac{E}{L+A+\frac{BK}{B+K}} \right]} \quad (7)$$

$$= \frac{\left(\frac{E}{L+K} \right)}{\left[\frac{EB}{(L+A)(B+K) + BK} \right]} \\ = \frac{(L+A)(B+K) + BK}{B(L+K)} \quad (8)$$

This gives the ratio of the line currents in terms of the four resistances L , A , B and K . The second condition imposed in our problem, that the terminal resistance must not change, will now be useful. In one case, when A and B are out of circuit, the terminal resistance is comprised of L alone; in the other case it is the joint resistance of B and the sum of L plus A . Therefore L must be equal to the joint resistance just given, or

$$L = \frac{B(L+A)}{L+A+B} \quad (9)$$

$$L^2 + AL + BL = BL + AB \\ L(L+A) = AB$$

$$\text{whence } B = \frac{L(L+A)}{A} \quad (10)$$

If now we substitute the value of B given by (10) in the value of n given by (8), we shall get

$$n = \frac{(L+A) \left[\frac{L(L+A)}{A} + K \right] + KL \frac{(L+A)}{A}}{\frac{L(L+A)(L+K)}{A}} \\ = \frac{L(L+A) + AK + KL}{L(L+K)} \\ = \frac{L(L+A) + K(L+A)}{L(L+K)} \\ = \frac{L+A}{L} \quad (11)$$

But the result of (11) can be converted to the form

$$A = L(n-1) \quad (12)$$

And by substituting the result of (12) in the value of B given by (10) we have

$$B = \frac{L[L+L(n-1)]}{L(n-1)} \\ = L \left(\frac{n}{n-1} \right) \quad (13)$$

This completes the solution of our problem, and to recapitulate, we have

$$\left. \begin{aligned} A &= L(n-1) \\ B &= L \left(\frac{n}{n-1} \right) \end{aligned} \right\} \quad (14)$$

This result can be expressed in words as follows: to find the resistance A in the line circuit, subtract one from the ratio n of the long to the short voltage and multiply the remainder by the lamp resistance L ; to find the least resistance B , divide the ratio n of the voltages by a quantity equal to one less than this ratio and multiply the result by the lamp resistance L .

It is interesting to note that the resistances A and B depend only upon the resistance of the lamp in the generator tap and the desired ratio of voltages or currents; they do not depend at all upon the resistance of the line. Therefore an adjustment of A and B to give a certain desired ratio will be operative for lines of any length, when L is not changed.

Before preparing a table of values of L , A and B , we may take note of another method of deducing the formulæ given in (14). In the first method we worked out the result from the ratio of line currents but we could as well have used the ratio of voltages. It can be proved by Ohm's Law that the fall of potential in a given portion of a simple circuit, composed of resistances in series, bears to the total

E.M.F. the same ratio as the resistance of the portion considered bears to the whole circuit. For example, consider the simple circuit composed of L , A and B , in series with the generator; the total E.M.F. acting on the line will be equal to the fall of potential in B , but the latter bears to the generator E.M.F. exactly the ratio that the resistance of B bears to the total resistance of L , A and B . Therefore we could express the ratio of short voltage to long voltage as

$$n = \frac{L+A+B}{B} = \frac{L+A}{B} + 1 \quad (15)$$

$$\text{or } B = \frac{L+A}{n-1} \quad (16)$$

Making use again of the fact that the whole terminal resistance must be the same whether A and B are in circuit or not, we have as before, in (10),

$$B = \frac{L(L+A)}{A} \quad (17)$$

Therefore,

$$\frac{L+A}{n-1} = \frac{L(L+A)}{A} \quad (18)$$

Or,

$$\frac{1}{n-1} = \frac{L}{A} \quad (19)$$

And

$$A = L(n-1) \quad (20)$$

This is the same result as we obtained before in (12) and (14). For the resistance of B we have,

$$B = \frac{L[L+L(n-1)]}{L(n-1)} \quad (21)$$

Or,

$$B = \frac{Ln}{n-1} = L \left(\frac{n}{n-1} \right) \quad (22)$$

And this is the same result that we obtained in (13) (14). Therefore the whole result expressed in (14) has been proved by two methods which give identical results. The expression of a rule in mathematical form is not convenient for many persons and therefore a table has been prepared to show actual values of L , A and B which give certain ratios of voltage. It is well to remember in this connection that the lamps used in the generator taps do not have a perfectly constant resistance. The resistance of carbon filament lamps decreases as the current increases, and hence their resistance should be measured with values of current equal to what they carry in actual service. This can readily be done with a voltmeter and an ammeter.

The values of L , A and B in the following table are all expressed in ohms and the table is ready for practical use. The choice of lamp resistance is an important matter, because it affects the efficiency of the line in bad weather. The working margin

on a line which has a large amount of leakage, will be made greatest by keeping the lamp resistance as small as possible. Of course, there is a limit to the lowest practical resistance which the lamp may have, fixed by the appearance of sparking at the transmitter contacts. The lamp resistances should properly be graded to correspond with the voltages of the taps, but often no attention is paid to this matter. It is important, however, and careful supervision of this feature will be amply repaid.

L. (LAMP)	VALUES OF THE RATIO, n.					
	A. 3.0	B. 3.5	A. 4.0	B. 4.5	A. 5.0	B. 5.5
100.	200.	150.	250.	140.	300.	133.
200.	400.	300.	500.	280.	600.	267.
300.	600.	450.	750.	420.	900.	400.
400.	800.	600.	1,000.	560.	1,200.	533.
500.	1,000.	750.	1,250.	700.	1,500.	667.
600.	1,200.	900.	1,500.	840.	1,800.	800.
700.	1,400.	1,050.	1,750.	980.	2,100.	933.
800.	1,600.	1,200.	2,000.	1,120.	2,400.	1,067.
900.	1,800.	1,350.	2,250.	1,260.	2,700.	1,200.
1,000.	2,000.	1,500.	2,500.	1,400.	3,000.	1,333.

Table showing the resistances A and B (Figure 1) to use with various lamp resistances in the Field key system.

Relation of the Telephone to the General Organization of Fire Department Service.*

BY H. C. BUNDY, WATERTOWN, N. Y.

It is surprising indeed to note the rapid and enormous increase which the telephone has acquired in the last few years over the regular fire alarm system for fire calls.

I dare say that two-thirds of the fire alarms in the second and third size cities, as well as in some of the larger cities, come into the fire houses through the telephone.

If this rapid increase continues I wonder what will become of our present day fire alarm telegraph system.

It is fair to assume that the telephone has come to stay. It certainly has become an indispensable item in connection with all kinds of business, both commercial and private. With its thousands of uses its value can hardly be estimated.

Acknowledging all of these facts there is a remarkable and distinct difference, as between its use for fire calls and any other service it has to perform. The fire alarm telegraph which was designed absolutely and solely for fire alarm service, necessarily must be accurate and perfect at all times.

The custom and trouble that usually prevails on telephone systems would not be tolerated for one moment by any city, village or town on a fire alarm telegraph system. I mean by this, that if one had to

*Paper read at the fifteenth annual convention of the International Association of Municipal Electricians, Rochester, N. Y., September 6-9.

pull a fire alarm box three or four different times before he could arouse the fire department, after which he would have great difficulty in making the firemen understand what was wanted of them, and if it was as uncertain in as many ways as the telephone it would be considered absolutely inadequate and unfit for fire service, and would be thrown in the junk pile.

Fortunately, however, owing to brains, experience, with the expenditure of thousands of dollars, there has been installed in ninety-nine per cent. of the cities of the United States, fire alarm telegraph systems, supervised by an army of trained men, whose ever watchful brain and eye are strained that nothing can destroy its wonderful accuracy and efficiency.

It is unnecessary, I believe, for me to stand here before this body of men and dwell longer upon the accuracy and efficiency of the systems of which ninety-nine per cent. of you gentlemen are being held responsible throughout the cities and towns of the United States and Canada.

I believe, however, there are some methods whereby still quicker service can be obtained, and systems can be extended in headquarters at lesser expense than is now being done by many cities both large and small.

I am not going to repeat my language of a previous paper by enumerating the peculiar and perplexing difficulties and hazards which subject our fire departments throughout the country to criticism by being forced to receive telephone fire calls.

I remember that only a few years ago one of the most famous fire chiefs the world ever knew was removed from his position on account of his persistent attempts to install a telephone fire alarm system, so great was the prejudice against the use of telephones in fire service at that time.

I am also satisfied that even at the present day there is a decided lack of confidence in the accuracy of the telephone service, even by those who resort to it. As an evidence of this, you can all testify that many times in your own departments, you get your fire calls from your regular system, after someone has spent valuable time trying to get a correct and satisfactory message to your department over the telephone wire.

In many cities where overhead construction prevails, fire-alarm wires are subjected to wind and sleet storms and other difficulties as are telephone wires, but I have known many times, after the wind and storms have put them out of commission the fire alarm wire is the first one to be repaired as compared with the thousands of telephone wires which sometimes require a week to restore and put in commission. These troubles and many others occur on the telephone systems, they sharing no responsibility whatever; they consider with entire indifference the fact that hundreds of business places and residences have been temporarily deprived of their means of fire protection.

It is strange indeed that even the telephone companies themselves maintain in their own offices and equip their entire buildings with the Gamewell Auxiliary Fire-Alarm Telegraph System, connected directly with the street system of fire alarm telegraph.

This fact alone is conclusive evidence that even the promoters and maintainers of telephone franchises are alive to the fact of the superiority, accuracy and efficiency of the fire-alarm telegraph over the ordinary telephone system in case of fire calls where delays and misunderstandings might cost them hundreds of thousands of dollars.

My opinion after reviewing these facts is stronger than ever that every municipality should gain the right by some legislation (providing, where telephones continue to be used in fire-calls) that the telephone companies should be responsible in that they should keep in their employ expert operators especially for the fire service, thereby obviating a large portion of the trouble now existing, by reason of inexperience, nervous and excitable operators who become confused, and do not take or transmit the call of fire properly and distinctly.

In my city all of our department houses are connected with the central office on the bridge system, this is quite inexpensive and seems to me about as good a plan as can be adopted, as when there is a telephone call from any part of the city to an engine house the party making the call will be asked if it is to report a fire; if so, they must tell the operator the exact location of the fire. The operator immediately throws on the switch and each house or department 'phone is rung simultaneously, whereupon the operator conveys the message to each department.

My theory is that an operator should be maintained for this special work, with nothing else to do only attend to fire calls. The operator should be a person not excitable or nervous, with a goodly presence of mind, and one that has had considerable experience at the telephone board, and should insist upon the applicant being thoroughly understood before transmitting the alarm from the central office to the department.

The superintendent of fire alarms, in my opinion, should be one to which operators should be responsible. With this plan in operation, I believe much better results would accrue from the service which was not really intended to take the place of the regular fire alarm telegraph system.

In closing this subject I feel grateful that I have been considered as one to write upon this topic, as the question of responsibility should be placed upon some one for telephone fire calls equally as much as the superintendent of fire-alarm telegraph is held responsible by his city for the proper and accurate response of every fire alarm signal box no matter at what time of day or night it is pulled for a fire call.

The Passing of the Telegraph Frank.

When the new federal railway law which classifies telegraph and telephone companies as common carriers and places them under the jurisdiction of the Interstate Commerce Commission, went into effect on August 17, the telegraph companies were compelled to call in all franks held by persons who were not telegraph employees. This surrender of franks came hardest to the newspaper men and some of them took occasion to express in their editorial columns their indignation and remorse at this curtailment of their privileges. Many, however, took the matter philosophically and wrote in a humorous vein.

An Indiana editor wrote as follows:

"A wise government, more or less dominated by insurgency, has decreed that telegraph franks, issued by the Western Union and Postal companies, and perhaps by others that we have never had the pleasure of knowing and consequently are spared the present pain of parting from, must be no longer issued. Those now outstanding must, moreover, be called in. And with a patriotism that we have never been encouraged to believe these iniquitous corporations to possess, they have notified their perturbed beneficiaries to the same effect.

"This is a very moral and public-spirited performance, which must be commended in the heartiest possible manner. So take your old franks! Here they are—thirteen left in one book (ominous number!) and twenty-five in the other. Why not fire them all off at once, like the last bunch of firecrackers on the night of the Fourth, anywhere and everywhere, in the full consciousness of rectitude and also of the certainty that as soon as they are gone a perfect pandemonium of deaths, marriages, births and other occasions calling for instant telegraphic advices will break out over the entire circle of one's acquaintance?

"We repeat, the frank system, like the pass system, is iniquitous and should be done away with. This is a great victory no doubt for reform, and hurrah, of course, for reform! And one of the very worst features of the frank system was that they were so hard to get and so easy to use up. This will all be done away with now, thanks to the high moral quality of insurgent statesmen who will go on franking pianolas and donkey engines all over the civilized world and inserting magazine articles as a part of the congressional proceedings. Here is where the high cost of living gets back on the job with none so poor to do it reverence.

"Too long has the infamy of the telegraph frank weighed down the public conscience. The editorial profession in particular is certain to experience a great uplift and tighten its belt about two holes to meet the crisis. In the joy of this spiritual upshoot we can only wish that some such ennobling boost might be passed on to our dear, unselfish senators and representatives whose interest in other people's rectitude is always so touchingly on the job. No doubt this vicarious sacrifice will call for another

increase in their salaries, just as Mr. Rockefeller first gives \$1,000,000 to charity and then marks up the price of gasoline."

An Alabama editor penned the following touching obituary to the privilege which has gone from our midst forever:

"Died at midnight—August 16-17, 1910—the telegraph frank. There are tears in the eyes and wails on the lips of statesmen to-day. Poor Lo, the newspaper correspondent, is among the weepers. He has lost the last vestige of his quondam array of passes, permits, franks, licenses where the common herd had none, and open gates shut to the ordinary come and go of men. All telegrams hereafter sent must be paid for in coin of the realm.

"Newspaper men are born logicians or become so if they remain long in the game. They know that every up has its down and they cultivate a habit of mind that knows neither surprise nor regret. So with one short weep it is over with them. But the statesman has perhaps died harder. They always do. A statesman is chosen by the people, but after election he does what he chooses to do and is apt to literally consider himself one of the 'elect.' That the knife has been put to his telegraph frank is hard indeed.

"They have gone one by one, those blessed privileges. The legislator now pays his way to the capitol. The alderman must pony up his street car fare. The express companies regard with a look askance the 'man' who asks that his small package of butter and eggs picked up in rural districts at a song be sent free to his family in the city. Railroad superintendents do not annually assemble their friends and in the luxuriance of private car convey them free and well fed to points in Florida or the far west to fish for tarpon or chase the poor bruin.

"Every fellow is now paying his way. No one is getting something alleged to be free with a string tied to it. A fellow can say what he wants to about railroads, express companies or the telegraph lines. There are no presiding geniuses in the halls of state legislatures handing out passes with one hand and with the other delivering over a set of instructions regarding the legislator's vote on proposed statutes. There are no envious of the common herd 'cussing' the lucky fellow with the pass and wishing at the same time that he was as lucky. Railroad offices are no longer burdened with the pass seeker. In those sacred precincts now they talk about train running and rights of way instead of the good fellows that ought to have a pass. The newspaper man has always paid his way with a good stiff price in spite of the pass. He now pays his way with the stiff price minus the pass."

Another editor in returning his franks said:

"You will notice some discolorations upon the frank, and may think them caused by grape juice. Not so. They are the marks of my bitter tears; the print of my lips where I kissed Old Frank good-bye forever.

"Permit me in this hour of sorrow to thank you and the Company for the many courtesies extended to me, and to say that I believe that the parting gives you, as well as myself, pain—a pain for which, unfortunately, there is no balm in this land of the full fare and home of the slave."

A Texas newspaper man, upon receiving the notice calling in his franks, decided to make the most of his opportunities and use up all of the franks which he had before it was too late.

"In heaven's name," said he, "what sort of Congressmen and Senators have we, anyway, that they should thus deprive us of our rights, privileges and immunities? Didn't they do enough to us four years ago when they lopped off our free railroad passes and the sacred right of contract? Why should they now take away our means of communication? Prior to 1907, I wandered wherever I pleased, as free as a bird. Now I'm a goat. Since then I have been compelled to take my vacations within walking distance of home, and about all that I have had to distinguish me from the common herd were these telegraph franks, good only for interstate messages. Now they have lopped these off, except to officers, agents and employees of railroads, telegraph and express companies. As to these latter, our Congressmen and Senators have actually restored all the privileges which they had aforetime. Now all that I have left of freedom is a baseball pass which I seldom get to use for the reason that I must pay street car fare.

"One of the telegraph companies was fairly decent; it sent me a stamped envelope wherein to return my frank book. This, I assume, was intended to temper the wind to the shorn lamb, and I appreciate it; but it is not sufficiently consoling. I have an aching void that nothing but coin or franks will fill. But, ye gods, I will be avenged! Before surrendering these franks I will send my sweetheart and all my relatives and friends a farewell message, which the telegraph companies must handle free, gratis, for nothing. I will bid them good-bye forever and hand the telegraph companies a package which will hold them for awhile. And I will bide my time to get even with the Congressmen and Senators, who, having the privilege of franking their mail, and enjoying fat allowances from the Government, care not that much for what we common people must endure."

This newspaper man did not get down to writing his messages until August 16. He used up the last of his franks, and returned the empty covers to the telegraph companies. Then, while check clerks and operators swore over the procession of "deadheads," he leaned back in his easy chair and chuckled fiendishly.

This newspaper man had frequently sent telegrams to his sweetheart, relatives and friends. Moreover, he had bragged to them about his being privileged to use the wires free of charge, and had

invited them to "save postage by telegraphing to me, collect, and I will frank them."

In sending out his farewell messages on August 16, he had failed to remark that he was saying farewell because his fair sailing was over, and the franks as well as the passes had passed.

The next day answers poured in upon him. His instructions had been obeyed to the letter. His sweetheart, relatives and friends had "saved postage by telegraphing collect." But he could not frank the messages, for there were no more franks to frank with.

Book Review.

"Wireless Telephones and How They Work," by James Erskine Murray, D. Sc. (Norman M. Henley Publishing Company, New York, 68 pages, fully illustrated), is one of the latest books dealing with this interesting subject. This is a work free from elaborate details, and the author aims to give a clear outline of the principles underlying the operation of wireless telephones. It is intended for amateur workers and those whose knowledge of electricity is limited. Among the subjects discussed are: how we hear; the conversion of sound into electric waves; wireless transmission; the production of high-frequency alternating currents; how electric waves are radiated and received; receiving instruments and detectors. Professor Murray is one of the best informed men in the wireless field and the book which he has now produced should prove of special value to those for whom it is written. Price \$1.00. Orders may be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Telegraphs and Telephones in New Zealand.

According to the annual report of the New Zealand Post and Telegraph Department for 1909-10, the working expenditure of the telegraph department was £411,296. This exceeded the revenue by £16,786. Telephone messages have so greatly encroached upon the field of the telegraph that telegrams have barely held their own. Telegrams transmitted were 7,846,890, an increase of 421,197, and telephone communications were 1,757,869 as compared with 1,423,093 during the previous year. On March 31 last there were 10,901 miles of telegraph line and 34,788 miles of telegraph wire. Submarine cables within the Dominion were 368 miles. There were 291 telegraph and 1,580 telephone offices open.

Seventeen new telephone exchanges were opened during the year, the number of subscribers increased by 2,104, and the total number of connections by 2,848. There are now 153 exchanges. The total number of connections is 29,681, compared with 26,833 in 1909. On March 31, 1910, there were 1,270 miles of telephone line and 35,233 miles of wire.

The Military Telegrapher in the Civil War.

PART XLVI.

BY THEODORE E. MORELAND, PITTSBURG, PA.

(Continued from page 626, September 16 issue.)

Here is another one on me and one that most people would smother, but as I was entirely innocent I will tell the story. It was widely known at that time by our telegraph people. The last day of our retreat before reaching Harrison's Landing after the battle of Malvern Hill, where we whipped the Confederates badly but did not find it out for months afterwards, I had again fallen into company with Henry Cowan as a chum. In our travels, about dusk one evening we had strayed onto a deserted road or bridle path. Our march was interrupted by a runaway horse that came up to us on a gallop. We had no trouble in capturing him and soon discovered that he belonged to no ordinary officer as the magnificent animal was handsomely caparisoned and in the holsters and saddle bags were a very handsome revolver and a liberal supply of medicine in liquid form that was very frequently used for purposes not strictly medicinal when it could be had as the water was dangerously bad in that neighborhood. We, of course, put this liquid to work immediately and a half a dozen of us in that crowd decided that the war was not the failure that we had been led to believe it was. The horse became my property by right of capture. The saddle and bridle I gave to Cowan and some of the other trappings I generously gave to some of our orderlies who were always on the staff of the operators as couriers, etc.

Our appearance the next day on the march was superb and I think now, at this late day, that our soldiers may have been led into the belief that our troop might have been little "Mac" or Hancock, the superb, and staff. We were rudely awakened the following day when we were halted on our march by a provost guard and asked to explain how this horse and trappings came into our possession. They were given a truthful version of the runaway capture and we were given the laugh. We were told that this particular horse would stand for days, possibly weeks, at a time and would never run away unless told to do so by General O'Neill of the regular army. Bucky, as he was dubbed, got this name. I learned afterwards, by punishing his men by the buck and gag for their different offenses. We were told to dismount and consider ourselves prisoners and as we would likely be shot at sunrise, a little sprint before our execution would do us good. Cowan, whose brother commanded a battery in this division told our guard of this fact and he and our orderlies were released. I was dismounted and after a tearful farewell to Henry and the others, I marched to my doom. To make my disgrace and humiliation the greater, Bucky's squad marched me right through a corps where I was pretty well known and in which I had two brothers. All kinds of guessing was engaged in

as to the nature of my crime or offense. The best one was that I was a captured spy and that I would likely share the fate of Major Andre and a whole lot of other fellows of that kind. After a walk in a broiling hot sun for six or eight hours I was landed in the presence of his august majesty General O'Neill. The meeting between us was warm—very warm—I felt that a disgrace had been brought on this grand old corps of which I was a member. Bucky claimed, as did his men, that this particular horse wouldn't run away though pounded by all the shells in the Southern Confederacy—or tempted by all the oats or hay in the Northern Army. I told Bucky he lied and although my story was true, I was sent to the guard house. In the meantime Cowan had not been idle, he having reached McClellan's headquarters and told them the correct story. Harper Caldwell and Cowan came over at once with an order from McClellan for my immediate release. Harper had told McClellan that he knew I wouldn't steal a horse as I already had one. Bucky, when satisfied that I was a member of the telegraph corps which had rendered him and others such great service and who stood well with little Mac and those at headquarters, was very profuse in his apologies and said he would set them up had it not been for the fact that the liquid that was in the saddle bags had mysteriously disappeared.

All is well that ends well and I have partly forgiven Bucky for his brutal treatment of me and that the sun to which I was exposed for hours didn't lay me out was surprising as sunstrokes and exposures caused great havoc at this time.

History records the embarkation at Harrison's Landing and other nearby points of the Army of the Potomac to take up a new base of operations near Washington.

On my arrival at Washington I was again returned to Fort Lyon, and re-opened the office at that point under the same commander as previously, General Heintzelman. General McClellan having been removed, Pope had succeeded him. I was next sent to the old Bull Run battlefield and with Henry Cowan was assigned to General Fitz John Porter's headquarters, and here it was that Pope's famous order to move on the Confederates at once and annihilate them was received. Porter, finding that the enemy outnumbered him four to one (this being unknown to Pope) refused to, or at least did not obey the order. Charges were preferred against Porter for his disobedience and he narrowly escaped being shot. But the sentence was as bad or worse to a brave soldier. He was found guilty and forever debarred from holding any office of honor or trust under our government. This sentence was removed twenty or twenty-five years afterwards and Porter was vindicated, Grant and most of his generals and Lee, Jackson and Longstreet agreeing that Porter's action was right and his corps would have been slaughtered if Pope's order had been executed.

Cowan and myself were brought to Washington as witnesses in this trial for the purpose of identifying different despatches passing through our hands. Being very young—only seventeen—we did not see the possible impropriety of calling upon Porter as we both admired him very much as being one of the very best soldiers in the Army of the Potomac. At this meeting Porter told us to answer all questions truthfully and not to hide anything we might know out of our friendship to him. He also told us that he never expected to see us again. When the order came to retreat McCandless with his linemen and Cowan and myself were in the advance stretching our wires. General Porter was unable to reach us by couriers and as our gang was a mile or two outside of the lines it was a miracle we were not captured. I do not remember how word reached us—or if it reached us at all—that we were getting on dangerous ground, but McCandless, not hearing from any one in our rear, thought it would be good generalship to fall back and we acted accordingly. On our march back we nearly ran into a large body of Confederate cavalry that were in camp preparing to eat. They were camped just on the edge of the woods, about fifty yards from us and, of course, saw us. Our squad numbered about twenty-five and we were all mounted. Cowan halloed and waved his hat at them, which greeting was returned. We were not sure they were Confederates, but took no chance of getting near them. They evidently looked upon us as friends and made no effort to capture us. Cowan afterwards told us that he knew all of the time that they were Confederates and this was merely a little ruse of his to throw them off their guard. We, of course, did not believe him, but did not want to deprive him of the glory of saving us from capture and in all likelihood a trip to Libby or Andersonville prison. About this time we were getting considerably alarmed and thought it time to make inquiries. We had at times strayed out of sight of the telegraph wires as our general, Levi McCandless, had thought it unwise to expose ourselves too much. Luckily, shortly afterwards we stumbled on to our wires and the next thing in order was to cut in and seek information, and we then discovered we were not the only ones in search of the same thing.

Probably we were not the first discoverers of the horse telegraph office, but I think we were, and Cowan and myself were the first to open an office in the saddle. At this particular time I was acting as the pack horse—it being my turn to carry the telegraph instrument. Upon cutting in we found current and had scarcely closed the wire when "Who goes there?" was asked. It proved to be John Dwight at the war department office. I had opened an office on the pommel of my saddle and the horse was a little uneasy and made a rather unsteady telegraph office. The war department was glad to hear us and said they had had no communication from Pope or anyone

else for a long time and asked us what we knew and where we were. We told them that we had no knowledge of the whereabouts of the army and were not very sure where we were but thought we were near the Bull Run battlefield as we could hear an engine just below us blowing off steam.

At this time assembled in the war department office as we were told, were President Lincoln, Edwin M. Stanton and all of the prominent officials in Washington who were greatly alarmed and had their grips packed ready to make a start if that city was captured by the enemy. Before closing our office we were told that if the locomotive was still there Secretary Stanton had ordered us to board the engine and tell the engineer to pull the throttle open and come back to Alexandria at once and let our cavalry escort and linemen come back overland as best they could. This showed that Stanton appreciated the value of the war telegrapher and did not want to lose any of that scarce article just then. Many years afterwards Mr. T. B. A. David at that time our superintendent in Pittsburg and a native Pittsburger asked me if I had ever read a description of the ride taken by Cowan and myself from Bull Run to Alexandria by order of Secretary Stanton and General Eckert. One of the New York papers at the time devoted a great deal of space to it and looked upon it as marvelous. It must be remembered that at this time, our army was in a rout and was fleeing as fast as Pope could lead them to Washington. The line of the railroad, the Orange and Alexandria then, now, I think, part of the Southern, had been abandoned to the Confederates and our ride would likely prove a very hazardous one. The engineer declared that there were two routes open to us to get to the happy hunting grounds. The railroad route or to fall into Colonel John Mosby's hands and be hanged. As he had been a railroader all his life he preferred to make his exit from this world by the railroad route, and as no choice was left us we were compelled to take the same way. At this time the contraband and our soldiers were bringing in the most exaggerated stories of Colonel Mosby's barbarous and atrocious treatment of his prisoners. With the feeling that it would go hard with us if we fell into Mosby's hands, on the part of the engineer we started for Alexandria with our bare engine and tender. As it seemed to be taken for granted by the engineer that we preferred the guerrilla or Mosby route for our exit, we were provided with seats on the tender and made a good and conspicuous target for the Confederates, whom we supposed had possession of the railroad and had either removed the rails or destroyed the road entirely. This is one instance of where General Lee was asleep and lost some prizes that would have weakened General Eckert's telegraph corps a little. Our miraculous escape from death, as I said before, was commented on and our great speed ride broke the record and broke it badly. That trip of some-

thing over 21 miles was made, we thought then, in that many seconds. I don't know that I have yet recovered from the jolts and fright caused by that ride.

General Burnside having succeeded Pope, I was sent to his headquarters fronting Fredericksburg and remained there a short time, but was taken ill with fever and ague and that magnificent fatherly old soldier advised me to go home, as I could not get cured where I was. I took his advice and with General Eckert's consent and transportation, I reached home, staying there a couple of weeks, when I returned to take part in different localities with different generals. For a short time I was with Fred Bickford and Thomas Dolan, the ex-newsboy and a number one operator from New York, one of the most humorous and best natured fellows I ever ran across in my war experience, the most generous and unselfish and the life of the crowd. While taking part in the Hooker Wilderness campaign J. D. Tinney and myself again had a narrow escape. We had been well to the front when General Lee drove us back, but we turned the tables very shortly thereafter and drove the Confederates. Tinney and I were ordered to again re-open our office in the front which we had been compelled to abandon. Tinney, understanding the importance of getting to that office and re-opening it in a hurry better than I did, broke through our line of battle advancing two deep and over a mile in length, and by the way, one of the grandest sights I had yet witnessed. I, of course, could not show a white feather and was with Tinney at the opening of the office. We drove the Confederate pickets, they falling back slowly, giving way and contesting every inch. They were dropping our advancing men rapidly and why Tinney and myself were not picked off, as we made conspicuous targets on horseback, we will leave to them to tell. My war experience ended shortly thereafter as I was captured along the line of the railroad at Catletts Station by some of Mosby's men under command of Captain Lee, who claimed to be a nephew of General Robert E. Lee. They treated me splendidly with one exception and that exception was a telegraph operator whose name I have forgotten. As we reached the rendezvous of the guerrillas at dusk the first evening of my capture, Lee attempted to introduce me to this operator as one of the fraternity. He turned his back and said if I was a Yankee I was not in his set. Lee told me afterwards that this operator was assigned to his command as a wire tapper to operate inside our lines, but that it took a bayonet to keep him at his work.

I might meet that fellow at the other end of a wire some day and if I do, he will get a roast if I have a few hundred to send to him, that will make him regret his treatment of me on that occasion. To show how the respective governments looked upon the value of the telegraph operator in war times, while I was a prisoner we

rode up to a large mansion, where Captain Lee was well known, as he was everywhere over the route we traveled, upon the veranda of which sat a very old couple who had three sons in the Confederate Army. Upon the old lady asking Captain Lee who I was, what he intended to do with me and pleading with him to release me, Lee replied that he regarded me as one of the most important prisoners he had yet taken since he had been a free lance and had engaged in the "Yankee capturing business." He told the old lady that his Uncle Robert had issued orders that any one bringing in one Yankee operator would be promoted one grade and that I would make a Major of him. Bringing in two would make him a Colonel—three a General—and by capturing four, he could take his Uncle Robert's job as Commander in chief.

After Pope's defeat at the second battle of Bull Run and my return to Washington, I was assigned to the war department office for a few days by Major Eckert and Mr. D. H. Bates.

The night of the battle of Antietam the following relay message passed through the war department office and has always been stamped upon my memory:

Antietam.

Mrs. Geo. B. McClellan,
Orange, N. J.
My dear Nellie:

We are in the midst of the greatest battle of the age. Pray to God for our success.

Geo. B. McClellan,
General Commanding.

Some More Reminiscences of George M. Dugan.

In a second article in the New Orleans "Picayune," Mr. George M. Dugan gives some more of his war time experiences while employed as a Confederate Military Telegrapher in addition to those which appeared in our September 1 issue.

Mr. Dugan's experience was largely with the cavalry, much of the time with General Forrest. The only fun he had on his vacations was to accompany the cavalry when going on a raid, though it was not always, he states, so funny at times, and after a week or ten days in the saddle, Mr. Dugan was glad to get back to his duties, trying to keep the wires working, which was no easy matter at times when the Northern troops decided to pay them a visit.

Mr. Dugan tells the following story about a member of General Forrest's staff who is still living.

"After the capture of Fort Pillow, Generals Forrest and Chalmers, with their staffs and escorts, rode ahead to Jackson, Tenn., and awaited the arrival of the column. The boys in groups passed along the streets looking for something to eat.

"Lieutenant J. A. Taylor, Captain T. E. Lindsey and Lieutenant James Dinkins, of Chalmers' staff, were returning to the grove where our horses were resting and passed along by three young girls standing at a gate. Lieutenant Dinkins invariably

wore his coat buttoned, and, having a good figure, one of the girls, Miss Jennie Day, said after they had passed: "Oh! the one in the middle has got on a corset!" and all three of the girls screamed and laughed. So did Taylor and Lindsey, but Dinkins thought it was an insult."

The Captain Lindsey referred to was the father of Judge Ben Lindsey, of Denver juvenile court fame. Lieutenant Dinkins afterward became captain and is now living in New Orleans. To get even with Mr. Dugan for telling the joke on him, Captain Dinkins in a later issue of the "Picayune" relates the following incident in Mr. Dugan's military career.

"Colonel Dugan had a taste for the romantic, as well as an appetite for good things to eat, so one day he stole a march and hied himself toward the enemy's lines (which, at that time, were at Holly Springs), without so much as saying good-bye to the rest of us.

"As a matter of fact, he ran away from us. We afterwards learned that he spent a very pleasant day at the home of some friends, among whom was a very bright, attractive girl, just about the romantic age.

"While thus enjoying himself a troop of Union cavalry rode up and carried the young man off.

"It must have been that the Yankees thought he was a very bad, or, at any rate, a valuable rebel, because, to make sure, they put him in the Alton (Ill.), penitentiary, where he languished for about four months, after which they moved him to Gratiot Street prison, in St. Louis.

"I do not know how he finally managed to be exchanged, but he was, and came back to us with improved impressions of Yankee hospitality.

"I dislike to tell that he served a term in a penitentiary, but it is a fact.

"On his return to the command, after being exchanged, he stopped at Holly Springs to get a horse, and, incidentally, to see his friends again. He found the Third Mississippi Cavalry camped there on outpost duty. As luck would have it, the Yankees came out for a brush with our boys, and Colonel Dugan, hearing the guns, mounted his new horse and joined Colonel McGuirk. In the mix-up the new horse was killed, and he had to foot it back to our lines.

"We all forgave him, and he behaved very well from that time to the close of the war."

Speaking of the closing scenes of the war, Mr. Dugan says:

"The end came, finding me at Grenada, Miss. While sitting in the office alone, the operators having gone for the night, a rapid calling for "DA" (Grenada) came over the wire, which I paid no attention to at first but finally, through curiosity more than duty, I answered to see what was causing such a disturbance at this unusual hour. When Holly Springs, one of our remote outpost offices, spoke, his first words were: 'Hell's to pay; Lee surrendered.' I replied: 'Don't believe it; another Yankee lie.' He replied: 'Oh, it's so; I have an

extra Memphis Bulletin, brought in by one of Henderson's scouts. No doubt about it. A fast steamer has been despatched down the river to Vicksburg to convey the news, firing guns every thirty minutes. Can hear them from here.' With this information, I walked over to General Marcus J. Wright's headquarters, where I found several gentlemen sitting around the room, among them Governor Isham G. Harris, of Tennessee; Major Butler, Colonel Jesse Forrest and a few other gentlemen (Governor Harris having arrived only a short time before), discussing the situation. The first greeting was: 'Well, Dugan, anything new?' I do not now recall what I said, except to quote the Holly Springs message by saying 'Hell's to pay sure enough. Lee surrendered.' A bombshell with short fuse would not have caused greater consternation. Every man was on his feet, some wanting further information, others speaking in about the same language used by myself on hearing it, all discussing the news except Governor Harris, who retained his seat and composure until the question was asked him what his opinion was. He rose in his usual dignified and impressive manner, saying: 'I am prepared to receive just such information, and, in fact, have been expecting to hear it for the past several days. On leaving Richmond ten days ago, I—in fact, we all—felt that the end was near.' One of the gentlemen present asking him what would be the next move, he said that, if it was a fact that Lee had surrendered, it would end the war. Other commands must necessarily follow, 'and, gentlemen, my advice to you is to make up your minds to accept the situation. Make your arrangements to return to your homes; and build up again, become good citizens and go to work.'"

Some of the newspapers, in speaking of the recent death of a military telegrapher, have given that individual credit for sending from Rome, Ga., to President Lincoln, the cipher message from Sherman proposing his march to the sea. This statement is not correct, as according to Mr. D. H. Bates, the late Charles G. Eddy was Sherman's cipher operator at that time, 1864, and Captain Samuel H. Beekwith, now of Utica, N. Y., was Grant's cipher operator at City Point, Va. The cipher message from Sherman proposing the march to the sea, from the very nature of things, could not have been entrusted to any one but his own faithful cipher operator, Mr. Eddy. It was translated at the war department by one or more of the cipher operators there, C. A. Tinker, A. B. Chandler, D. H. Bates, Frank Stewart or George C. Maynard.

Mr. H. P. Dwight, president of the Great North Western Telegraph Company, Toronto, Ont., in ordering us to continue his subscription for another year, writes:

"I would not do without the Age for ten times the price. I should simply be lost without it."



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The Railroad.

The annual meeting of the Railway Signal Association will be held at Richmond, Va., October 11, 12 and 13. Mr. C. C. Rosenberg, of Bethlehem, Pa., is secretary of the association.

Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad, Los Angeles, Cal., has been confined to his home by sickness for some time past but is now much improved.

Among recent New York business visitors were Mr. W. W. Ryder, of Chicago, general superintendent of telegraph of New York Central lines west of Buffalo, and Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va.

The Big Four Railroad has placed in service an intercommunicating line in the Cleveland-Linn-dale yards connecting six offices, with a call box and selector at each station, so that anyone can ring any other station without disturbing those not wanted. No extra wires are used with this arrangement, only two telephone wires being required.

The Grand Trunk Railway has recently placed two telephone train despatching circuits in commission on the northern division, one line between North Parkdale Junction, Toronto, and Burlington Junction, via Allandale, a distance of 145 miles with twenty-one way stations. The despatchers are located at Allandale, about midway of the circuit. Another line connects Allandale and Nipissing Junction a distance of 165 miles with twenty way stations and with the despatchers at Allandale. Both circuits are giving satisfactory service and it is expected that additional circuits will be constructed in the near future. This work has been completed under the supervision of Mr. W. W. Ashald, superintendent of telegraph of the Grand Trunk.

Mr. W. C. Bassett, for several years past manager of the Kansas City relay office of the Atchison, Topeka and Santa Fé Railway and division operator at that point, has been appointed assistant superintendent of telegraph of that system with headquarters at Los Angeles, vice Mr. G. A. Lawrence, resigned. Mr. G. D. Criswell, personal record clerk in the office of Mr. L. M. Jones, superintendent of telegraph of the Atchison, Topeka and Santa Fé Railroad, Topeka, has been appointed chief clerk, vice Mr. G. D. Hood, resigned. Mr. L. L. Leech, night chief of the Albuquerque, N. M., office has been appointed wire chief and manager of that office, vice Mr. A. W. Douglas, resigned. Mr. L. A. Dickenson, night chief of the Fresno, Cal., office has been appointed wire chief and manager of that office, vice Mr. L. K. Whitcomb, resigned. Mr. E. C. Bruns has been appointed late night chief of the Los Angeles office, vice Mr. F. L. Titus, resigned. All of the gentlemen mentioned, who have resigned have entered the service of the Western Union Telegraph Company.

The Indianapolis Union Railway is extending the intercommunicating selector system to the Union tracks to give the switch tenders better communication facilities.

Mr. S. G. Gearhart, division operator on the Pottsville division of the Pennsylvania Railroad at Sunbury, Pa., is supervising the installation of a telephone despatching circuit on that division with a total of twenty-three stations.

Mr. Jas. Donnelly, division operator of the Pennsylvania Railroad at Baltimore, is supervising the installation of a telephone despatching circuit between Baltimore and Sparrows Point, Md.

A patent, No. 969,985, for a signaling system, has been awarded to H. O. Rugh, of Sandwich, Ill. Railway system with a central station and telephone system for signaling and substations along the line with a signal at each substation, a selecting device therefor, and an electromagnetic means for operating the selecting device in each line at each signal receiving station and a shunt circuit transparent to the telephone currents bridged around the electromagnetic means.

The printed proceedings of the twenty-ninth annual convention of the Association of Railway Telegraph Superintendents, which met at Los Angeles, June 20-24, are now ready for distribution. The large amount of work accomplished by that convention is shown by the size of the book, 268 pages being required for the complete record, which makes it the largest of any of the printed proceedings of the annual meetings. The papers and discussions contained in this report form a valuable addition to the library of any one interested in railway telegraph operation. The work of compiling the proceedings has been carried out under the supervision of Mr. P. W. Drew, of Chicago, secretary of the association.

Meeting of Western Railway Telegraph Superintendents.

The regular quarterly meeting of the western division of the Association of Railway Telegraph Superintendents was held in the general office building of the Chicago and Northwestern Railroad at Chicago, September 22.

The meeting was called to order at 10.30 a. m. by Chairman E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railroad, St. Louis. In the absence of Secretary F. E. Bentley, Mr. F. H. Van Etten was elected secretary pro tem of the meeting. Messrs. Chenery and Bentley were unanimously elected to succeed themselves as chairman and secretary respectively of the division for the ensuing year.

The matter of establishing a "clearing house" for the interchange of telegrams between local railroad offices in Chicago was brought up and as there seemed to be no general need for such facilities at this time, it was finally decided by vote to allow the subject to pass.

The meeting was favored with the presence of Mr. W. J. Lloyd, division traffic superintendent, M. T. Cook, division commercial superintendent and M. H. Clapp, division plant superintendent of the Western Union Telegraph Company, each of whom in turn explained their aims and desires in the departments represented and solicited the co-operation of the several railway telegraph superintendents towards the upbuilding of the commercial service generally, so far as rested in their power. The remarks of each gentleman were listened to with interest and it was the consensus of opinion that mutual benefits would result from frequent meetings of the commercial and railway telegraph representatives and the commercial representatives were cordially invited to attend the Association meetings.

Considerable discussion was had on lightning protection for telephone circuits in which Messrs. Ryder, Bennett, Launbranch, Currier and others gave technical and practical experiences.

An invitation to luncheon at the La Salle Hotel was tendered by Messrs. Harkness, Currier, Wray and Rugh on behalf of the interests they represented, which was accepted by nearly all in attendance at the meeting.

At the afternoon session the matter of handling telegrams for parties on trains was taken up; Mr. Griffith, the chairman of the committee appointed at the annual meeting, stating that it was proposed to discuss the matter with the officials of the telegraph companies and after agreeing on a suitable method, report at the succeeding meeting.

The subject of high tension wire crossings was discussed, but as only a few of those present were at the Los Angeles convention or had had time to peruse the minutes of that meeting, the matter was laid over. It was suggested, however, that it would be of much benefit to all the members if a complete record was secured of the laws relating to wire crossings now in effect in the various states and the secretary of the western division was directed to assign one or more states to each superintendent of telegraph, the latter to be requested to secure from the railway commission or such other officer a copy of such laws or regulations now in effect and submit the same to the chairman. The eastern division would doubtless be glad to co-operate and with a complete record at hand the committee might decide to print the laws in pamphlet form and distribute them to all of the members.

Mr. Griffith called attention to the resolution passed at the annual convention on the proposition to erect a monument by popular subscription at Turner, N. Y., to commemorate the first train order by telegraph. It was suggested that pamphlets outlining the proposition might be furnished the several members who, in turn, would distribute them to the operators on their respective roads and any donation thus received be sent to the committee.

A vote of thanks was tendered Mr. Bennett for the commodious quarters provided for the meeting and to the gentlemen who acted as hosts at the luncheon, after which the meeting adjourned.

Among those present were:

Chicago: Wm. Bennett, M. H. Clapp, M. T. Cook, W. L. Cook, P. W. Drew, J. G. Jennings, W. J. Lloyd, M. E. Launbranch, W. W. Ryder, F. T. Wilbur, F. H. Van Etten, D. W. Dean, Albert Douglass, A. G. Francis and A. Wray.

Detroit, Mich.: J. J. Ross.

Danville, Ill.: W. L. Connelly

Indianapolis: C. S. Rhoads.

Kansas City: Val B. Mintum.

New York: H. D. Currier, E. P. Griffith, W. E. Harkness, B. A. Kaiser and J. A. Waugh.

Pittsburg, Pa.: L. A. Lee.

St. Louis: E. A. Chenery.

St. Paul: George Boyce, L. H. Merrill, E. J. Little and E. E. Dildine.

Sandwich, Ill.: H. O. Rugh, C. S. Rhoads, Jr.

Toledo, O.: E. C. Keenan.

Topeka, Kan.: L. M. Jones.

Train Despatching on the Louisville and Nashville.

The Louisville and Nashville Railroad has placed a large order for telephone train despatching apparatus. This equipment will cover the Cumberland Valley and Kentucky divisions from Cincinnati to Norton, a distance of 304 miles and will consist of six circuits in all, four train wires and two message circuits with a total of 162 stations. One circuit will extend from Cincinnati, Ohio, to Paris, Kentucky, with a branch to Maysville. This circuit covers 136 miles and will be equipped for 32 way stations. The train despatcher will be located at Paris.

Another circuit extends from Paris to Corbin, with a branch from Paris to Lexington, and another from Rushmore Junction to Rowland. The mileage covered by this circuit is 165 and 30 way stations will be equipped. The despatcher for this circuit will also be located at Paris.

In addition, there will be a telephone message wire circuit, used to handle general railway business, extending from Paris to Cincinnati and from Cincinnati to Corbin. This circuit is 195 miles in length and has 40 way stations.

The Corbin to Norton division consists of three circuits, the first a train despatching circuit extending from Corbin to Middleborough, the second a train despatching circuit from Middleborough to Norton and the third a telephone message wire circuit from Corbin to Norton. The circuit from Corbin to Middleborough is 41 miles in length and has 14 way stations, while the Middleborough to Norton division, 79 miles in length, is equipped with 14 stations. The train despatchers for both of these circuits are located at Middleborough. The message wire circuit is used to handle general railway business, is 120 miles in length and has 33 stations.

The Louisville and Nashville already has in operation a telephone train despatching circuit between New Orleans and Mobile, a distance of 139 miles, with 26 stations. Mr. C. B. Phelps, superintendent of transportation of this system and Mr. R. R. Hobbs, chief operator, will direct the work of installing the new equipment.

The Turner Monument Fund.

In our September 16 issue we recorded the passage of a resolution by the Old Time Telegraphers' and Historical Association at their Chicago reunion and the appointment of a committee to receive subscriptions for the erection of a monument at Turner, N. Y., to commemorate the sending of the first telegraph train order. The money for this purpose is to be raised by popular subscription and it is proposed when the project has been completed to issue a souvenir booklet giving the history of the event which the monument will commemorate, as well as the story of its erection, with the names of all contributors and the amounts given. Each contributor will also receive an engraved certificate suitable for framing or placing in a scrap book and specifying the amount paid to the fund.

The Erie Railroad Company is now constructing a new station at Turner and will, no doubt, aid the committee in the selection of a site near the old station whereon the proposed monument may be erected.

The committee which has the matter in charge consists of: E. P. Griffith, superintendent of telegraph, Erie Railroad, Jersey City, N. J., chairman; C. Selden, superintendent of telegraph, Baltimore and Ohio Railroad, Baltimore, Md.; E. A. Chenery, superintendent of telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railroad, Montreal, Canada; J. B. Taltavall, editor Telegraph and Telephone Age, New York; Colonel W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia, Pa., and F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All contributions should be sent to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who will act as treasurer of the committee. Acknowledgment of the amounts received will be made in the columns of Telegraph and Telephone Age as soon as possible after their receipt. The committee will be glad to receive any amount, large or small, from any person, whether connected with the telegraph service or not. Anyone should esteem it an honor to contribute to this object, which will perpetuate the memory of one of the most important railroad events in telegraphic history.

Trade Notes.

Sales of the Western Electric Company for the first nine months of the present fiscal year indicate that the gross sales for the year will amount

to \$61,000,000. The only year in the history of the company which has ever surpassed this was 1906, when the total business amounted to \$69,000,000. The number of orders for the present year, however, will be approximately 800,000, as compared with 475,000 in 1906.

The Sandwich Electric Company reports sales of their selectors to the Pennsylvania Railroad for equipping their new New York terminal and for telephone despatching installations on the Pottsville division and between Baltimore and Sparrows Point, Md. The Canadian Pacific Railway is also installing Sandwich selectors between Moose Jaw, Sask., and Broadview, Sask., a distance of 135 miles. The Indianapolis Union Railway is extending their Sandwich intercommunicating system which was described in our February 16 issue.

Municipal Electricians.

Plans are being prepared at Passaic, N. J., for the installation of the fire and police telegraph systems in the new fire headquarters and also for connecting all of the city telephones to a switchboard located at the same place. The cost of the entire work will be about \$25,000.

Bids have been received at San Bernardino, Cal., for the construction of a fire alarm telegraph system in that city.

At the concluding session of the convention of the International Association of Municipal Electricians, Mr. W. Y. Ellett eulogized the work of the retiring secretary, Frank P. Foster, and on behalf of the members presented him with a silver service.

Good Opportunities for Commercial Telegraphers in Canada.

A telegraph operator who went from New York to Canada three years ago and secured employment with one of the telegraph companies in that country, in a recent letter states that he is better off in every way than he would have been if he had remained in the United States. There are doubtless many operators in the large cities of this country who would make the same report if they appreciated the advantages which might be theirs if they should locate in one of the rapidly growing cities of Western Canada where the business is increasing so fast that the commercial telegraph companies are having considerable difficulty in securing an ample supply of operators. There seems to be a general impression that the Canadian climate is very severe and this undoubtedly deters many from making the change. Thousands of those who have emigrated to Canada from the United States, however, agree that the climate is more equable than in many parts of this country.

Mr. J. M. Carnahan, manager of the Western Union Telegraph Company at Missoula, Mont., in renewing his subscription, says: "I may be late, but I will sure be there with my renewal."

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XVIII.

How are the higher electromotive forces required obtained in some offices?

What objection is there to this method when the lower potentials are not required?

Where only high potential machines are installed how is the lower potential required for duplex operation sometimes obtained by the Postal Telegraph-Cable Company?

Draw a diagram of the connections for this arrangement.

What changes in this arrangement for duplex operation would make it available for the higher voltage required for quadruplex operation?

What different voltages can be obtained with the arrangement shown and with an original dynamo voltage of 380?

CHAPTER XIX.

Why does not the use of the high potential duplex introduce any conditions which tend to unbalance the instruments at the other end of the line?

Why can not this arrangement be used to secure the two voltages required for quadruplex operation?

What is the formula by which the resistance value of the various coils in the Field key combination may be obtained?

Show by actual examples that by using the values obtained by this formula the joint resistance of the two routes for the incoming current is always the same when the transmitter is closed and is equal to the resistance of the current path when the transmitter is open.

How is a leak box arranged to provide for two different proportions of the long to the short end current?

Compare the formula given by Mr. Jones with the one worked out by Mr. Fowle in his article on page 666 of this issue.

Does the value of the resistances used depend upon the value of the line resistance in any way?

Obituary.

C. J. Casey, an operator employed by the Western Union Telegraph Company at Savannah, Ga., since 1882, died at that place August 15, aged forty-seven years. He is survived by a wife and six children.

William D. Lessing, Associated Press operator, died of Bright's disease, at Waco, Tex., on September 2. He was well known in press circles in southern and western states.

David Davis, for many years employed by the Western Union Telegraph Company, died at Syracuse, N. Y., September 18, aged forty-nine years.

John H. Beymer, who was identified with the Western Union Telegraph Company at Wheeling, W. Va., died September 16, aged forty-four years.

Charles N. White, an expert telegrapher, formerly employed at Memphis and New Orleans, died of consumption at Bouse, Ariz., on September 4. Mr. White was the son of Mr. W. N. White, of Covington, Tenn., a well known old time and military telegrapher, who is now in the real estate business at that point.

Jeremiah B. Boyer, a member of the Old Time Telegraphers' and Historical Association, died at his home in Pittsburg, September 19, aged seventy-six years. Mr. Boyer entered the telegraph service in 1853. For over thirty years, until his retirement from business two years ago, he was proprietor of a Pittsburg hotel.

John D. Voltz, a member of the United States Military Telegraph Corps, died at Elgin, Ill., September 19, aged seventy years. Mr. Voltz had been in the telegraph service for fifty-five years. He was for twenty-five years employed by the Chicago and Northwestern Railway at South Elgin, Ill., but was retired last fall on a pension.

John V. O'Brien, special agent in charge of the commercial business of the first district, Pacific division of the Western Union Telegraph Company, at San Francisco, died September 18, aged forty-six years. Mr. O'Brien was for several years manager of the San Francisco office of his company, having only recently been promoted from that position to the post he occupied at the time of his death.

Death of W. A. Van Orden.

W. A. Van Orden, a well known old time telegrapher of New York, died September 22, of paralysis, aged fifty-five years. Mr. Van Orden entered the telegraph service in 1871 with the Franklin Telegraph Company. In 1885 he joined the forces of the Western Union Telegraph Company, and was since employed by that company as operator, traffic chief, quadruplex chief, draughtsman, assistant general wire chief and general wire chief, which position he held at the time of his retirement five years ago on account of ill health. In addition to his telegraphic duties he served for over fifteen years as draughtsman for Telegraph Age.

Mr. E. P. Griffith, now superintendent of telegraph of the Erie Railroad, and for many years general wire chief of the Western Union Telegraph Company at New York, pays the following

tribute to Mr. Van Orden, with whom he was closely associated for many years:

"Mr. Van Orden has gone, but is not forgotten. A bright star in the telegraph firmament has dropped from sight, but the magnets of his personality will remain warm with the current of love induced by his brilliant career in the field he occupied. His associates for the past thirty years will remember him as the storehouse of knowledge pertaining to the great wire system of all telegraph, telephone, electric light, power distributing, police and fire alarm telegraph wires in New York City, and an encyclopedia of telegraph and cable circuits covering the world. It was Mr. Van Orden who made the map showing the land lines along the Atlantic and Pacific coasts, and the Gulf of Mexico, as well as the submarine cable connections in Cuba and the West Indian Islands which was a guide to the government and our enterprising American newspapers in keeping in touch with the situation during the Spanish-American War in 1898.

"Van, as I shall always remember him, was one who always did what was expected of him. It was only necessary to intimate what was required and then rest assured that the thing was done within the margin of time allowed. The same principle which characterized his telegraph business career, was shown in his domestic life, and old timers who have known Van in every phase of his work and home life, feel with the beloved widow that the loss is mutual."

LETTERS FROM OUR AGENTS.

PHILADELPHIA, POSTAL.

The vacation season among the chiefs in this office is about over, Assistant Wire Chief F. P. McElroy relieving all of the other chiefs while they were on vacation.

F. S. Barrett has returned from Atlantic City, where he has been helping to handle the heavy summer traffic.

A new telephone exchange is being installed in this office which will greatly assist in the handling of the large amount of business which is received and delivered by telephone.

CHICAGO, WESTERN UNION.

The following promotions have been made in this office:

J. J. Welch, general traffic chief, has been appointed inspector of traffic and J. W. Konigsmark, assistant chief operator, has been appointed division wire chief. Both of these gentlemen are attached to the superintendent's office.

Chas. H. Shell, general wire chief, has been appointed assistant chief operator.

W. F. Webber, western switchboard wire chief, succeeds Mr. Shell as general wire chief.

Roy R. Willhoit, wire chief west switchboard, becomes western switchboard wire chief.

James R. Pierce, assistant general traffic chief, has been advanced to be general traffic chief, vice Mr. Welch.

F. D. Bermke, division chief of the Cincinnati and southern division, has been promoted to be assistant general traffic chief.

Louis Konefsky, assistant division chief of the Cincinnati and southern division, has been advanced to the position of chief in that division.

NEW YORK, WESTERN UNION.

Mr. T. A. McCammon, district traffic superintendent, has returned from his vacation and judging from appearances, was much benefited by his stay in the North Woods.

"Senator" William L. Ives, the dean of the eastern division, on his return from the annual reunion of the Old Timers, spoke in high terms of praise of the hospitable reception accorded him at Chicago.

Mr. William B. Purcell, loop chief, was a delegate to the Eucharistic Congress held in Montreal recently.

A daughter has been born to Mr. George McCammon, son of district traffic superintendent T. A. McCammon.

A daughter was born to Mr. B. F. Griffith, of the quadruplex department on September 16. Mrs. Griffith, nee Marion Dobson, was formerly identified with this office.

A retiring room for the ladies of the operating force has been fitted up on the ninth floor and a reading and smoking room for the men on the same floor. These rooms have been attractively furnished and are much appreciated by all of the force. The latest periodicals and library books are accessible and as many as forty people are frequently seen in the rooms at one time.

Mr. Peter Ritter, formerly and for many years in charge of the elevator service in this building and well known to old time members of the profession throughout the country, was a recent office visitor. Mr. Ritter received a hearty welcome from his numerous old friends on the occasion of his visit. For over thirty years he had been a prominent figure in this building.

J. J. Barrett, of the night force, suffered a stroke of paralysis while at work on the evening of September 9, from the effects of which he died at St. Gregory's Hospital, the following morning. Mr. Barrett was of a genial disposition and highly esteemed. He is survived by a wife and four children. A delegation from both the day and night forces attended the funeral.

George H. Worzel, the veteran office lineman, who retired from the service recently, after forty years of continuous employment, died at his residence, at New Brighton, Staten Island, on September 10. Mr. Worzel was a man of excellent character and esteemed by a host of friends. The interment was at the Moravian Cemetery at New Dorp, Staten Island, and was attended by a number of his old associates from this department.

Milton Pope, of Atlanta, Ga., died suddenly in this city on August 30. Mr. Pope's parents had the remains forwarded to his old home in Atlanta for burial.

Altro Godman, who formerly worked for the old Atlantic and Pacific Telegraph Company, in New York, died in Bellevue Hospital, this city, on September 12, aged forty-five years. Interment was at Chicago.

The Electrical School connected with this department re-opened for the season, on September 16. Judging from the large number present and the lively interest displayed, the outlook is most encouraging. The officials of the company have kindly placed a spacious, comfortable, well lighted room on the ninth floor at the disposal of the students and this action is highly appreciated by all concerned. The school fills a long felt want and its advantages should be availed of by many more. The fees connected with the instruction are nominal.

OTHER NEW YORK NEWS.

The annual meeting of the Telegraphers' Mutual Benefit Association will be held in the Western Union Building, 195 Broadway, New York, on Wednesday, November 16.

Mr. Thomas J. Cusack, formerly and for many years one of the prominent figures in commercial telegraph circles in New York, but for the past twelve years identified with the fire alarm telegraph department of this city, has been enjoying a vacation in Maine, New Brunswick, and other eastern states and provinces.

Assessment No. 514 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of William H. Plunkett, at New York; John E. Payne, at Denver, Col.; Harrison H. Smith, at Washington, D. C.; Harry Wobensmith, at Philadelphia, Pa.; James F. Grayson, at Kansas City, Mo.; Ferdinand E. Basler, at Sullivan, Ind.

Outing of Mackay Field Club.

The Mackay Field Club of the Commercial Cable Company held its annual outing at Young's Manor, Kingsland, N. J., on Saturday, September 17.

The executive office distinguished itself by winning every athletic event on the program. The 220-yard dash for single men was won by Charles Dedon, of the executive office, with Frank Brady, of the treasurer's office second and John Quinn, of the clearing house office third.

The executive office relay team, composed of J. McKiernan, Leroy Lilley, Henry Brinkmeyer and Charles Dedon, won the 440-yard relay race. The clearing house team finished second and the commercial pacific quartet was third.

Charles Mignon, of the executive offices, captured the 100-yard dash for married men, with Fred Rauh, of the clearing house office, second and Alfred Stevens, of the clearing house office, third.

The executive office defeated the clearing house office at baseball by a score of 8 to 3. The batteries were: executive office, Dedon and Brinkmeyer; clearing house office, Quinn and E. McKiernan.

After the games the forty-five members of the club who were present enjoyed an excellent dinner and the remainder of the evening was spent in singing, dancing and other amusements.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, has total assets of \$500,000. The real measure of safety which it offers to depositors, however, is much greater than this, as they have \$450,000 loaned on first mortgages on real estate, the actual value of which is at least double this sum. Hence, the value of their assets is stable and unaffected by fluctuations of the stock market. Inquiries by mail receive prompt attention.

Life Insurance is based upon the certainty of death at some time and its possibility at any time. The splendid financial position of the Telegraphers' Mutual Benefit Association, 195 Broadway, New York, is shown in the Reserve Fund, of \$317,000, which, apart from current assets, amounts to nearly 6 1-3% of the total contingent mortuary liabilities, and yields an annual revenue of more than \$15,000; operating on sound and correct principles, with ample security, it offers to the telegraph and telephone employee the best and most economical form of protection for the family and dependents yet devised. Write for particulars.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. They render the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

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Telegraph and Telephone Age

No. 20.

NEW YORK, OCTOBER 16, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Study of Telegraph Apparatus.

PART IV.

THE NEUTRAL DIFFERENTIAL RELAY.

The relay used on the common or "B" side of a quadruplex circuit is called neutral because it ignores the polarity of the current which operates it. That is to say it has no preference for either, all it asks is a certain quantity or volume of current.

It operates in the same manner that a single line relay does when working over an escape. In both cases the tension of the retractile spring is simply made stronger than the magnetic strength of the current due to the volume of the escape alone, and the operation of the relays depends upon the additional volume which flows when the key is closed. On quadruplex circuits, the "short end" current represents the equivalent of an escape.

There are peculiar features and connections in this relay that operators as a rule do not observe unless attention is drawn to them.

For instance the platinum contact points are not on the front or closed position of the lever as is the case with polar and single line relays, but on the open position. This alteration is made for the purpose of utilizing a repeating sounder, or "bug trap" as Mr. Edison's invention is called. The repeating sounder closes the receiving sounder when

the relay closes because the contact points of the repeating sounder are on the upper instead of the lower side of the lever. The object of this arrangement is to create an air gap between the back contact points of the relay which must be entirely closed again before the receiving sounder will be released. For this reason the periods of no current in the neutral relay when the distant battery is being reversed, which may be long enough to cause the lever of the relay to be partially released, are yet too short to allow the lever to close the platinum points on its upper side before normal conditions of current resume. Hence the receiving sounder does not record the kick that would obviously result without the help of this intervening gap.

Another unobserved feature is the dimensions of the iron core. One glance will show that the spools are much shorter than ordinary relays. The length of the core is lessened for the purpose of enabling the relay to act quickly. A short stumpy magnet always acts in this manner, but in order to get sufficient magnetizing force, the coils must have a greater number of convolutions of wire per linear inch, hence the wire used in winding it must be of very fine gauge, usually No. 36 B. & S.

The retractile spring, again, is usually larger and stronger in order to be less easily influenced by the short end current.

Of course the student knows that multiplex relays possess two coils, each having the same number of convolutions one of which is wound around the core in a direction exactly opposite to that of the other, the purpose of which winding is to prevent the home current from interfering with the incoming signals. This is the usual way of explaining the non-interference of the home signals. But did it ever occur to the student that as a matter of fact a great many of the letters received, or at least part of some letters, he imagines are made by the sender at the distant end and due to current from that point, are really made by the sender sitting by his side and by the home current at that? If not he does not fully appreciate the wonderful capacity of a differential relay. The fact is that the home current is only ineffectual on the home relay when the wire is grounded at the distant end and the balance is perfect. At all other times, that is to say, while the circuit is being worked double, the receiver can never tell whether he copies an L or an E from the man at the other end of the circuit or his side partner.

The following explanation will make this fact apparent.

Each incoming signal is due to a surplus of current in one of the home coils over and above that which flows in the other. This unbalanced condition exists the moment the distant battery is cut in after a line balance has been taken.

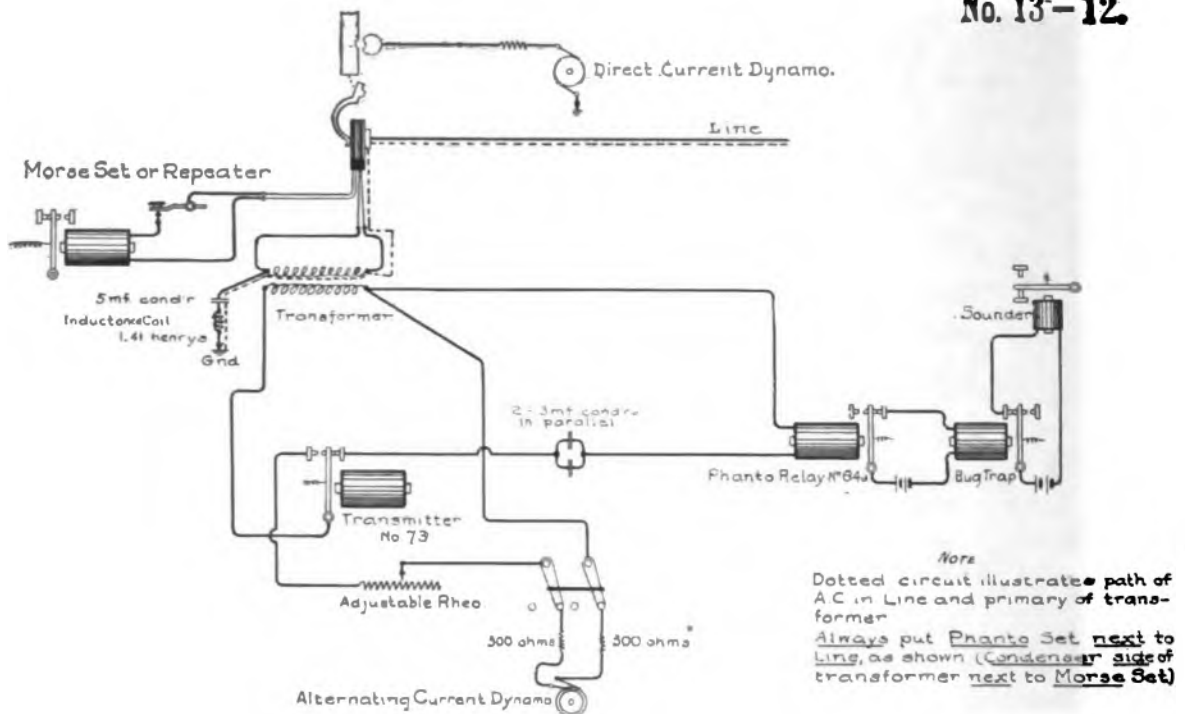
It is apparent that to a distant ground the same volume of current will flow through the home main and artificial line coils, and will produce no magnetic effect because the two currents balance each other. When, however, the distant battery is cut in the volume of current in the line and the spool containing the main line coil must obviously be either increased or diminished according as to whether the e. m. fs. of the two batteries assist or oppose one another. As the artificial line is grounded and the incoming current never traverses that coil the volume of current in the artificial line never varies nor can it be shut off by any changes of polarity occurring in the main line and companion coil.

mitting, but cannot do so as long as an equal amount of current flows through the main line. The moment, however, the line batteries oppose each other, this coil becomes instantly active and creates the intended signal.

(To be continued.)

[In describing the principle involved in the operation of the movable steel lever armature of a camel back polarized relay in the preceding installment of this article (third line, second column) the omission of a line from the original copy gives an erroneous explanation. The words "overpowers the horseshoe magnet," should have read "overpowers the induced magnetism in the soft iron spool cores or extensions of the horseshoe magnet."]

No. 13-12.



THEORY OF 60-CYCLE PHANTOPLEX.

Now what happens when operation begins? We know that at each end of the line when the key is closed the negative pole of the battery is to line, and the positive pole where the key is open. When like poles oppose no current can flow through the line coils, but each artificial line coil will get current from its home battery and operate the relay just the same. Hence each home battery and artificial line coil actually make the signal that would have come over the wire had the e. m. fs. combined and created a surplus of current in the main line spools. It is evident, therefore, that whenever the two senders happen to make the same letter or letters in unison the main line current is shut off and you are copying from the sender beside you.

The student should remember that the artificial line coil in his relay is always endeavoring to make the signals or letters the distant operator is trans-

Postal Telegraphic Apparatus.

BY JOHN F. SKIRROW.

Associate Electrical Engineer of the Postal Telegraph-Cable Company, New York.

THEORY OF 60 CYCLE PHANTOPLEX.

Phantoplex equipment is frequently set up upon lines which parallel nearby telephone circuits, or where telephone circuits are carried upon the same poles. In such cases a frequency of 150 cycles, the usual frequency employed in phantoplex work, interferes with telephone operation. Telephone apparatus is so designed, however, that it is not affected by frequencies below 60 cycles.

Where conditions exist as indicated, therefore, phantoplexes are operated at 60 cycles frequency. The accompanying print shows the theory of operation, the dotted line indicating the path of the A. C. current.

Recent Telegraph and Telephone Patents.

A patent, No. 971,237, for a telephone, has been granted to J. W. Atlee, of Riverton, N. J.

A patent, No. 971,352, for a party line indicating system, has been issued to C. C. Bradbury, of Chicago, Ill.

A patent, No. 970,821, for an automatic exchange selector, has been awarded to H. B. Holmes, of Park Ridge, and E. B. Craft, of Wilmette, Ill.

A patent, No. 970,975, for private branch intercommunicating telephone system, has been taken out by J. N. Wallace, of La Crosse, Wis., and Edward B. Craft, of Chicago, Ill.

A patent, No. 971,170, for telegraphy, has been secured by Charles G. Burke, of New York. A book for telegraphic purposes consists of words composed of letters agreeing or differing in the number of electric units constituting their individual telegraphic symbols, but the aggregate of whose units are divisible and convertible into number symbols all of which have a like number of units.

The following patents have expired:

Patent No. 505,087, for a telephone, issued to Joseph B. S. Booth and Ernest J. Falconner, of Manchester, Eng.

Patent No. 505,170, for a telephone switch, held by Thomas W. Ness, of Montreal, Can.

Patent No. 505,188, for a multiple switchboard apparatus, held by John J. Carty, of New York.

Patent No. 505,628, for a duplex telephone, issued to William Marshall, of New York.

Patent No. 505,917, for a transmitting telephone, issued to Silas W. Holman, of Boston, Mass.

Personal.

Mr. Stephen D. Field, the well known electrical engineer and inventor of Stockbridge, Mass., was a recent New York visitor.

Mr. Louis de Goll, president of the Rowland Telegraphic Company, Baltimore, was a recent New York visitor.

Mr. James Uncles, a well known old time telegrapher, formerly of New York, but now of North Adams, Mass., was a recent New York business visitor.

Mr. Charles E. Scribner, chief engineer of the Western Electric Company, New York, accompanied by his wife, returned October 7 from Europe, after attending the recent conference of telegraph and telephone engineers held in Paris.

Mr. D. W. Phelan, of Salt Lake City, an old time telegrapher, but for the past twenty years in the smelting business at that point, accompanied by his wife, sailed from New York for Europe a few days since to be absent two months.

The annual carnival of the Priests of Pallas, of Kansas City, occurred October 4-9. Mr. George M. Myers, a former telegrapher of that city, and at one time president of the Pacific Mutual Telegraph Company, is one of the moving spirits in this affair, and it is largely through his efforts that these celebrations have been carried on each year since 1887.

Mr. Ed. J. Mock, editor and publisher of the "Telephone Engineer," Chicago, was a recent New York visitor.

Mr. Russel H. Potter, manager of the National District Telegraph Company, of Buffalo, N. Y., has resigned to accept a position as sales agent for the Star Electric Company, of Binghamton.

Mr. Robert L. Dean, of Chicago, inventor of the Dean Rapid Telegraph System, was a recent New York visitor, coming here on business connected with printing telegraph development.

Mr. John Gennings, general manager of the Central News Company, and editor of the Telegraph Chronicle, London, England, has been spending some time in New York. He was entertained while here by many of his friends in the telegraph and newspaper service.

The report of the serious illness of General Thos. T. Eckert, of New York, formerly, and for many years president of the Western Union Telegraph Company, is without the slightest foundation. General Eckert has spent the summer at his residence in Long Branch, N. J., and contemplates an early return to his city home.

His Excellency, the Hon. R. Nakashoji, vice-minister of the Department of Communication of Japan, is visiting in this country. Since early in June Mr. Nakashoji has been visiting various cities in Europe for the purpose of inspecting railroad, marine, telephone, telegraph and electrical systems, and is now here to examine American systems of this sort.

Mr. Robert H. Smith, of Port Chester, N. Y., has recently received from the War Department a certificate of service in the United States Military Telegraph Corps. Mr. Smith served during the Civil War as operator in the War Department office and in the field for nearly two years. He and the late D. W. McAneeny, of New York, entered the military service at the same time.

Postal Telegraph-Cable Company.**EXECUTIVE OFFICES.**

Mr. C. A. Richardson, acting superintendent at Boston, accompanied by his wife, is spending his vacation at Norfolk, Va., and Washington, D. C. Mr. L. Lemon, division superintendent of New York, is looking after the duties of his office during his absence.

Among the recent executive office visitors were Mr. George S. Palmer, lately appointed wire chief of the Chicago office.

A Mutual Investment Association, similar to the one which has existed for some time among the employees of the Company in New York, has been formed by the members of the force at Washington, D. C. Mr. F. B. Travis, manager of the office in that city, has been elected treasurer of the new association.

RESIGNATIONS AND APPOINTMENTS.

Mr. C. E. Flint has been appointed manager at Northampton, Mass., vice Mr. R. W. Harrington, resigned.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee, and Mr. Belvidere Brooks, general manager, of New York, are in Chicago on company business.

Mr. Charles H. Gaunt, general superintendent at San Francisco, and Mr. Edgar C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company, San Francisco, were recent executive office visitors.

At the annual meeting of the stockholders of the Gold and Stock Telegraph Company, the following were elected directors: G. W. E. Atkins, A. R. Brewer, B. Brooks, Thomas F. Clark, R. C. Clowry, George H. Fearons, J. C. Willever, Edwin Langdon, A. G. Saylor and J. B. Van Every.

Mr. George W. Blanchard, formerly superintendent of the Postal Telegraph-Cable Company, New York, but for the past three years in the real estate business, has re-entered the telegraph service and is now attached to the office of General Manager B. Brooks.

Mr. J. R. Hobson, commercial superintendent of the Southern Bell Telephone Company, Atlanta, Ga., was a recent executive office visitor coming here to perfect plans for the closer relations between the telegraph and telephone.

The following appointments have been made in the southern division.

FIRST DISTRICT, RICHMOND, VA.

J. S. Calvert, district commercial superintendent.
F. O. Nourse, district traffic superintendent.
J. B. Faulkner, district plant superintendent.

SECOND DISTRICT, ATLANTA, GA.

E. E. Williams, district commercial superintendent.
G. W. Lloyd, district traffic superintendent.
W. A. Neill, district plant superintendent.

THIRD DISTRICT, JACKSONVILLE, FLA.

L. J. Maxwell, district commercial superintendent.
J. E. Peacock, district traffic superintendent.
J. C. Duane, district plant superintendent.

FOURTH DISTRICT, NASHVILLE, TENN.

J. R. Terhune, district commercial superintendent.
W. G. Peebles, district traffic superintendent.
W. K. McClarin, district plant superintendent.

Mr. J. E. Scofield has been appointed a special agent with headquarters at Atlanta. Mr. Scofield is well known in the telegraph field having for ten years until 1908, been manager of the Atlanta office of the Postal Telegraph-Cable Company. Since that date he has been engaged in other business.

The districts of the southern division have been rearranged so that their boundaries now follow state lines. The first district now includes Virginia, West Virginia, and North Carolina; the second district, South Carolina and Georgia; the third district, Florida and Alabama, and the fourth district, Mississippi, Tennessee and Kentucky.

Salt Lake City has been made the headquarters of a new district in the mountain division, which will include the states of Utah, Montana and Idaho.

Mr. U. G. Life, of Denver, has been appointed district commercial superintendent of the new district.

The following appointments have been made in the western division.

SECOND DISTRICT, ST. LOUIS.

W. R. Chapman, district commercial superintendent.

W. J. Armstrong, district traffic superintendent.

C. R. Fisher, district plant superintendent.

The office of the company at Trenton, N. J., has been moved into new quarters and modern equipment installed, making the office up-to-date in every particular.

The American District Telegraph Company, of New Jersey, has declared the regular quarterly dividend of one per cent. payable October 29, to stockholders of record October 19.

Mr. James Hiram Gates, whose appointment as assistant superintendent of the American District Telegraph Company, for the State of Ohio with headquarters at Columbus, was announced in our October 1 issue, was born at Lyons, Iowa, April 29, 1881. He entered the service at Clinton, Iowa, in May, 1897, and since then has served as manager at that place and at Bloomington and Quincy, Ill., where he was located at the time of his recent advancement.

Mr. W. H. Collins, whose appointment as district plant chief at Scranton, Pa., was announced in our October 1 issue, was born in that city and has been connected with the telegraph service at that point since 1877, when he entered telegraphic employ as a messenger for this company. In 1880 he became an operator and in 1882 was made chief operator of the Scranton office. He was later made assistant manager which position he held at the time of his recent promotion, and has for many years been a valued assistant to Superintendent Richard O'Brien.

RESIGNATIONS AND APPOINTMENTS.

Mr. William H. Van Zant, has been appointed manager of the Albany, N. Y., office, vice Mr. T. J. Meade, appointed district traffic manager at Syracuse.

Mr. E. W. Malloy, manager of the Lansing, Mich., office, has been appointed inspector of the fifth district, western division, with headquarters at Cleveland, O.

Mr. F. H. Potter has been appointed manager at Lansing to succeed Mr. Malloy.

Mr. C. B. Jewell, of Denver, has been appointed traffic chief in the Salt Lake City office, and Miss Pearl Vandervoort, of Omaha, has been appointed chief clerk to the chief operator of that office.

Mr. W. L. Burger, chief operator of the Schenectady, N. Y., office has been appointed acting manager, vice A. E. Reynolds appointed district commercial manager at Albany.

Mr. H. A. Carroll, manager at Macon, Ga., has been appointed manager at Jacksonville, Fla., vice J. E. Peacock, appointed district traffic superintendent.

Mr. E. G. Folger, manager of the Oakland, Cal., office, has been appointed commercial manager of the San Francisco office.

Mr. F. Aubertin, manager at Berkeley, Cal., has been promoted to the management of the Oakland office, and Mr. W. I. Thompson, of Kalamazoo, Mich., has been appointed manager at Berkeley.

Mr. W. J. Savage has been appointed cashier of the Buffalo, N. Y., office, vice J. A. Pfend, promoted to the managership.

Mr. Raymond Alger has been appointed chief operator of the St. Louis office, vice W. E. Bellman, resigned. Mr. Alger is twenty-eight years of age and entered the service at Hannibal, Mo., as messenger thirteen years ago. He has been connected with the St. Louis office for the past ten years during which time he has served as operator and assistant chief in several departments. Since October 15, 1906, he has been manager of the Gold and Stock department in that office.

H. C. Chace, Division Traffic Superintendent, Western Union, San Francisco.

Mr. H. C. Chace, who has recently been appointed division traffic superintendent of the Western Union Telegraph Company at San Francisco, was born at Santa Cruz, Cal., July 2, 1872. He entered the employ of the Western Union Telegraph Company in his native city in



H. C. CHACE,
Division Traffic Superintendent, Western
Union Telegraph Company,
San Francisco.

June, 1886. From then until 1897 he served that company in various capacities from operator to manager at Watsonville and Fresno, Cal., Seattle, Wash., and Ogden, Utah. He then became wire chief of the Los Angeles office, which position he held until April, 1902, when he transferred his services to the Atchison, Topeka and Santa Fe Railroad, as manager of their general telegraph office at Los Angeles. In July of the same year he was advanced to be assistant superintendent of telegraph of the Santa Fe System, with head-

quarters at Los Angeles, where he was located at the time of his present promotion.

Mr. Chace, by reason of his executive experience both in the commercial and railroad fields, coupled with natural executive ability, is well qualified to discharge the duties of the post which he has now assumed and his many friends in the service believe that future advancements are in store for him.

E. E. McClintock, Western Union Superintendent, Denver.

Mr. E. E. McClintock, who has been appointed superintendent of the first district, Mountain division, with headquarters in Denver, is one of the most popular figures in telegraph circles in that city. His ability is attested by the fact that for several



E. E. MCCLINTOCK,
Superintendent Western Union Telegraph
Company, Denver.

years past he has served as superintendent of telegraph for both the Colorado Fuel and Iron Company and the Victor Coal and Iron Company. Although these two companies are keen business rivals neither was willing to dispense with Mr. McClintock's services so he continued to serve both interests up to the time of his transfer to the Western Union. Mr. McClintock was born at Wilmot, Ohio, January 2, 1864, and entered the railway telegraph service in October, 1883, as operator. He has since served as train despatcher, station agent, passenger and ticket agent, telegraph train clerk and superintendent of telegraph for the two companies mentioned and the railroads which they controlled.

R. W. Gray, Division Plant Superintendent, Western Union, San Francisco.

Mr. Roy, William Gray, whose appointment as division plant superintendent of the Pacific division of the Western Union Telegraph Company, at San Francisco, was announced in our September 16 issue and who assumed the duties of that position on October 1, is, by reason of his extensive experience in plant engineering and construction work, well qualified for his new position. Mr. Gray was born

at Nashua, Iowa, July 29, 1875, and his experience in plant work began in 1898 when he joined the forces of the Pacific Telephone and Telegraph Company. While employed by that company he held the positions of foreman of underground construction in the Southern division, division construction foreman of the Central division, superintendent of the Sacramento division, chief inspector in the engineering department and division plant engineer of the Northern division with headquarters at Portland, Ore., which position he held at the time of his transfer to the telegraph service.

L. B. Thompson, Division Electrician, Western Union Telegraph Company, Atlanta.

Mr. L. B. Thompson, who has recently been appointed division electrician of the Western Union Telegraph Company at Atlanta was born at Cortland, Ohio, January 20, 1864. He entered the telegraph service at Atlanta as operator for the West-



L. B. THOMPSON,
Division Electrician, Western Union Telegraph
Company, Atlanta.

ern Union on December 15, 1888, and served successively as night wire chief, night chief operator and chief operator in that office. In September, 1904, he accepted a position in the office of the Chief Engineer of the Southern Bell Telephone and Telegraph Company. In 1906 he became superintendent of leased wires of that company and on September 1, 1908, he was appointed general toll wire chief which position he held at the time of his return to the telegraph service. Mr. Thompson has always been a thorough student in electrical matters and is undoubtedly one of the best qualified men in the south for the position which he now holds. During his previous employment in the telegraph service he was a frequent contributor of technical articles to our columns, and his many friends are glad to welcome him back to the ranks of the telegraph.

The Cable.

The American Telegraph and Cable Company, and the Western Union Telegraph Company, have applied to the English government for the renewal of their license to maintain and use at Sennen Cove,

Cornwall, England, two telegraph cables from America, and for a license to lay two additional cables. The applications will be considered on October 22.

It is announced that a concession has been granted by the Government of Costa Rica to English interests for the establishment and working of a submarine cable between Colon and Limon. The right to establish one wireless telegraph station in the Republic is also granted.

Wireless telegraphy is proving a valuable adjunct to the operations of cable laying and repairing steamers. An illustration of this occurred recently when one of the Western Union Telegraph Company's cables broke down about sixty miles from the English coast. The cable steamer *Colonia* was known to be on her way from the United States to England and was communicated with by wireless telegraphy, and informed of the location of the break. Captain Woodcock of that vessel, when he reached the proper position, made the repair with the loss of only a few hours' time and then proceeded on his way to London.

Annual Election of Great North Western Telegraph Company.

At the annual meeting of the stockholders of the Great North Western Telegraph Company held at Toronto, September 28, the following officers and directors were elected: President, H. P. Dwight; vice-president, Adam Brown; vice-president and general manager, I. McMichael; directors, H. N. Baird, James Hedley, Hon. J. K. Kerr, W. C. Matthews, Toronto; Colonel R. C. Clowry, J. B. Van Every, New York.

The Great North Western Telegraph Company has announced that after November 30 it will discontinue its news service which is known as the "Easson Service." The management of the company is taking this action as it believes that since telegraph companies are now classed by law as common carriers the collection and dissemination of news is not properly in their province.

Municipal Electricians.

A new fire alarm telegraph system will be installed in the near future at Chester, Pa.

Mr. Daniel W. Bowie, who has been assistant city electrician of Atlanta, Ga., for the past two years, has been advanced to the post of city electrician, vice Mr. Fred Miles, resigned.

A patent, No. 970,886, for a fire and police telegraph system, has been granted to F. W. Cole, of Newton, Mass. A signal transmitter with a winding member, a pivoted lever therefor, and a lever secured to the pivot shaft thereof, and two independent actuators for engaging the lever to turn the pivot shaft and operate the actuating lever. A patent, No. 970,887, for a fire alarm telegraph system, has also been granted to Mr. Cole. A signal transmitter with a ground circuit connected with the main circuit by the operating device and rewinding mechanism to restore the operating device and disconnect the ground.

The contract has been awarded at Rock Island, Ill., for installing improvements in the fire alarm system at a cost of \$11,265.

The Gamewell Fire Alarm Telegraph Company has been awarded the contract for installing the electrical equipment in the new fireproof building which is being constructed at Oakland, Cal., for the headquarters of the fire alarm and police telegraph systems. The cost of the new equipment will be \$12,805.

The Annual Meeting of the Western Union.

The annual meeting of the Western Union Telegraph Company, occurred at New York on October 12, when all of the directors were re-elected as follows: Robert C. Clowry, Henry Walters, George J. Gould, Joseph J. Slocum, Edwin Gould, Paul Morton, Charles Lanier, Robert M. Gallaway, J. Pierpont Morgan, Edward T. Jeffery, Chauncey M. Depew, Theo. N. Vail, Henry M. Flagler, Henry S. Howe, John Jacob Astor, John I. Waterbury, Oliver Ames, Robert Winsor, Jacob H. Schiff, Henry P. Davison, James Stillman, William H. Moore, John J. Mitchell, Robert S. Lovett, Henry A. Bishop, Edward J. Hall, Harris C. Fahnestock, Union N. Bethell, Thomas H. Hubbard, Henry B. Thayer.

The election of officers for the ensuing year will take place on October 19.

A detailed report of the auditors will be found on another page of this issue.

President Clowry, in his annual report to the stockholders, said in part:

"The number of messages transmitted during the year was the largest in the history of the company, and shows an increase of 7,081,966 over the number sent during the previous fiscal year. The increase in the number of offices was 504.

"There was added during the year 2,847 miles of pole and cable mileage, and 46,549 miles of wire, of which 30,515 miles were copper.

"The total wire mileage is now 1,429,049, of which 530,517 miles are copper.

"To meet the growing demands of the plant and traffic, the general superintendent of the first division, Mr. Belvidere Brooks, was appointed general manager, and the number of general divisions was increased from four to six. Greater authority has been given both to the general and district superintendents, and many changes have been made which will increase the efficiency of the organization and promote the welfare of employes.

"December 15, 1909, a contract was made between this company and the American Telephone and Telegraph Company, providing for the joint use of plant and operating facilities which will, when fully worked out, add greatly to the efficiency of the service and economical operation of both companies. It has not in the past been possible for this company to keep a large proportion of its offices open both day and night, Sundays and holidays, but under arrangements which are now in operation in some sections of the country, and which will soon extend

to all, it is expected that we will be able to maintain continuous telegraph and cable service twenty-four hours a day and every day in the year.

"Perhaps the most interesting if not the most important event of the year was the introduction of the "Night Letter." The response of the public to this new service has been most gratifying and it is manifesting itself not only in a large increase in our gross receipts but also in a generous recognition of the fact that we are striving to improve, extend and popularize our service in every way possible.

"The dividend has been continued at three per cent. because in the opinion of the directors no change should be made in this rate until it is determined what, if any, further charges should be made on account of depreciation or reconstruction and until such re-arrangements and improvements in the property shall be made as will enable new improved and extended facilities to be given to the public."

Legal.

By a recent decision handed down by the United States Circuit Court of Appeals, at Atlanta, Ga., in the case of the Western Union Telegraph Company against the State of Georgia it was held that as the telegraph company had already been taxed on a valuation of \$756,000 by the State, a further tax on \$950,000 federal franchise value was excessive.

By this decision every telegraph company in the United States which accepted the post roads act of 1866 is exempt from State taxation on its franchise. This means that States which have passed franchise tax laws will be prohibited from collecting such taxes from the telegraph companies."

Trade Notes.

The Western Electric Company has issued a booklet describing its composite telephone and telegraph system for railway service. The booklet contains fifty-four pages and is illustrated by many cuts of telephone sets, howlers, coils, condensers, protectors, batteries, line poles and a dozen circuit diagrams.

Mr. Walter G. Mullen, of Baltimore, Md., has accepted a position with the Morkrum Printing Telegraph Company, as their eastern representative, with headquarters at 253 Broadway, New York.

The new child labor law in New York State, prohibiting the employment of boys under twenty-one, as messengers between the hours of 10 p. m. and 5 a. m., went into effect October 1. This law also affects theatres and restaurants where boys are employed as check boys or ushers.

The Texas company which was organized by John W. Gates as a rival of the Standard Oil Company, and has refineries at several places in Texas, now has over 1000 miles of telegraph lines. They will soon have in operation a wireless station at Port Arthur, Texas, which will be established for the purpose of communicating with the company's ships.

The Telephone.

Mr. N. W. Harris, head of the firm of N. W. Harris and Company, New York, has been elected a director of the American Telephone and Telegraph Company.

Mr. J. F. Bratney, chief engineer of the Bell Telephone Company of Missouri at St. Louis, has resigned to become superintendent of plant for the Missouri and Kansas Telephone Company at Kansas City, Mo. Mr. Bratney has been with the Bell Telephone Company of Missouri for the last seven years.

Dr. Alex. Graham Bell, while on his tour around the world, recently gave evidence before the Postal Commission, at Melbourne, Australia, on the Sydney telephone service. While admitting that his observations of the Sydney service showed that much was still desired to make it efficient, many of the complaints of delay were due to the tardiness of subscribers in replying when called up. The average time occupied in giving the connection was 8 seconds, but the average time before a reply was obtained was 32 seconds.

A conference of officials of the associated Bell Telephone Companies was held in New York last week. On the evening of October 6, Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, gave a dinner at the Hotel Astor to those present at the conference and to some of the telegraph officials. Those present at the dinner were Theodore N. Vail, president; E. J. Hall and H. B. Thayer, vice-presidents; J. J. Carty, chief engineer, C. G. Dubois, comptroller, F. A. Pickernell, assistant to the president, and George B. Leverett, general counsel of the American Telephone and Telegraph Company, New York; U. N. Bethell, president and H. F. Thurber, vice-president of the New York Telephone Company; Bernard E. Sunny, president of the Chicago Telephone Company; W. D. Gentry, president of the Southern Bell Telephone Company, Atlanta; H. J. Pettengill, president of the Southwestern Telegraph and Telephone Company, Dallas, Tex.; E. C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company, San Francisco; Jasper N. Kellar, president of the New England Telephone and Telegraph Company, Boston; Alonzo Burt, president of the Wisconsin Telephone Company, Milwaukee; C. S. Gleed, president of the Missouri and Kansas Telephone Company, Topeka; Caspar E. Yost, president, and G. E. McFarland, general manager of the Iowa and Nebraska Telephone Companies; H. Vance Lane, president of the Rocky Mountain Bell Telephone Company, Salt Lake City; E. D. Nims, president of the Pioneer Telephone and Telegraph Company, Oklahoma City; Colonel R. C. Clowry, president, B. Brooks, general manager, and G. W. E. Atkins, vice-president of the Western Union Telegraph Company, and W. H. Baker, vice-president of the American District Telegraph Company, New York.

Mr. H. W. Edelen has been appointed division commercial engineer of the Pacific Telephone and Telegraph Company with headquarters at San Francisco.

At a meeting of the Telephone Society of Baltimore, held in that city October 5, Mr. S. B. Williams, of the engineering department of the Bell Telephone Company of Pennsylvania, delivered a paper upon "Opening of a New Exchange."

At a meeting of the Philadelphia Telephone Society, held October 11, Mr. W. A. Tower, plant superintendent of the Bell Telephone Company of Pennsylvania read a paper on "Some Facts Concerning Construction Work."

The following district commercial superintendents have been appointed in the central division of the Pacific Telephone and Telegraph Company, which is now divided into five districts: Mr. L. M. Brown, at Chico; Mr. J. P. Noble, at Sacramento; Mr. J. T. Gross, at Fresno; Mr. F. L. McNally, at San Francisco.

Plans are under way for establishing telephone service between Germany and Italy, and a conference was held in Zurich recently at which delegates were present from Italy, Switzerland and Germany to agree upon rules, regulations and tariff for the new service which will connect Rome and Berlin and intermediate cities.

An attempt is being made to establish in New York a telephone news service whereby subscribers may be provided with news bulletins, lectures, or vocal or instrumental music by telephone as desired. A similar service has been in use in Budapest, Hungary, for several years.

The Pacific Telephone Magazine for September contains a fine full-page engraving of Mr. L. W. Storrer, formerly special representative on the Pacific coast and for many years general superintendent of the Postal Telegraph-Cable Company, but who was recently appointed commercial agent of the Pacific Telephone and Telegraph Company in charge of leased lines and inter-company relations.

Colonel David B. Parker, a former prominent telephone official, died at his home at Ellicottville, N. Y., September 22, aged sixty-seven years. Colonel Parker was one of the pioneers in the telephone field, being at one time general manager of the Metropolitan Telephone and Telegraph Company in New York, and later vice-president and general manager of the Bell Telephone Company of Buffalo, from which position he retired twelve years ago on account of ill health. Among those in attendance at Colonel Parker's funeral were R. W. Devonshire, general manager of the American Bell Telephone Company, Boston; H. F. Thurber, general manager, E. F. Sherwood, superintendent of traffic, and G. C. Allen, division plant superintendent of the New York Telephone Company, New York; H. W. Pope, special agent of the American Telephone and Telegraph Company, New York, and A. P. Roberts, of the New York Telephone Company, Buffalo.

Annual Report of Western Union.

The executive committee of the Western Union Telegraph Company, at a meeting held October 6th, received from a special auditing committee, consisting of Edward J. Hall, Jacob H. Schiff and Henry A. Bishop, a report on the property and business of the company.

The report was approved, ordered printed and a copy to be sent to every stockholder, in accordance with the present policy of the company that, as a public service corporation, all its affairs be given the fullest publicity for the benefit of both stockholders and the general public. The report, as approved, stated in substance that the auditing committee found that improvements could be made in the system of accounting, and particularly as no audit of the books had been made for some years it was decided to employ Messrs. Price, Waterhouse and Company, to make a thorough examination of the books and accounting methods and to value with the assistance of engineering experts the physical property and other assets.

For eight months Messrs. Price, Waterhouse and Company have been working on the books of the company. Their instructions were to make a thorough and complete investigation and to report the facts regardless of what results might be shown. It was the desire of the executive committee to learn the real status of company affairs and to place all the information gained before the stockholders. The chartered accountants called in as engineering assistants the well-known firm of Westinghouse, Church, Kerr and Company, to value the physical property.

In submitting their detailed report, Messrs. Price, Waterhouse and Company, said:

"We have audited the books and accounts of the Western Union Telegraph Company and have prepared therefrom the accompanying balance sheet.

"The cost of telegraph property is stated at adjusted book figures and, according to a careful estimate obtained by us from independent engineers, represents the approximate replacement cost new. No provision has been made for accrued depreciation, nor, on the other side, has any allowance been made for going value of the value of the company's organization as a going concern. Patents have been valued at cost less a deduction for the expired portion of the term for which they have been granted. Real estate and buildings represent the value of the company's holdings as appraised by competent real estate experts.

"We have inspected the securities owned and have satisfied ourselves that they are fairly worth the values at which they are stated.

"The materials and supplies as inventoried and certified by responsible officers have been carefully taken at approximate cost and due allowance has been made for depreciated or obsolete material.

"Full provision has been made for bad and doubtful bills and accounts receivable and for all ascertainable liabilities.

"We have verified the cash by actual count or by certificates from depositories.

"And we certify that in our opinion the balance sheet is properly drawn up so as to show the true financial position of the Western Union Telegraph Company at June 30, 1910."

In addition to the revised balance sheet, the accountants submitted a report on the business of the company for the fiscal year ending on June 30, 1910, as follows:

Total earnings	\$32,754,111.13
Operating expenses, including rent of leased lines, reconstruction, repairs and taxes	26,614,302.88
Balance	\$6,139,808.25
Additional income from loans and investments	1,135,091.80
Net profit	\$7,274,900.05
Interest on bonds	\$1,687,829.73
Dividends	2,989,696.50
	4,677,526.23

Balance transferred to surplus account.. \$2,597,373.82

The balance sheet is as follows:

PROPERTY ACCOUNT.

Telegraph lines and equip't	\$127,978,617.82
Real estate	5,908,445.58
Patents	102,108.57
Amount recoverable on expiration of long-term lease on respect of obligations assumed thereunder	1,180,000.00
Total	\$135,169,171.97

OTHER SECURITIES OWNED.

Stock of telegraph, cable and other allied companies operated under long-term leases (not including securities held as lessee amounting to a par value of \$2,280,292)	4,699,623.19
Stock of telegraph, cable and other allied companies not leased	4,478,678.08
Miscellaneous investments	355,338.74
Purchase money notes and obligations ..	20,500,000.00
Inventories of material and supplies	2,752,089.54
Current assets	4,613,188.58
Total	\$172,568,090.10

Many important adjustments have been required in the surplus account of the company, and in order to show these changes in a concise manner a schedule has been prepared and attached hereto. Briefly stated, the more important are as follows:

Reduction of the book value of telegraph lines and equipment to the estimated value of \$5,595,089. Liability to Gold and Stock Telegraph Company in respect of proceeds of sales of securities prior to June 30, 1909, understated in balance sheet on that date, \$2,219,874. Loss on revaluation of investments, \$1,709,546. Reserves required on June 30, 1909, for bad and doubtful accounts, etc., and for accrued liabilities, \$1,706,634. Reserves for depreciation on cables to date, \$2,000,000. Reserves for contingencies, \$500,000. Total, \$13,731,143. The reductions cut the surplus down to \$5,136,318. Adding to this the surplus earnings for 1909-10, the total surplus on June 30, 1910, was \$7,733,692.

Public Service Commission News.

Mr. James M. Kite has been appointed by the New York Public Service Commission, Second District, engineer of the division of telephones and telegraphs. Mr. Kite completed an electrical engineering course in the Drexel Institute in Philadelphia. Shortly after graduation he entered the engineering department of the New York and Pennsylvania Telephone and Telegraph Company at Elmira, N. Y., and by successive promotions became assistant engineer and traffic engineer.

Mr. Francis V. Wilcox has been appointed by the New York Public Service Commission, Second District, telephone and telegraph accountant. Mr. Wilcox was for several years special auditor for the Consolidated Frontier and Associated Telephone Companies, with offices at Buffalo, and was also formerly connected with the New York and Buffalo Auditing Company, examining accounts of various public service corporations.

Among the recent orders issued by the New York Public Service Commission is one requiring all telephone corporations to file schedules showing all rates and charges between points in New York State and between each point upon its line and all points upon every line leased or operated by it and all points upon the line of any other telephone corporation whenever a through service or joint rate shall have been established between any two points. Each company is also required to furnish the commission with a copy of every issue of its directory of subscribers. The commission has also made an order requiring all telephone and telegraph corporations to report all accidents happening in connection with their work.

The Postal Telegraph-Cable Company has made complaint to the Public Service Commission of the Second District of New York of the charges exacted by the Western Union for business originating on Postal lines, and has asked for an order restraining the Western Union Telegraph Company "from discriminating against competitors" in the matter of rates.

The complaint laid before the Public Service Commission, alleges that where the Postal has no offices and is obliged to send its messages over the Western Union wires for delivery, the latter company makes excessive charges. The practice is for the Postal, when it receives a message for delivery in a town where the Western Union has the only office, to collect from the sender of the message the same fee as is charged by the Western Union between the sending point and the destination. It transmits over its own lines to the nearest point possible and then turns it over to the Western Union. The latter, the complaint alleges, not only charges the local fee from the point at which it receives the message to destination, but adds a charge for four or five words indicating that the message has been turned over to the Western Union for further transmission. These additional words give the place where the message was taken over and the date. In

addition to the full local rate the Western Union makes a charge of from two to three cents per word for those in excess of ten; and the Postal Company complains that it is obliged to pay, "as a result of such discrimination and unreasonable charge," a greater sum than it receives from the sender of the message.

In the complaint it is further alleged that the Western Union does not charge cable companies sending messages from New York over its land lines for additional words indicating that these messages have been turned over for transmission.

In asking for relief the Postal Company states that it is obliged to accept all messages presented at its various offices whether the destination is located on its own lines or not. Further it complains that the reason it has not extended its lines to the smaller villages and towns in the State now tapped exclusively by the Western Union is because of the contracts the Western Union has made with the railroads reaching these localities by which the cost of constructing and maintaining the telegraph lines is jointly supported and the railroads are prohibited from making similar contracts with any competitor.

The Postal Company asserts that it is not able to support independent telegraph offices in the small villages because of the great cost of maintenance where the railroad has no share in the expense of construction or upkeep. Finally in its argument against the injustice of the Western Union's practice of adding words to messages the complaint recites that the Western Union has objected to being compelled to add words to its own messages and pay for them in cases where its business has been transmitted through the Postal Company.

The commission is asked to make an order permanently restraining the Western Union from charging for additional words as complained of, the Postal Telegraph-Cable Company making the statement that if the practice is continued it will be "necessary for it to refuse to accept a large proportion of such messages from the public."

It is reported that the question of doing away with the employment of boys as telegraph messengers in Great Britain is being seriously considered. It is proposed to employ instead of the boys men who, by reason of age or for other causes are incapacitated for performing manual labor.

Kansas' Republicans have adopted a platform favoring the placing of telegraph and telephone companies and other public service corporations in that State under the jurisdiction of a public service commission having authority over the issue of stocks and bonds, having means and power to obtain the physical valuation of the plants of these corporations, to fix and adjust rates upon their own motion and to regulate rates and services in the interests of the people of Kansas and the investors and employes of these corporations.

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October 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

A Change in Our Editorial Staff.

Mr. Harry E. Dunham who, for nearly two years, has been associate editor of this journal, has resigned in order to accept a position as examiner in the Patent Office at Washington, D. C. During his connection with this paper, Mr. Dunham has made many warm friends among those identified with the telegraph and has rendered valuable service in bringing the paper up to the high standard it now occupies. The practical experience he has thus gained in technical journalism, combined with his education—he being a graduate of Syracuse University—eminently fit him for the duties of his new position.

It is Mr. Dunham's intention to take up patent law as a profession and we are sure that we express the sentiments of his many friends in the telegraph and telephone field in expressing our own in wishing him abundant success in his new line of work. He retires from his position on this paper

with our heartiest good will, and our best wishes go with him.

The position rendered vacant by Mr. Dunham's retirement will be filled by Mr. Thos. R. Taltavall, who, for over fourteen years, has been associate editor of the Electrical World. Mr. Taltavall needs no introduction to the telegraph profession, having been closely identified with telegraph interests some years ago. He began his business career as a telegrapher and was for several years superintendent of the leased wire service of the Associated Press. He entered electrical journalism in 1890 and has been engaged in that profession ever since. He brings to Telegraph and Telephone Age a wide and valuable experience in technical journalism which will find abundant opportunity for application in his new position.

The Status of Wireless.

It is a deplorable fact that a discovery which has such great possibilities of usefulness to mankind as that of wireless telegraphy, should have been used as a tool for so many get-rich-quick schemes of unscrupulous promoters and thereby actually been the means of much financial loss to unwary investors. This, however, is a fate which befalls many valuable inventions and in the end there is no doubt but that this branch of electrical science will assume its rightful place in the world's systems of communication.

At the present time, however, probably the only wireless operating enterprise which is worthy of any words of commendation, is the one which is headed by the man who has done so much to bring the art of wireless transmission to its present state of usefulness, William Marconi. While up to the present time even this organization has not been able to show any profit on their business; taken as a whole there seems to be no doubt but that the officials in charge of the Marconi companies are endeavoring to establish the business on a permanent commercial basis.

It has been our pleasure to meet many of the Marconi operators upon transatlantic vessels, and we have always found them to be of the highest type of operators in the telegraph service. They are well educated and are recognized as gentlemen, in fact, unless they can comport themselves as such they can not remain in the employ of the company. On ship-board they are classed with the officers of the ship on which they are stationed, and the importance of their labors is recognized by the steamship companies. None but highly experienced operators are entrusted with the care and operation of the equipment upon which the safety of so many lives depends. The connection of such a body of men with the wireless service has been in the past and will continue to be a great factor in the establishing of that service upon a permanent basis where it will command the respect of the industrial world.

In striking contrast to the status of the Marconi operators is that of those who are employed by the American wireless exploitations. The companies on this side seem to have made the establishing of a

large number of stations their chief aim and made the quality of the service rendered entirely subservient. Young men and, in fact, boys with little education and with no telegraphic experience, have been placed in charge of the ship installations in many cases, this being the only class of employees who could be hired to work for the meagre wages paid and who would labor under the conditions which they were in most cases expected to accept. Ship owners have not showed any great interest in the service, and the operators have usually been classed with the coalheavers and been obliged to mess with them. Where an occasional operator has been permitted to eat with the officers of the ship it has been because of the captain's favor. The employers of the operators have apparently had little care for their welfare. Such a condition of affairs cannot long exist, and the service rendered under such circumstances can be of but little value to anyone.

Now, one of the American companies has accused a rival corporation of wilfully interfering with the messages sent out by an operator on a vessel in Lake Erie, which was in trouble. It is hard to believe that any operator could sink his manhood so far as to stoop to such a despicable act, an act which might result in the loss of many lives, even though he was told to do so by his employers; but if the allegation is true it is merely additional evidence that the spirit which animates some of the promoters of wireless enterprises in this country is not one calculated to place the industry on a footing which will command the respect and support of the public.

What the final outcome of the present situation will be is hard to predict. Wireless telegraphy has proven of too great value to allow it to fall into disuse. It may be necessary for our government to assume control of this branch of communication as at present it seems rather doubtful whether any commercial company maintaining stations on all passenger-carrying vessels, large and small, can be made a paying enterprise. On the other hand inasmuch as a large percentage of the business handled between ships and the land has to be carried over land lines, the present telegraph companies may at some future day assume the management of communication between ship and shore. Up to the present, however, the prospective profits have not been great enough to tempt them to seek this business.

The Benefit of Co-operation.

The Mutual Investment Association, organized by employees of the Postal Telegraph-Cable Company in New York, the workings of which we described at some length in a recent issue of our paper, is almost daily finding new ways in which it can serve its members and is thus extending its field of usefulness. The movement thus inaugurated has without doubt greater possibilities for uplifting the social status of the telegraph operator than any plan ever adopted for their betterment. The loan shark, who

has for so many years been the bugbear of the telegrapher has been driven out of business in New York in so far as the Postal employees are concerned. The operation of this association, strange as it may seem, is making men out of many individuals who have for years been the slaves and tools of "Shylocks," whose greedy hands were always stretched out for their earnings. Once in the grasp of these human vampires it was almost impossible for the victim to release himself, and as a result pay day instead of being an event to look forward to with pleasure was a day to be dreaded, as the unlucky man knew that a large part of his wages must go to pay the usury demanded by his creditor. Now all of this is changed. When pay day comes the operator pays a small portion of his wages to the association as an installment on his typewriter, suit of clothes or whatever he may be buying and he knows that he is not only getting value received but that he is getting whatever he buys cheaper than he could under the former installment plan. He knows that in case sickness keeps him from his work for several weeks he is not going to lose what he has paid already. Many telegraphers are to-day purchasing pianos through the association, and they are buying better clothes and are living better than before.

When the loan sharks held full sway operators would sometimes go from one city to another without leaving any clue to their whereabouts in order to escape their persecutors and would often even change their names. Under the new plan, however, all feel that they are treated as men and meet their obligations accordingly, the officers of the association reporting that their losses due to operators leaving the city and failing to pay all that they owe have been practically nothing.

A similar association has now been formed among the Postal employees in Washington, and it is to be hoped that this idea will spread until everyone in the telegraph and telephone service will be able to benefit thereby. It is undoubtedly the most practical plan that has ever been devised among telegraph employees to assist each other and to secure the great benefits which may be derived from co-operation.

Another argument for the removal of overhead wires has been found in the rapid development of aerial navigation. In several instances recently aviators have run into overhead wires, which they could not see or were unable to avoid, and come to grief.

Mr. Donald Murray, of London, England, inventor of the Murray printing telegraph, has begun the issue of *The Murray Printing Telegraph Journal*, which will be published at irregular intervals, two or three times a year. In addition to news in regard to the progress of the Murray systems there will be published from time to time practical articles in regard to the Murray apparatus and technical discussions of the various theoretical and practical aspects of printing telegraphy.

The Military Telegrapher in the Civil War.

PART XLVII.

In our issue of June 1, 1908, we published a general description of the military experience of Mr. James E. Pettit, as Part IV. of this series of articles. After the death of that gentleman at his home in Chicago on February 22, 1909, there was found among his papers the story of his capture by the Confederates and of the hardships which he underwent while confined in a southern prison. This narrative, which was written in 1891, relates in a graphic manner the experience of Mr. Pettit which was similar in many details to that of thousands of others who were incarcerated in Confederate prisons during the war. Mr. Pettit's story, which was largely written from a diary which he kept at the time, is in part as follows:

"In 1863, I was stationed at an outpost of the army, in northern Alabama, at a little place by the name of Athens. Guarding the approaches of the town was a small, but well arranged fort, in which were garrisoned some six or seven hundred infantry (colored). I was filling the offices of express agent and railroad agent, and the more important one of military cipher operator, for the Government. My office was located in a railroad depot of the Nashville and Alabama Railroad, over a quarter of a mile from the fort.

"The 24th of September, 1864, was bright and warm, a typical day of old Alabama. The train from Nashville was due at 4.30 p. m., but it was half an hour late when it came in sight, and I knew that something was wrong, for it was reported on time at the last station it had passed, which was located but eight miles away, at a very high bridge named Sulphur Trestle, the subsequent scene of many lively engagements.

"As the train drew into the depot, the conductor ran hastily up to me and anxiously inquired if my wires were O. K. I answered, 'Yes, so far as I know.' He asked me to ascertain to a surety. I ran into my office and found my instrument silent; making the necessary tests, I found that the wire was open north of me, but that I could still work with the next station south, which consisted of a small block house, four miles down the road, erected for the purpose of guarding a bridge. The train had been fired on six miles north of us, and a large body of troops had been seen in the distance; the engineer had speeded forward, and the only damage done, was to severely scare several lady passengers.

"The troops in the fort were alert and upon consultation it was decided to disconnect the engine from the train, load it with troops, and run down the road and ascertain if the enemy had surrounded the town; it took but a few minutes to find that the greycoats were on the south of us also; the engine returning, quick preparations were made for repelling the enemy, who up to this time, had remained out of sight. We were not to remain long in ignorance of their whereabouts, however, for soon we heard the firing upon the pickets; it was but a few minutes before the ominous rattlesnake buzz of the

conical rifle bullets was heard, as now and then, one came dangerously near; I hastened over to my room, which was in an old deserted hotel, on the public square; gathering a few of my choicest valuables together, I started for the fort, and as I was just leaving the public square, imagine my surprise to see a number of Confederate soldiers enter my office, which was on the opposite side of the square; they caught sight of my rapidly disappearing form and fired several shots at me, but happily without effect.

"It took but a very few moments to place myself in safety behind the solid walls of the fort; although on the way over I was the unwilling spectator of as pretty a piece of fighting as was ever given to me to behold. A body of some 70 or 80 negro soldiers had stationed themselves behind the railroad embankment and the enemy were trying to dislodge them. I being on my way to the fort, was obliged to cross the line of the enemy's fire; without hesitation I placed the main body of myself behind a large oak tree, of ample enough proportions to safely cover me; there I watched the fight. It was very fierce, as to noise, but little execution was done by the enemy, because of the safe and strong position of our troops. Nevertheless, it required nerve for our colored troops to maintain their position, and they seemed to be possessed of the necessary grit, for awhile, but the attacking forces receiving reinforcements, the darkies were slowly driven back towards the fort. The lines of the enemy were slowly tightened, until at last we were all gathered into the fort. A count revealed the fact that there was in the neighborhood of eight hundred troops and non-combatants inside the walls of the fort; this was not very satisfying, for it was rumored that the enemy were in force to the number of ten thousand, afterward proven to be a little over six thousand, under the command of Lieutenant-General Forrest, of Fort Pillow massacre fame; this fact did not tend to ameliorate the fears of the colored troops. At this late date (1891) I cannot very well recollect the incidents of the night other than that my assistant, a big hearted and faithful friend, John F. Ludwig and myself, were allowed to sleep at headquarters, and if my memory serves me right, we both slept like logs, for we were both used to this sort of thing. We were up early, and after partaking of a soldier's breakfast, we strolled around the fort; wandering through the barracks we beheld many curious sights; one man I saw sewing money into the skirt lining of his coat, one I found covering over something that he had buried in the ground.

"At about 7.30 a. m. the enemy opened on us with a brisk fire from their field artillery; they having no siege guns, and as I recollect, they made it very uncomfortable for us. They had nine twelve pounders, and for about an hour they poured on our devoted heads the fire of their batteries, then, dividing their forces, they sent one-half of their artillery to the south of us, thus delivering

an enfilading fire for another hour. The scenes in the fort during this time were of fearful interest to us; the enemy were using both solid shot, shrapnel and shell, and their fire was mostly directed at our flagstaff for knowing that reinforcements were on the way to relieve us; which fact we were unaware of, at the time; their aim was to disconcert our reinforcements, as when they would arrive in sight of the fort they would be met by an apparently lowered flag. The casualties inside the fort were but few; thanks to the well built and solid walls. One conical shell struck the wall of the embrasure, near which I was standing, glanced against the gun, and landed in the centre of the parade ground; one of our Lieutenants went over to it and rolled it over with his foot. There was no danger in this apparently foolish act, for the shell was of the percussion kind and was harmless, and his act was to reassure his men. About 9 o'clock General Forrest sent us a flag of truce, demanding our immediate surrender, stating that his force amounted to 10,000 troops, and in order to save bloodshed, he requested the commander of the fort to come out and satisfy himself as to the truth of his statement, by an inspection of his forces. Our officer in command, a Colonel Campbell, accepted the invitation and after a brief absence, returned. I was standing near the flagstaff. Hearing a noise and a sound as of one in grief, I turned around and was horrified to see an officer in the act of lowering our flag. I cannot express the emotions that filled my breast at this sight; the officer that was engaged in performing this melancholy duty was the same one that I had noticed earlier in the morning push the loaded shell with his foot, and the tears were running down his cheeks; this, I quickly comprehended, was the signal of our capitulation; hastily running into the headquarters building, we commenced to mutilate and destroy the telegraph instruments that we had brought with us to the fort. Those of the troops who had revolvers, extracted the chambers and threw them into the well of the fort; and I suppose even to this day there lies at the bottom of that well, at least, a half peck of rusty revolver chambers. While in the hurly burly incident to the preparation for surrender, I was surprised to see the gates of the fort open, and there entered a man of commanding presence, surrounded by his staff. This I knew to be the celebrated Lieutenant-General Forrest of Confederate fame. The first one that he called for was the telegraph operator. After repeated promptings, I stepped slowly forward and was asked by him, if I was the man. When I replied in the affirmative he asked me to produce my instruments. I walked over to the building in which they were stored; there I found Ludwig still at work, disabling them. I took them up, with a great show of care and brought them out to the general. He took each instrument as carefully and handed one to each of his officers, near him; for these little telegraph instruments were worth their weight in gold, in the south, where they

could not be bought for love or money. I hardly think, with the talent that the Confederates were possessed of at this time, that these instruments could have helped very materially in any subsequent success of their forces. We were marshalled into ranks and marched outside the fort, where after a short delay, we took up what proved to be a very tiresome march; it was for a distance of only eight miles, yet my feet suffered very much at the halting place, for I had on a very snug-fitting pair of boots, and my feet became so swollen, that I could hardly remove my boots.

"We lay upon the ground without covering, and those who did sleep, awoke the next morning thoroughly wet with dew; hungry and jaded we started on our day's march, my feet causing me intense pain. We had no means of carrying drinking water, and had to depend upon what water we happened to come across; I remember drinking out of a hog wallow; this was not as bad as it may seem to be, as it was in nice blue clay, and the hog hadn't been there for a long time, and the water was very clear and cool, and last but not least, I was nearly perishing with thirst.

"That day we marched seventeen miles, unbroken by any startling incident. We camped on the banks of the Tennessee River at the foot of the celebrated Muscle Shoals; on the march, many of us were forced to give up our hats, coats, boots, shoes, jack-knives, blankets, and in fact anything that the Confederates coveted, and as it was done at the point of a revolver or carbine, accompanied by language that was plain, accurate and to the point, we complied without hesitation and without surprise.

"Again we slept, my feet giving me intense pain. In the middle of the night, Ludwig lost his treasure which consisted of a rubber blanket, it being stolen by one of the guards. The next morning we crossed the river on flat boats, and after a very fatiguing march of fifteen miles, we camped at Tuscumbia, Ala., on the banks of a stream about twenty feet in width, which was formed by a large spring that flowed from the base of a high crag of rock, which was crowned with a beautiful oak tree; some idea can be formed of the size of the spring by the fact that the water that flowed from it, furnished the power that drove two good-sized mills that were located in the city.

"The next day we marched to Cherokee, a station on the railroad. Thus far we had marched 56 miles and my feet were so swollen that I could not wear my boots. Here we camped out in the rain.

"All of this exposure and marching was hard on we two operators, as we had been closely confined to the office for many months, and were rather tender-footed. There was quite a body of troops here, and we were visited by two or three Confederate operators that were attached to the various commands in the near vicinity; one of these operators was a well known character in the south, by the name of William Ord; he was at this time attached to Forrest's command, but we received little

consolation from them. We remained at this station all day, waiting for a train.

"September 9, four days after our capture, we had scanty rations of beef issued to us; this was eaten without salt or bread, it was the first eatable that had been issued to us since we had been captured, excepting a small ration of bacon.

"The next day I destroyed all letters that I had about my person; we were crowded into cattle cars, and off we started for Corinth, Miss. We passed Iuka, Miss., at 1.30 p. m., and arrived at Corinth at 4 p. m. Here I had a good view of the celebrated battery Robinette, the scene of one of the fiercest battles and hand-to-hand conflicts of the war. We changed tracks here to the Mobile and Ohio Railroad and travelled all night; the wounded suffering horribly; at three a. m. we arrived at Okolona, Miss., which we found to consist of a town of chimneys, apparently, waiting for a town of houses to be built around them; this fact was accounted for, by a visit that General A. J. Smith had paid them, a short time before. At 7 a. m. we commenced the run to Meridian, Miss. When about four miles out of Okolona, in a driving rain, on a steep down grade, with a drunken engineer at the throttle, the track spread at the bottom of the grade where there was a short trestle; off we went. there was a short, snapping crash and we hastily picked our cold, stiff and dazed forms out of the debris of as complete a wreck as I ever saw. The bridge was entirely destroyed; five cars were one unrecognizable mass of ruins; five dead men and twenty wounded, some fatally, was the result; we lay at the scene of the disaster all day, on a low piece of ground, in tall weeds, infested with the greatest variety of insects that I ever saw outside or inside of a museum.

(To be continued.)

Telegraphs in the American Republics.

The bulletins of the International Bureau of American Republics for July and August give a large amount of interesting information in regard to the republics of South and Central America and among other things give a brief description of the telegraph system of each country.

In Argentina the government telegraph system comprises 613 offices and 36,716 miles of wire. In 1909, 10,800,000 messages were handled. Private companies also own and operate lines whose mileage is about equal to that of the government lines. The telegraph system of Bolivia comprises 3,979 miles of lines, of which the government owns 2,390 miles and has 124 offices.

Brazil has over 2,000 offices and 18,874 miles of government telegraph lines. There are thirty-nine private telephone systems of which the most important are at Rio de Janeiro, with 3,500 subscribers; Sao Paulo, 3,300; Rio Grande do Sul, 1,479, and Pernambuco, 631.

All parts of Chile are connected by the government telegraph system, which comprises 359 offices and 17,388 miles of wire.

Colombia has 524 telegraph offices and 10,676

miles of wire. This includes the lines owned and operated by the government and does not include the telegraph lines of the various railways. The Colombian system connects with the government telegraphs of Venezuela and Ecuador.

There are 119 government telegraph offices in Costa Rica, with 1,335 miles of telegraph lines in operation. In 1909, 505,375 messages were handled.

The Dominican Republic, which occupies the larger part of the Island of Haiti, has 52 telegraph offices, with 1,269 miles of wire and during 1909, 2,501,000 messages were transmitted over these lines.

Ecuador has 2,608 miles of telegraph lines with 60 offices.

The telegraph and telephone system of Guatemala comprises 4,196 miles of wire, with over 200 offices and a staff of over 800 employees.

Honduras has 3,600 miles of telegraph lines and 217 offices. The number of messages transmitted over these lines in 1909 was 886,697.

The telegraph wire mileage of Nicaragua amounts to 3,637 miles with 130 offices.

The telegraph system of Paraguay comprises over 2,000 miles of wire and reaches all points of importance along the southern frontier. It is expected that the service will soon be extended northward to the boundary with Brazil.

Peru has 5,986 miles of telegraph lines and 178 offices. 751 miles of this amount was constructed during the past year and 23 new offices opened.

The republic of Salvador reports 179 telegraph offices and 2,479 miles of lines.

During 1909, over 1,000,000 domestic and international telegrams were handled by the government telegraph system of Uruguay. During that year 248 miles of lines were reconstructed and 500 miles of new lines are contemplated.

Venezuela had in operation on January 1, 1909, 4,756 miles of telegraph lines with 169 offices. During the past year nine new offices were opened and communication established with Colombia.

Mr. Theodore E. Moreland, of Pittsburg, Pa., in renewing his subscription, says: "Enclosed find \$2.00 to cover another year's subscription to your good paper and long may it wave."

Major J. Orton Kerbey, the well known old time and military telegrapher, is the president of a newly formed company known as the Amazonia Rubber Exchange, the principal object of which is to deal in Para rubber and to cultivate the same in its native habitat, Brazil. Major Kerbey, by reason of his residence in Brazil as American consul and his extensive travels through that country which he has so entertainingly described in "The Land of Tomorrow," has acquired a vast amount of experience which will be of great value to him in conducting the affairs of the new organization.

Standard Time.

On the afternoon of September 21, at 5 o'clock, Washington time, summer had its official ending and autumn began. It was then that the sun made its annual pilgrimage across the equator on his journey to southern climes. It is true that, according to our method of measuring time, it was slightly ahead of his schedule. It takes the sun twenty and one-third minutes less than a complete revolution of the earth around the sun to complete the journey from one autumnal equinox to the next. Therefore, if we were to count a full revolution of the earth around the sun as the time between two autumnal equinoxes, in 13,000 years we would find ourselves in the northern hemisphere, having ice harvest in July and wheat harvest in January.

This question of time reckoning in one form or another, always has been a puzzling thing to humanity. "In bygone generations," says Mr. Frederic J. Haskin, "the problem was to adjust the yearly calendar so as to make the seasons conform to it. Before the days of Julius Caesar long distance time keeping was not a very accurate thing at best. He revised the calendar, but in the 1,500 years that it continued in force the dates got ten days ahead of the seasons and the equinoctial periods were all awry. Pope Gregory XIII, with a view to keeping the equinoxes and the calendar in harmony, instituted our present system of time reckoning, which is so nearly perfect that it will not vary more than a day in a thousand years."

Coming down to the smaller divisions of time, the basis of the Grecian and the Roman methods was the course of the sun across the sky from sunrise to sunset. As the length of the day varied in winter and summer, and as these two peoples insisted upon a twelve-hour day at all times, it naturally followed that their hours were shorter in winter than in summer. They had all sorts of peculiar contrivances to reckon the varying hours. One was a modification of the Egyptian water clock, in which water was used instead of sand, as in the hourglass. In the Greek and Roman timepiece the figure of a man with a pointer in his hand was mounted on a piece of cork. The scale varied for every day in the year, and was placed on a revolving drum that made a revolution in 365 days. The hours of proper length were thus kept before the man with his pointer as he descended with the ebbing of the water. It was the Egyptian who divided the day into twenty-four hours, reckoning a day and a night as one day. From that time the world got along very well with the day reckoning until the telegraph and the railroad made it important that time should be identical over widely distributed areas. This led to the agitation which brought about the adoption of standard time.

In the early part of 1883 there were time reckonings in the United States from no less than seventy different prime meridians. While the smaller communities got their time from adjacent important cities, there were upward of a hundred different

time standards in use in the United States. This produced no end of confusion, led to many accidents on the railroads, and in many ways was most inconvenient. Two railroads crossed each other. One had one time standard and the other another. What was more inevitable than that they should have a collision sooner or later? A traveller going west was continually setting his watch back, and from the standpoint of time never knew just where he was.

All these inconveniences led to the assembly of a convention of railroad men in Chicago on October 11, 1883. Following the suggestion of Professor Cleveland Abbe and Professor Sanford Fleming, then with the Canadian Pacific Railway, it was decided that North America should be divided into four time belts, and that in each of these the railroad time should be identical for every line operating within the belt. Eastern time was to prevail in all the region east of Pittsburg, Wheeling, and Bristol, Tenn. Central time was to prevail in all the region between eastern time points and such places as Dodge City, Kan.; El Paso, Texas, and Minot, N. D. A line approximately from Demin, N. M., through Huntington, Ore., and Laggan, British Columbia, was to form the western boundary of mountain time and the eastern boundary of Pacific time.

This program was agreed upon and recommended to the government. At noon on November 18, 1883, for the first time in history, standard time was sent out from the Naval Observatory at Washington to all the stations east of the Pacific time belt, and from the Mare Island Navy Yard to stations in that belt. From that day to this every properly regulated clock in the United States has pointed to the same minute and the same second at all time. Only the hour hand differs.

The accuracy of the nation's time is largely in the keeping of the Naval Observatory at Washington. The method by which that institution sets a nation's clocks is interesting and ingenious. In the first place, it has the co-operation of every national telegraph and telephone line in the country. At the hour of noon in Washington, eastern time, every railroad and telegraph clock in the country is set to correspond with the Washington noon. There is a great master clock, kept in an air-tight, moisture-proof vault, in which a uniform barometric pressure and a uniform temperature is maintained; the latter being accomplished by the aid of a little thermostat and a small electric light. This clock is checked up several times a week by observations of the fixed or clock stars through the transit telescope. The Nautical Almanac shows the exact position of each clock star for every hour, minute and second of the year, and with the transit telescope and the Nautical Almanac the astronomer making the observation is enabled to calculate the exact time to the minutest fraction of a second. He does this, and sets the master clock accordingly. There are three other clocks which are set by the master clock. These always are ready to be switched

into the telegraphic circuit. At 11.55 a. m. they are switched into the telegraphic circuits, and every connected clock in the country east of the Pacific time belt ticks in consonance with the clocks on Georgetown Heights. In the middle of each minute a second is skipped—the twenty-ninth—and at the end of each minute five seconds are skipped until the last minute is reached when there is a silence of ten seconds, and then every hand moves to 12 o'clock in the eastern time belt, 11 o'clock in central, and 10 o'clock in mountain. Thus is the country's time set right for another twenty-four hours.

There is said to be no government that maintains as many time balls as the United States. It has some twenty of these in all the principal ports and other important points throughout the country. It is said that the one in Washington is the most expensive small institution the government has. Every day at noon the majority of the government employees, from Capitol Hill to Georgetown stop to watch the time ball on the State War and Navy Building.

A Few Thoughts.*

BY COLONEL W. R. PLUM, LOMBARD, ILL.

The Old Time Telegraphers' and Historical Association grows stronger and stronger as the years roll by. The Society of the United States Military Telegraph Corps, like the Grand Army of the Republic, is passing away as the days fade into the mists of history.

The "Old Timers" now aggregate about fifteen hundred, a larger number of telegraphers than were engaged in one of the greatest struggles in history, and will continue to increase in membership, power and influence as it shall merit a larger measure of success. On the other hand, the cohesion and strength of the military society depends entirely upon duty done.

The one, with its resplendent history and present, looks to the future. The other glories in an heroic past with a hope of complete recognition.

Old timers represent a growth as phenomenal as education. The army operator represents a service, unique in warfare, that has become a universal military necessity.

The one entwines the Union with mystic cords, making a great people neighbors. The other made the Union a continuing certainty by the electric tongue.

Old Timers have furnished governors, generals, judges, presidents of railroads, honest legislators and others prominent in Federal, State and municipal affairs as well as in the professions and trades.

*Address delivered at banquet of Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, Auditorium Hotel, Chicago, September 10.

The Civil War telegraphers reanimated the despondent, stood sentry at all vital points and kept the government, the armies and the people in touch with one another.

Nothing since the dawn of the Christian Era, with a possible exception or two, has so greatly conduced to the world's peace as the civil telegraph. Nothing since sin entered Eden so controls the activities of war as the military telegraph.

Nothing so promotes the world's business as its network of wires and nothing shortens war like the electric courier.

Civil telegraphy compressed editorials and multiplied facts; it compelled business readjustments and is the first aid in all great calamities. Military telegraphs supply the troops, avert surprises, strengthen the weak and consolidate armies.

One is an angel of peace; the other the thunderbolt of Jove.

In these days, when tense religious animosities are nearly unknown, when peace is the world's desideratum, when the telephone, for all practical purposes, has opened telegraph offices in our very homes, it is befitting that old men, telegraphers of the Civil War, and others, with uplifting achievements, should rejoice with one another over cemented friendships made possible by faithful service, and because from our ranks have sprung the most potent advocates of international peace and the wizards of electric progress.

Harmony is the law of the universe. The brotherhood of man is largely specialized harmony. Each vocation creates its own peculiar comradeships. To-night we are all old timers. All with garnered memories. The past rises before us. It cements one another. It is a certificate of character. Hence this reunion.

Dots, dashes and spaces,
Cadmus outdone,
Uniting all races
Under the sun.

Beating time, diurnal,
"What hath God wrought?"
Messenger supernal
Transmitting thought.

Brotherhood of the key,
Telegraphists,
Ignoring land and sea,
Telepathists.

Long may your hearts unite,
And virtues shine
Many years, ere good-night
Comes o'er your line.

I leave my "73,"
"30" retain.
Blest be this eve's mem'ry
Till we meet again.

The Necessity of Quick and Accurate Notice of Location of Fires in Connection with Rapid-Moving Apparatus.*

BY WILLIAM L. RIEHL, SUPERINTENDENT FIRE-ALARM TELEGRAPH, CINCINNATI, O.

The necessity of giving prompt alarm of fires has always existed throughout the entire history of organized fire-fighting. Prior to the advent of the fire-alarm telegraph as a permanent institution, notice of fire in large communities was given by citizens or street patrols to watchmen in watch towers located at various points throughout the city. The watchman first receiving the information as to the existence of a fire, rang an alarm manually upon his bell. This alarm was taken up by one watchman after another until in a short while the entire city was aroused. This old system of sounding alarms of fire gradually disappeared with the coming of the electric fire-alarm telegraph, and the fire alarm system as it exists to-day is the result of years of growth side by side with the wonderful increase in the efficiency of fire-fighting apparatus and fire department organizations. It may, of course, be stated without fear of contradiction that, notwithstanding the perfection to which the latter-day methods of firefighting have been brought, the necessity of quick and accurate notice of the location of fires is far greater now than it was in the early days, or than it has ever been since. The size of our modern buildings, the congestion of their occupancy, and the large volume of merchandise carried in them, as well as the solidly built-up blocks which characterize our large cities, makes it absolutely essential that our fire-fighting facilities should be quickly brought into action. It is also true that the full value and efficiency of our fire department apparatus and organizations cannot be realized unless they are rapidly concentrated at the point of danger. Efficient officers and men, modern engines, automobile chemical apparatus, quick-raising ladders, and all other devices and appliances used in the fighting of fire, demand, by reason of their very perfection, that prompt and accurate alarms of fire should be given. It therefore becomes the duty of fire department officials to see that the public is not only provided with adequate and reliable means for sounding alarms of fire, but that they are made fully familiar with the method of operating the system provided for that purpose. It being admitted as an elemental fact that quick and accurate alarms of fire are essential to the proper protection of life and property, those charged with the important public function of preventing and extinguishing fires should see to it that a proper system of notification is provided for public use. A fire-alarm system is probably the most important of all emergency signaling services, and should be so laid out and planned that the quickest possible advantage should be derived from it

in case of need. This necessarily means that a sufficient number of alarm stations should be provided to insure the least practicable delay in sounding an alarm. Street boxes should be so located as to be quickly accessible to all important risks and special hazards. The National Board of Fire Underwriters, in their reports on fire protection of the various cities of the country, recommend that not over 500 feet should have to be traversed from any important building before reaching a box. This recommendation, of course, should be regarded as a fixed one, as all special hazards, such as hospitals, institutions, theatres, etc., should be in closer touch with an alarm-giving station. The time lost in operating a street box for fire should be minimized, either by the use of the keyless door in many cases or by leaving the keys to boxes in the doors under a special key-guard. Instructions for turning in an alarm of fire should be placed at each box station, and information as to the location of the nearest street box to various buildings, hotels, apartment houses, should be given by means of cards placed in prominent positions, and bearing an inscription something like the following:

"The nearest fire-alarm box to this building is Box 612, Sixth and Vine Streets."

On this card should be a cut of the box, and directions for its operation. In other words, not only should a sufficient number of street stations be provided, but care taken to educate the public as far as is practicable, to the location of the box or boxes nearest them, and as to how to operate them. I think also that it would be part of wisdom for city officials to encourage the installation of private boxes in large and important properties, allowing the owners thereof to purchase boxes of the type in use by the city department and to pay the cost of connecting them into the city circuits, the city thereafter to maintain such private boxes as a part of its telegraph system. Such boxes, however, should not be placed in the interiors of buildings where access cannot be had to them, and to the circuits by the fire department employees at all times. Boxes should be placed on the outside of premises. As the street box is the basis of a municipal fire alarm telegraph system and the starting point of all department firefighting and actual operations, the sending of alarms of fire by any other means than through a street box should be discouraged as far as possible. The use of a telephone for this purpose involves certain delay, and is at times liable to cause confusion and uncertainty, sending the department to locations removed from the actual fire. I think that it will be self-evident that the nearer we can bring the sounding of an alarm to the discovery of the fire, the nearer we come to the minimum of loss, and unless every effort is made to accomplish this much-desired result, we can never realize the true value of our progress along the lines of fighting and extinguishing fire.

*Paper read at convention of International Association of Fire Engineers, Syracuse, N. Y., Aug. 23-26.

What the American Telegrapher Has Accomplished.*

BY FRANK J. LOESCH, CHICAGO.

In rising to respond to the toast proposed by the Master of Ceremonies I feel a certain embarrassment, due in part to lack of expert knowledge of my subject, as it is many years since I separated myself from the certainty of a Telegraph Company's pay roll to put my trust in the terrifying uncertainty of a professional income, and in part to the fact that I am but a youthful member of this Association, being indeed in my freshman year and yet have been given to do a full Professor's work.

Only a man in a lifetime's constant touch with the practical operation of the telegraph or one who had expended in it the expert study of years could do justice to the subject, and not then in less than a royal quarto volume.

And yet, confessing as I must, my inability to give this subject the treatment it rightly deserves at the hand of an expert, I wish to thank the committee for the honor conferred upon me in asking me to respond to this toast and in allowing to me the liberty of treating it as best suited the time at my disposal and my inclination.

I may be excused for stating that my work during the years of my service in my youth and early manhood with the rank and file of the men in one telegraph company and the years of association in an advisory capacity with the officials of another telegraph company made to me lasting friends who have maintained themselves in my heart with undiminished affection. It is a joy to meet so many of them at this annual meeting.

In the age in which we live new inventions follow so fast one upon another and their practical application to every day life and business is taken so much as a matter of course that we are apt to lose sight of the fact that the invention of the electric telegraph, scarcely more than two generations since, created, generally speaking, the present modern day world as distinguished from the ancient world. The inventions of the steam engine by Watts in 1763 and the traction engine or locomotive by Stephenson in 1829 needed only the invention of the telegraph by Morse in 1835 to 1844 to make the beginning of the transformation of civilization which has taken place in our own time and which to the student of the history of the world makes child's play of the story of Aladdin and his wonderful lamp. If we cannot erect a palace in a night, we can do what the slave genie of the lamp couldn't do—we can without a genie's aid, with a few movements of the fingers, light our auditoriums and residences as at the World's Fair and other similar exhibitions, light up a score of palaces in a moment's time, with a brilliancy exceeding that of clusters of diamonds and without the aid of hundreds of genii necessarily required in sticking diamonds, emeralds and other precious stones of fabulous value around the

window frames and door jambs for night illumination. Cities of millions of people can be lighted in every part so well that the terrors of darkness, the refuge of the criminal, have been well nigh banished. We do not have the genie carry one of us at a time through the air from one part of Africa to the Magician's Castle in another part in a night in fear, discomfort, hunger, sleeplessness and cold. We have improved upon that. Many scores of people on the eve of every day leisurely enter a palace on wheels, are by the aid of steam and the telegraph, whisked away and while smoothly gliding through the air eat a substantial dinner, go to bed in comfortable beds in a heated room, are served with running water, are waited on by colored genie of benign aspect and polite manners and at breakfast time on the following morning are landed at their destination a thousand miles distant in comfort, safety and content.

We might extend indefinitely the discussion of the advantages of electricity over the genie of the Arabian Nights and over the reality which the world had down to two generations ago, if we were to consider the use of the telegraph's younger sisters—the telephone and the wireless telegraph; and its stronger and dangerous brothers—the application of electrical energy to running machinery and swiftly propelling cars.

Naturally a force so mysterious as electricity and an energy of such possibilities to high civilization and commerce as the telegraph drew to its support the younger men and youths of quick intelligence, who, when they became expert telegraphers, were men of consequence and importance in each community.

The construction of a telegraph line upon the Erie Railroad about 1855 and its use for train despatching, increased the value of the single track railroads and decreased the dangers of their operation and its use to that end became at once general and opened a still wider field to the young men of intelligence and ambition.

The Civil War conclusively established on a large scale the inconceivable value of the telegraph to the commanding generals and their subordinates in the field, to the Executives at Washington and Richmond and to the people at home who were daily scanning with alternate fear, anxiety or joy the telegraphic news from the front. The Civil War did more than that. It proved the unflinching courage, the resourcefulness, the untiring energy, the endurance of the military telegraphers, most of whom were very young men, to be the equal of that of the bravest of the soldiers in the regular and volunteer armies.

To establish that fact where personal knowledge is lacking we have only to read the increasing number of histories of the period of the Civil War, the reports of the military commanders, and the countless memoirs of participants in that gigantic struggle and also as seen from the monographs of Bates, Chandler, Plum and others of the military telegraphers, some of whom are with us to-day.

*Address delivered at banquet of Old Time Telegraphers held at Chicago, September 10.

The telegraph had been constructed to the Pacific Coast prior to the Civil War and was maintained over vast waterless deserts, scarcely passable mountains, through dense forests in an uninhabited country and through hostile Indian camps. It is not too much to say, as I have heard it said, that California was saved to the Union largely by that single telegraph line in friendly hands.

So that by the end of the Civil War the telegraphers under the lead of such well known and progressive men as J. H. Wade, Marshall O. Roberts, Hiram Sibley, Norvin Green, General Anson Stager, William Orton, and others had become a recognized force in the commercial and social world of America.

The close of the Civil War, the turning back into civic life of a million soldiers whose places had in large part been filled by women and boys during their absence on field duty presented a seeming problem which was, however, soon dissolved. Every man found his place in the development of the material resources of the country, and the taking up of new lands—for the old soldier was now an intrepid pioneer and often a rover—and in building up the waste places or those neglected by reason of the exigencies of the war.

An unexampled era of construction of public works and notably of railroads was carried on west of the Allegheny Mountains and especially in the Mississippi Valley including the first transcontinental line. The new telegraph lines were keeping equal pace and it was the heyday of the roving expert telegrapher who could get a job at good pay wherever he turned up and at any time a railroad pass to any railroad point his imagination chose to long for.

The almost mystic operation of the telegraph has never ceased to have a strong fascination for many men and in the fifteen or twenty years following the war multitudes of youths were drawn into the telegraph service by reason of its great expansion and especially so by reason of the development of train despatching as a science and by the increase of joint commercial and railroad telegraph offices.

The telegraph service tends to develop every faculty of the mind in any intelligent and ambitious boy or young man. A long list can be made of successful men now living who are prominent in telegraph, railroad, telephone, and banking corporations, in brokerage, mercantile and manufacturing business and in the professions, who entered the telegraph service either directly or through the railroads between the years 1860 and 1885 or even later and spent most of their formative business years as telegraphers and in allied service.

There must be an underlying cause for a result so general. From no other business of which I have any knowledge have so many men been drawn into prominent positions in other lines of business than from the telegraph. It is to be expected that the executives in the telegraph corporations will be drawn from the staff promotions in the service, as is the rule in other businesses, but that does not ac-

count for the men who have withdrawn from the operating ranks and made successful careers otherwise.

Alertness of mind, quick comprehension, instant decision, a thorough knowledge of his own beautiful art, a wide acquaintance with the geography of one's country, a good idea of business affairs and conditions, a working knowledge of humanity, are quite apt to accrue to the intelligent, studious and ambitious operator, and to form the basis of unlimited improvement, development and progress in whatever position he may be placed.

It is only on such grounds that I can place the material accomplishments of such American telegraphers as

Marvin Hughitt, president Chicago and North Western Railway Company;

A. J. Earling, president Chicago, Milwaukee and Saint Paul Railway Company;

W. C. Brown, president New York Central Lines;

W. J. Underwood, president Erie Railroad Company;

Henry U. Mudge, president Chicago, Rock Island and Pacific Railway Company;

Henry R. Williams, president Chicago, Milwaukee and Puget Sound Railway Company;

C. A. Goodnow, assistant to president, Chicago, Milwaukee and Puget Sound Railway;

W. A. Gardner, vice-president Chicago North Western Railway Company;

Theodore N. Vail, president American Telephone and Telegraph Company;

Col. R. C. Clowry, president Western Union Telegraph Company.

Col. A. B. Chandler, builder and former president of the Postal Telegraph System;

E. J. Nally, vice-president and general manager of the Postal Telegraph Company;

W. H. Baker, vice-president American District Telegraph Company;

E. C. Bradley, vice-president and general manager Pacific Telephone and Telegraph Company;

B. E. Sunny, president Chicago Telephone Company; and

E. W. McKenna, vice-president Chicago, Milwaukee and Saint Paul Railway Company.

None of these are classed as rich men. If we must for the benefit of the aspiring operator, have an example of a rich telegrapher we may take Andrew Carnegie, but who by reason of having induced the Government to enter into partnership with him is a class all by himself.

See'st thou a man diligent in his business?

He shall stand before Kings.

When Solomon transcribed that sentiment into his Book of Proverbs for the benefit of future ages, he was but transmitting to us the wisdom of his ancients, which was still literally true in his time and for nearly thirty centuries later there was but one source of power, business favor and authority—

the King. In him was centered everything and beyond him there was nothing.

Now the political King has passed or is passing. It is all he can do to hold his own. Democracy is rapidly making him a mere figurehead still held in place by tradition, habit and privileged orders.

But inserting in place of the King, the People, the Capitalist, the Banker, the Merchant, the Manufacturer, the Board of Directors, the Superior, we have the proverb as literally true now as it was in the wise man's days.

Several years ago it was my fortune to be engaged in a legal contest in which experts made up of one class of men were introduced as witnesses by one side, and a totally different class of experts were offered by our side.

As our expert railroad witnesses came successively upon the stand it was a great lesson in human nature to watch the faces of the jurors—ten of whom were mechanics and clerks and two of whom were independent business men, as the business biography of each witness was outlined by him. As the first witness gave his beginning and rise from a telegraph operator through successive changes and promotions to the presidency of a railroad company running from New York to Chicago, the faces of the jurors showed their wonder and interest as well as the witness' rise in their estimation.

And when he was succeeded by a second man who gave his beginning as a telegraph operator and through many successive promotions his rise to the presidency of a railroad running from Chicago to almost the Pacific Coast, so the interest of the jury increased in intensity with each promotion and he became a man in their eyes whose experience gave controlling weight to his words.

And when a third witness came forward and gave his first employment as a telegraph operator and his final promotion by successive steps and in different corporations to the vice-presidency of a great railroad corporation, the jurors came to the conclusion that all railroad company presidents were by some mysterious law of nature made from telegraph operators.

To satisfy the curious in the room who are now speculating on the subject, I will add that the witnesses referred to were Messrs. Underwood, Earling and McKenna.

All of the men I have named are living illustrations of the truth of Solomon's proverb.

These men are constructive men of the highest ability in America. The result of their work has made homesteads and farms for millions of souls on former waste lands and deserts: has made towns where the savage roamed to obtain a precarious livelihood: has made great cities out of small villages: has developed mines of precious and indispensable metals the existence of which were unknown or inaccessible: has raised cheap food for millions of foreigners: has developed manufacture, has spread intelligence and quick communication; trade and commerce advanced high civilization and obtained

comforts for the millions unimaginable two generations ago. There has been spent under their initiative and by their authority for the success of their corporate undertakings and for the benefit of the public hundreds of millions of dollars without suspicion of a scandal connecting itself with their names by reason of it. Let the business world of Europe and America, if it can, and the heads of the private corporations and industries, produce examples equal to that given by these and other old telegraph operators in business integrity and efficiency.

That is a part of "What American Telegraphers Have Accomplished."

Yet another and more difficult part of the work of these men and others in similar positions is to conserve what has been created with so much labor and at such cost. Conservation is in the air. But it isn't the forest, the water power, the soil, the oil and the minerals which alone must be conserved. Capital, too, needs conservation if it is to continue to flow freely for the benefit of all. And so these old telegraphers are to-day in a more trying and difficult position than they have ever been in. Almost, if not in fact, the very life of their corporations is at stake in the economic and epoch making struggle to which they have been forced between the nether millstone of procuring capital for necessary betterments of their corporate properties and giving a proper return to such capital, and the upper millstone of government regulation, which in defiance of the lesson taught by Joseph in Pharaoh's time, seeks to limit capital returns in fat years but is unwilling to guarantee any returns in lean years, a jug handle regulation which would, if carried out as demanded by inconsiderate and singularly selfish extremists, be the practical destruction of investments in public utility corporations, and carry with it economic ruin and devastation to which we have had no parallel in this country.

But these men are not pessimists. They are loyal to themselves and to their past. They are stayers and they must be hopeful that a good cause if well sustained will in the end win out through the sense of fair play, which will come to their aid on the part of the public.

The young man looking about for a career in life and finding his lot cast in village or city has before him numberless examples of business and professional success, not in money making, but in character first. Let him note in what other calling without means, with a fair education, intelligence, courtesy, ambition and energy as his aids he is likely to do better than as a telegraph operator.

The leaders must in due course follow the law of nature, but promotion rarely waits upon death. It comes to the worthy one. The search is constant for the right young man—the demand is never satisfied. All good places are not even now preempted by the old telegraphers.

And let him also comfort himself with the examples of other men who spent years in telegraph

work and through the training and suggestions there received were given new direction for their energies and ambition, and so became able to maintain themselves acceptably as men of character and standing with abundant success in other fields of work. They may rest assured their experience so gained will always prove useful. And if he would be measurably happy he will reduce from the example of these old telegraphers the truth of the words of Theodore Parker, that:

"The earnestness of life is the only passport to the satisfaction of life."

The Telegraph in Alaska.

BY CARL V. SNOW,

First Class Sergeant, U. S. Signal Corps..

The telegraph service in Alaska, which is owned by the government and operated by the Signal Corps of the United States Army, is carried on principally over the land lines which connect the more important points in that country. These lines, however, are subject to frequent interruptions and are difficult to keep in repair on account of the severe cold in winter and the spring freshets. The line from Valdez to Fairbanks, a distance of 367 miles, is often interrupted from two to ten days at a time. In such an event the business is sent from Valdez to Fort Egbert, where it is transferred by wireless to Circle, and from there relayed to Fairbanks, where it is returned to the land lines. Three hundred messages per day are often handled in this way.

The wireless service has been found to be very reliable both at day and night in the winter, the northern lights having no appreciable effect upon it. During the summer, however, from May until August, static disturbances are very frequent and troublesome, rendering communication difficult. These disturbances often continue for 36 hours without a break, and make it almost impossible to read the incoming signals. At times these discharges add dots to the characters or make a dash out of two dots, thus completely changing the signals. The sound of these static signals cannot be distinguished from those sent by the distant station.

When the earth is frozen hard in the winter it is impossible to make use of it electrically and the snow being perfectly dry is also a non-conductor. The telegraph lines are then grounded in the river. Frequently in the spring when the ice in the river breaks up the telegraph line ground is broken and it is sometimes several days before a new ground can be secured. Serving the same purpose as a ground connection for the wireless, a system of wires is arranged parallel with the ground and about seven feet above it. This is called a counterpoise. The wireless station at Circle is the farthest north of any and furnishes the only telegraph service at that point. Prior to 1909 it was located in a log cabin and was probably the only wireless station in the world housed in this manner. During that

year new quarters were provided and the station, which is of three kilowatt capacity, was moved and placed in working order again in less than twenty hours, including the time spent by the men in sleep.

Messages for Alaska are sent to Seattle, where they are turned over to the government for transmission by cable to Sitka, a distance of 1,085 miles. There they are relayed by cable to Valdez, 599 miles distant. The paper tape of the siphon recorder is then pasted on message blanks and the messages are sent over the land lines in the Morse code direct from the cable record, which is made in the Continental Code. The entire cable, land line and wireless system is operated by the men of the Signal Corps. Over fifty offices are maintained along the coast and in the interior of Alaska. During the winter linemen utilize dog teams exclusively for transportation. In the summer the rivers are open for navigation for three or four months and during this time most of the supplies used are carried in. The telegraph offices are located at points along the river as far as possible, as most of the overland trails are impassable in summer. With the exception of Fairbanks, Tanana, Nome and St. Michael, all of the places in the interior have less than 100 inhabitants during the winter and hence are rather lonesome places for most telegraph operators.

The temperature of Alaska in summer is as in the United States, around 100°, and mosquitoes are plentiful. In winter the average temperature is from 30° to 40° below zero in the interior, though every year cold snaps come which bring the thermometer down to 70° below zero or even lower, these cold spells lasting at times for several weeks. On account of the dryness of the climate, however, this excessive cold is not felt as severely as would be imagined.

Freight which arrives at a river town in navigation season for miners or others located away from the towns usually waits until winter, when it is hauled over the snow by the freighters. Horses are never taken out of their stables when the weather is colder than 45° or 50° below zero. With the exception of freighters no one has horses in the small towns, the cost of keeping them being too great.

No places of amusement are to be found at the small towns, making reading practically the only winter diversion, and while magazines are a month or more old when received, they are always appreciated.

Carl Vivroux Warren Snow, the author of this interesting description of Alaskan Telegraphs, was born at Dayton, Ohio, April 5, 1878. He entered the telegraph service at that point in 1890, as operator for the Postal Telegraph-Cable Company. From 1895 to 1897 he was a student at Rose Polytechnic Institute, and upon his graduation went to Chicago and again entered the serv-

ice as an operator. In 1898 he enlisted in the Signal Corps for service in the Spanish American War, receiving his discharge in 1899. He then engaged in other business, but in 1901 returned to telegraphic ranks as operator on the Long Island Railroad. He was afterward employed by the Delaware, Lackawanna and Western Railroad and by the Brooklyn Rapid Transit Company. In 1904 he again enlisted in the Signal Corps as Sergeant and has been connected with that organization since that time. Over two years of his enlistment have been spent in Alaska, hence Sergeant Snow is well qualified to write about the service in that country. At present he is stationed at Fort H. G. Wright, New York.

Book Reviews.

"The History of the Telephone," by Herbert N. Casson (A. C. McClurg and Company, Chicago, 300 pages, illustrated), might well be called *The Romance of the Telephone*, as the author has told the story of the birth and growth of our great telephone industry in a way which makes the book more interesting to read than most novels. Beginning with the early experiments and trials of the young and almost penniless teacher, Alexander Graham Bell, which led up to the discovery that the transmission of articulate speech was a possibility, the author relates some of the many vicissitudes through which the youthful industry passed before it was finally placed on a paying basis. The book is not intended to be technical or statistical but the author has aimed rather to tell his story in such a way as to make it of interest to the general public and in this he has succeeded. Copies of this interesting work will be sent to any address carrying charges prepaid, upon receipt of price, \$1.50 by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

"Principles of Wireless Telegraphy," by G. W. Pierce (McGraw-Hill Book Company, New York, 342 pages, 235 illustrations), is the latest book from the press upon this subject and is one which would make a valuable addition to the library of anyone interested in wireless telegraphy. The author discusses in an elementary way without the use of complicated mathematical formulae the principles underlying the generation of electric waves, the properties of electric waves and electric oscillations. He then shows how these principles have been gradually developed and applied to produce waves which are suitable and efficient for the wireless transmission of messages. The various forms of apparatus in commercial use at the present time are also discussed at some length. The book is written with the purpose of being useful alike to the amateur experimenter who has little knowledge of electricity and to the professional electrician who is engaged in the operation or construction of wireless apparatus. It has twenty-eight chapters and two appendices which give some useful definitions

of electrical units and formulas which will be of value in making electrical measurements. Taken as a whole this is undoubtedly the best book on the subject of wireless telegraphy on the market at the present time. While any book dealing with this new art necessarily grows obsolete to a certain extent in a short time because of the developments which are daily taking place, the work of Professor Pierce has undoubtedly a more permanent value than most of the books which have been written during the past decade owing to the fact that he lays more stress upon the basic principles underlying the art than upon their actual application. These principles are fixed although their application is susceptible of many modifications. Copies of this valuable work will be sent to any address, carrying charges prepaid, upon receipt of price, \$3.00, by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

New Railway Telephone Cabinet.

The Kellogg Switchboard and Supply Company, of Chicago, is now furnishing a special cabinet for their No. 33 combined drop and jack for use on railway telephone despatching and message circuits. Where more than one circuit is used, it will be found very convenient and a saver of equipment. The apparatus is mounted in strips of five in a good substantial oak box, all connections being wired to terminals on the inside of the box. One telephone may be switched by means of a cord and plug, to any of the five jacks and lines.



KELLOGG DROP AND JACK CABINET.

When a call is received over a line on which telephone selectors are used, the circuit is so arranged that the selector throws the drop instead of ringing a vibrating bell, and the drop in turn rings a vibrating bell. These drops are so arranged, that by means of a switch, a ring on the bell until answered may be given or a ring of the same duration that the selector contacts are closed may be obtained.

When current is sent through the drop, the armature of the drop draws up and closes a pair of contacts, at the same time the shutter on the front of the drop is released and falls, closing another pair of contacts. The pair of contacts closed by the armature, are closed only while the current is passing through the winding of the drop, and in this way give the short ring on the bell. The pair of contacts closed by the shutter are closed until the drop is restored.

It is very convenient to be able to have two lengths of bell rings where an office is busy in the day time, and where an operator sleeps at night. With either method of ringing the drop always furnishes a visual signal, which is restored by simply inserting the plug in the corresponding jack below, the shutter being restored by means of a simple mechanical arrangement.

As an illustration: It is suggested that drop and jack No. 1 be used on a telephone despatcher's circuit; drop and jack No. 2 be used on a telephone message circuit; drop and jack No. 3 on block telephone east; drop and jack No. 4 on block telephone west and drop and jack No. 5 on a yard telephone circuit—or even the line to the city telephone exchange.

It will be seen from this that the operator can operate all the lines with one telephone from his chair. These drops may be arranged to operate on two cells of dry battery, or be bridged across any circuit in place of a bridging bell.

The Pennsylvania Railroad Lays Two Submarine Cables.

The problem of satisfactorily caring for the numerous telephone, telegraph and signal wires necessary for the operation of a large and important railroad at points where its tracks cross a navigable river, making a drawbridge a necessity, has recently been solved by the Pennsylvania Railroad Company at its new Hackensack "draw" at the point where the Pennsylvania Terminal and Tunnel Division crosses the Hackensack river, a few miles west of Jersey City.



UNREELING SUBMARINE CABLES FROM BARGE.

The accompanying illustrations show the laying of two submarine cables, one a 35-pair No. 13 gauge, triple wrapped paper insulation, to be used for telegraph circuits, and the other of 45-pair, No. 13 gauge, double wrapped paper insulation, having the wires of the inner core triple wrapped, and having eight pairs of this core twisted into double pairs, thus forming four phantom circuits. Each cable

was 1225 feet long, the 35-pair cable weighing eleven and a half, and the 45-pair twelve and a half tons. Each cable had a lead sheath $\frac{5}{32}$ of an inch thick. Each sheath was saturated with a non-corrosive preservative compound, over which was wound two layers of saturated jute put on in reverse directions. Over this jute was placed an armor of No. 4 B. W. G. iron wire, the armor being saturated with a preservative compound, and over this was placed two thicknesses of hemp rope, laid on in reverse directions and thoroughly saturated with preservative compound. The average mutual electrostatic capacity of this cable was between .06 and .074 microfarad per mile.

The work of laying these cables was carried out by the Postal-Telegraph-Cable Company, and was under the personal supervision of Mr. M. Keily, who represented Mr. J. C. Johnson, superintendent of telegraph of the Pennsylvania Railroad.

One very interesting feature aside from the laying of the cable was the very efficient and durable line of concrete poles which terminated on either shore. These poles were cast by the railroad company in accordance with its own specifications, and it is expected that they will be found much more suitable in the low, swampy ground where they are placed than wooden poles.

The weight of this cable was such that it was not considered necessary to do any dredging along the river bottom, as it is believed that the weight of the cable will sink it far enough into the mud to prevent its receiving any injury.

The engineers of the Pennsylvania Railroad Company, who worked in conjunction with those of the Western Electric Company, who manufactured the cable, were kept busy for some time designing and developing this cable, which is the latest product for submarine work.

The Telegraph in China.

All telegraphs in China are now entirely under government control, the interest in the Imperial Chinese telegraphs which was formerly held by private individuals having been taken over by the government. Extensions to the system are rapidly being made, the most important during the past year being the direct Peking-Hankow line along the railway, on which fast automatic Wheatstone working has been established. The statistics for 1909 show that there are 1,099 miles of submarine lines and 25,273 of aerial line. The head office staff number 112, the general staff 3,473 and the line staff 2,833. 807,841 telegrams were handled. The receipts were \$838,733, and the expenditures \$479,816. There are 1,171 instruments in use, of which 22 are Wheatstone and five wireless. A reduction of telegraph charges of 20 per cent. was effected in 1909. The program of the Board of Communications for 1911 includes preparations for installing wireless telegraphy along the coast.

Radio-Telegraphy.

One wireless experimenter has discovered that a large tin dishpan makes a very efficient aerial for the reception of wireless waves.

The New Zealand Government has asked for bids for five wireless stations to be erected at or near Doubtless Bay, Gisborne, Cape Farewell, Sumner (near Christchurch) and Bluff.

The United States Civil Service Commission will on October 19, hold an examination to secure eligibles for appointment as wireless telegraph operators in the Philippine service at a salary of \$1200 per year.

The Brazilian government has recently installed a four and one-half kilowatt Telefunken wireless telegraph station near Bahia, Brazil. The guaranteed range of the station is 400 miles, but communication has easily been carried on with Rio Janeiro, 730 miles distant, and with ships 1000 miles at sea.

With the aid of a kite to support the antenna, Mr. William Marconi reports that he has succeeded in receiving signals from Clifden and Glace Bay on board the Italian Lloyd steamship, *Principessa Mafalda*, at distances up to 3,500 miles, in the day time.

A patent, No. 970,592, for wireless transmission apparatus for controlling the movements of vessels, has been granted to V. C. De Ybarrondo, of Los Angeles, Cal. Electromagnetic means combined with the rudder and energized by impulses transmitted thereto from the generating apparatus under control of the operator.

A patent, No. 970,850, for wireless telephony, has been awarded to A. Plisnier, Jr., of Stuttgart, Germany. The Duddell oscillating circuit is fed by a mercury vapor spark gap or an electric arc, and the tension on the microphone may be varied by means of a self-induction coil, a shunt circuit including a microphone and capacity.

The Dominion Wireless Telegraph-Telephone Company, Ltd., has been incorporated in Ontario, with a capital of \$40,000 and offices at Windsor, Ont., to deal in wireless telegraph and telephone instruments, to erect and operate wireless telegraph and telephone systems, and to conduct a general wireless telegraph and telephone business. The directors are: J. Clark, A. Beckett, S. Anderson, Windsor; L. F. Boomer, Cleveland, O., and T. E. Clark, Detroit, Mich.

An effort is being made under the direction of Mr. G. H. Mann, a Washington lawyer, to form a national organization of amateur wireless operators. It is stated that the object of this organization is: first, to defeat the Depew bill requiring all wireless stations to be registered, and placing them under the supervision of the Secretary of Commerce and Labor; second, to secure the passage of the Roberts' joint resolution, which provides a commission to take testimony before any legislative action is adopted, and, third, to secure an expression on behalf of all the amateurs favoring some positive legislation which will give them protection.

Mr. William Marconi who, for some time past has been at Punta Del Este, Argentine Republic, supervising the construction of a high-power wireless station, reports that he has received at that point messages from Glace Bay, Nova Scotia, and Clifden, Ireland, a distance of at least 5600 miles.

The British Post Office Department reports that within three months the number of wireless messages received and sent has been doubled. Following the recent purchase of wireless telegraph stations along the coast it is the future plan to have a complete ring of such stations encircling Great Britain and Ireland.

The Australian Government has decided to change the location of the proposed wireless station at Sydney, which was to be erected near the coast, to an inland point, about thirteen miles distant. It is reported that this change will involve an additional expense of £2,000 in the construction of the station, but the Commonwealth authorities believe that the location now decided upon is much more advantageous.

The Canadian wireless telegraph service has been transferred from the Department of Marine to the Department of Naval Service. The officials of the telegraph service are C. P. Edwards, superintendent of radio-telegraph service, Ottawa, and E. J. Haughton, district superintendent of radio-telegraph service, Victoria, B. C. The latter has charge of the Pacific coast branch of the service, and reports to the superintendent.

Wireless in Japan.

In a recent issue of one of the London electrical papers, Mr. Wichi Toukatu, gives an interesting description of the Teishinsho system of wireless telegraphy which is used in Japan. This is a spark system, and makes use of a telephone and detector for its receiver. Many special devices are used to minimize the damping and get sharp tuning. Of detectors the Teppun, the tantalum and the Koseki are chiefly used. In the Teppun detector two steel poles are magnetized and arranged to be adjustable in their distance as in a coherer. Fine steel powder, oxidized on its surface by burning in a flame, is introduced between the poles so that the powder makes a bridge between them by the magnetic field of the poles. The powder must not be in too great a quantity, and each granule must be neither too large nor too small. The sensibility of the detector depends mainly upon the degree of the oxidation and also upon the adjustment. The tantalum detector of the author depends upon dipping a tantalum point into some alkaline or acid solution. The tantalum detector is very sensitive, and many samples which the author has made in his laboratory were more sensitive than the glass-shielded platinum-point electrolytic detector. The tantalum is not acted upon by ordinary acid or alkali, and the life of the detector is very long. The Koseki detector employs zincite, molybdenite or iron pyrite as a substitute for the oxidized iron-powder of the Teppun detector. Five land stations and eleven Japanese vessels are now equipped with this system.



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The Railroad.

F. M. McKinney, a night telegraph operator on the Chesapeake and Ohio Railroad at New Richmond, O., was on September 30, shot and killed while defending his station from robbers.

Mr. W. L. Connelly, superintendent of telegraph of the Chicago, Indiana and Southern Railway, Danville, Ill., is installing telephone despatching and message circuits on the Kankakee division of that road.

The Missouri, Kansas and Texas Railroad; W. H. Hall, superintendent of telegraph, Denison, Tex., is preparing to install a telephone despatching circuit between Denison and McAlester, a distance of 97 miles.

The Canadian Pacific Railway has authorized the construction of two more telephone train despatching circuits, from Toronto to London, 115 miles, and from London to St. Thomas, Port Huron and St. Marys, 114 miles. When this equipment is installed it will make a total of 2130 miles of the Canadian Pacific system operated by telephone.

Mr. C. A. Parker, whose resignation as superintendent of telegraph of the Denver, Northwestern and Pacific Railroad was reported recently, is still employed in that capacity. At the time of his reported resignation several of the higher officials of the road resigned on account of the retrenching policy of the system. Mr. Parker, however, was not among those who resigned.

The Pere Marquette Railroad has ordered equipment for a telephone train despatching circuit between Saginaw, Mich., and Toledo, O., a distance of 135 miles. This circuit will have thirty stations, and the chief dispatcher will be located at Saginaw. This is the first telephone despatching circuit on the Pere Marquette and the work of installing the equipment will be carried out under the supervision of Mr. W. K. Tasker, superintendent of telegraph of the road.

The third annual convention of the Association of Railway Electrical Engineers, which was held at Chicago, September 27-30, was well attended, 150 active and associate members being present. This association now has a membership of nearly 500. The affair concluded with a banquet at the Hotel La Salle in which 350 participated. Mr. W. H. Bennett, superintendent of telegraph of the Chicago and Northwestern Railway, Chicago, was one of the speakers on this occasion.

The monthly meeting of the division operators and other telegraph employes of the Pennsylvania Railroad, was held in the assembly room of the Pennsylvania Railroad Annex Building, Philadelphia, on September 30, and was largely attended. Papers were read by Mr. J. D. Jones, electrical engineer in the department of the superintendent of telegraph on "Specification Requirements for Telephone and Telegraph Cable," and by Mr. H. F. Smith, chief transportation clerk and division operator of the Philadelphia, Baltimore and Washington Railroad on "The Telephone as Applied to Railroad Operations."

At the annual meeting of the Philadelphia, Reading and Pottsville Telegraph Company, held at Reading, Pa., October 3, the following officers were elected: president, Geo. F. Baer; treasurer, H. E. Paisley; secretary, W. R. Taylor; directors, Theodore Voorhees, Samuel Dickson, E. F. Smith and John F. Auch.

Arrests for Wireless Interference.

Ernest E. Goodwin and Elberon Holt, operators employed by the Continental Wireless Telegraph Company, were arrested in Buffalo, N. Y., on September 28, on complaint of Edwin C. Newton, superintendent of the United Wireless Telegraph Company at Chicago, who alleges that the two operators wilfully and maliciously prevented and delayed the transmission of a message from the steamship Western States on September 21, when that boat was disabled on Lake Erie off Long Point owing to the breaking of a shaft and cylinder head.

According to the affidavit, Charles Royal, the operator aboard the Western States, unsuccessfully tried from 4.10 a. m. until 9.40 a. m. to reach either the Erie or Buffalo stations. Royal states that the moment he began to send out a message asking for assistance, the operator at the Continental station, Buffalo, began to interfere.

The two operators arrested were charged with a violation of the penal code. At a hearing held in the Buffalo City Court, October 3, affidavits containing copies of orders alleged to have been sent to its operators by the defendant company were introduced. One alleged order read: "We wish to impress upon our men that the fight is not to allow the competing and complaining company to get a single word through."

Operator Royal was formerly employed by the defendant company. In his affidavit he said while working for the defendant he had both verbal and written orders not to let the opposition "get through a single message."

While in Detroit, Royal said in his affidavit, he was ordered to go to the laboratory of his then employer, the present defendant, and start an interference machine to prevent the rival concern from receiving messages sent to it.

"This machine was so arranged by having points on the shaft of a motor that as the motor would turn it would close the circuit and make dashes. My instructions were to interfere until 3 a. m. each day. I then went to the laboratory and started the interference machine; that ran until all their boats had docked. I carried out these instructions during the entire time that I was working for the company in Detroit."

The case will probably be carried to the Supreme Court.

The electric lights in the main office of one of the telegraph companies in one of the large cities failed one night recently, and for over an hour the operators were obliged to work by candle light. This reminded some of the old timers in the office of pioneer days.

American Telegraph Engineering—Notes on History and Practice.*

WILLIAM MAVER, JR., NEW YORK: I should like to say that this résumé is not by any means a full account of the history of American Telegraph Engineering. For instance, in the paper nothing whatever is said about lightning arresters, the forerunners of the switches of which we have heard so much. The early telegraph engineers had their troubles with lightning, and the methods adopted to overcome these troubles were numerous; finally coming to the method which is in universal operation to-day, that is, the short path to earth for the lightning current.

About twenty-five or thirty years ago the electric light was inaugurated, following which very quickly telegraph companies began to be troubled a good deal with crosses between the wires of the two systems, with the result that the telegraph switchboards were often burned out, and not the switchboards only, but the buildings of the telegraph companies also. To obviate these troubles as much as possible, the method was employed of coiling up fine German silver wire into coils the size of a pencil, consisting of ten or fifteen turns termed the spider wire. This was put in series with these telegraph circuits at the switchboard, in addition to the short air gap arrester. I do not think the engineers had any thought at the time that the coiling of the wire would have any effect in retarding the progress of the oscillating current towards the instruments.

JOHN B. TAYLOR, SCHENECTADY: One of the points I wish to raise is that this matter of delivering a telegraph message from a person in one part of the country to a person in another part of the country is something more than getting a code of signals through a given area. It involves a matter of readiness to serve at all hours of the day and night, frequently in small places only during certain hours of the day, and also a system of collecting and delivering messages, assuming that the office is open. This, as far as I can see, is the main reason why these automatic systems, which can send signals over the wire at a phenomenal rate of speed, sufficient to give a thousand or more words per minute, have not gone into anything like general use, and in fact they have gone into use only in very limited cases. Mr. Maver can, I hope, enlarge on this point a little more than I can, but we all of us here see frequently the statement that the telegraph people are not alive to the possibilities of sending messages at a great rate of speed over a single wire, and while a number of messages over a single wire is a good thing, perhaps, between two large cities, it is of practically no use at all

to the small towns, of which there are a great many in this country.

The telegraph line is rather apart from the work of most of the members of the Institute, I think, but I am glad that we have had another paper giving an up-to-date résumé of the present practice. It is difficult for a man out of the field to know just what is being done. We get hold of the old books and find descriptions of duplex systems, quadruplex systems, repeater systems, etc., but as a rule that is not interesting, and if a member of the Institute is interested in this subject, he is interested in knowing what is at the present time improved practice in the majority of cases, and for this reason I think it is very well that the matter is summed up in this way and spread on the Institute records at this time.

My own recent interest in telegraph and telephone matters has been due, more or less, because of my interest on the side of the disturbance feature from powerful lines, and one or two points occurred to me as Mr. Maver was abstracting his paper. It is plainly brought out by him that the practice of quadruplexing, which means to get four messages over a single wire at the same time, was not worked to an extent, which, at first sight, it would seem that it should be, and this is due to a number of reasons, possibly divided up between poor insulation, variable weather conditions, etc., and to a large extent due to inductive disturbances—I think only to a small degree from short circuits or low inductive disturbances from circuits of the same class on the same pole line, and this raises the question whether the telegraph companies could not afford to use metallic circuits, in which case the matter of inductive disturbances from their own wires, as well as foreign wires, would be obviated. The matter of insulation would still, perhaps, be troublesome, but I think this could be improved without an investment which would be very great, in comparison with the investment in poles, etc., by merely using a better grade of insulators.

There is also the question of using wires of greater capacity by the combined telephone and telegraph, composite and simplex, etc., according to the special system used. Now, if the demand for the telegraph wires and the demand for the telephone wires comes out in just a certain ratio, we might have metallic circuits between all the important points working as telephone wires and also perhaps a sufficient number to take care of telegraph service, perhaps as grounded lines and metallic lines between two pairs of telephone wires. Incidentally, two pairs of telephone wires would be used to make a third telegraph circuit by the phantom arrangement, and again, there might be some uncertainty as to the most economical division of wires between telephone and telegraph circuits, and that matter would be given attention at that time. However, the curve of demand probably varies to a very great extent during the day, the telegraph business of a certain

*Discussion of the paper presented by William Maver, Jr., and Donald McNicol, at the Twenty-seventh Annual Convention of the American Institute of Electrical Engineers, Jefferson, N. H., June 28-July 1, 1910, and which was published in our columns July 16-September 16.

sort going out in the daytime, probably at the peak of the telephone load—but with the introduction of the night lettergram, at day rate—the wires are probably not very busy for telephone work, at any rate since the night telephone rate has been abolished—and it is to be hoped that the recent active interest of the telephone people in the telegraph companies will give a more economical working of the conductors, so that it may appear that the telegraph systems can be worked out advantageously on the metallic circuit, and thus give us the full benefit of the quadruplex and other multiplex systems.

I did not have time to look the paper over very carefully, and do not know just what Mr. Maver said about the Rowland system, which in the last few years was written up in an interesting paper by Mr. Potts, I believe, where an octoplex capacity was claimed for it. This system used the tape printing device direct from keyboard to the message delivered at the other end, and if this device has been found to work out in practice, it would seem to have been a good thing, but I have not heard lately that any great extensions have been made with it, and if Mr. Maver can say a word or two as to the general reasons for the apparent inactivity, I should like to hear from him.

Incidentally, I believe my name has perhaps been taken in a way to give me more credit than is due. I find in the paper reference is made to the New York, New Haven and Hartford Railroad Company, and a paper presented by me to the Institute in October, 1909, on "Telegraph and Telephone Systems as Affected by Alternating Current Lines," is referred to at the bottom of the page in connection with this matter. While I was interested in the work on the New York, New Haven and Hartford Railroad, for the Western Union Telegraph Company, and described the scheme in actual use, I cannot claim any particular credit for it, but Mr. Scott of the Westinghouse Company, who is here, can tell you to whom the credit belongs better than I can. This cut with my name under it looks like some drawing in a patent application, but I do not think the write-up of the telegraph should be left in its present form, which would give the impression that the present development on the New York, New Haven and Hartford Railroad is to be credited to me.

GANO DUNN, AMPERE, N. J.: I heard Mr. Maver say that four-fifths of the operators in this country use the mecograph. Is this really so?

My observation as I travel around the country is that we do not see many of them, although I do not get into the central offices.

I have found them imperfect, probably because of my own lack of skill, but there seemed also to be certain inherent difficulties such as difficulty of adjustment and not enough certainty of action to cause all the dots to go through on a long and variable line.

It is also difficult constantly to change the adjustment of the mecograph to follow the rising and falling inductive and leakage changes that are found on a long and poorly constructed line, with many stations.

The wireless telegraph is introducing a greater than ever conflict between the Continental and American Morse alphabet. I should like to know whether there is any attempt towards a more general introduction of Continental Morse into this country, and if so, what Mr. Maver thinks of its probable success.

WILLIAM B. HALE, MEXICO CITY, MEX.: Perhaps a few remarks on the telegraph system of the Republic of Mexico may not be amiss. The system there is an extensive one, considering the comparatively few large centers of population. The telegraph lines extend to even the smallest towns and villages, because, being a telegraph controlled by the Government, its operation is not based upon the question of profit. The Government is ready and anxious to install a telegraph office in any town which has any need for such service, whether it will pay or not. The idea is to supply reliable telegraph service to the entire people at cost.

The general equipment of the system is practically that of the United States a few years ago. The Morse manual system, with simplex, duplex and quadruplex operation, is in use; and the lines are mainly constructed with No. 8 galvanized iron wire and a European type of porcelain insulator. Wooden poles are chiefly used, but some of the trunk lines have iron poles. There are a few Hughes printers in service in the Capital for communication between the central office and its branches. In the larger cities of the country duplex and quadruplex instruments are used, and in all other offices the Morse simplex is employed. The American closed-circuit system of operation is in use; also the regular Morse alphabet, with a few changes to adapt it to the Spanish language.

The telegraph is used very extensively in Mexico, not only for business purposes, but for social and personal matters as well. To a very considerable degree the Mexican makes use of the telegram where you would use the mail, or a messenger service. He sends telegrams from his place of business to his home, messages of congratulation to friends on their birthdays and telegrams of felicitation on such days as Christmas and New Year's. In the City of Mexico one finds a very convenient form of service for such social messages; we have a card, about the size and shape of your postal card, which can be purchased for five cents, Mexican currency, the equivalent of two and one-half cents in your money. On the front of the card is a space reserved for the address and a number of ruled lines for the message, which must not exceed ten words. These card telegrams, after being filled out, may be deposited in boxes, similar in appearance to letter-boxes, which are placed at the more important

street corners throughout the city, and from which frequent collections are made. The messages thus collected are delivered at the nearest branch office, telegraphed to the office which is within the shortest distance of the person to whom they are addressed, and from there delivered by the regular messengers. This is a prompt and efficient, as well as cheap, means of communication within the limits of the Federal District—in the center of which lies the City of Mexico—and it is very extensively employed for business and social purposes.

The rates for telegraph service in the Republic of Mexico are low. A ten-word telegram may be sent from one end of the country to the other for only one peso, or fifty cents in American currency. The rate for night messages, which are transmitted from 10 o'clock in the evening until midnight, is one-half that of the day rate.

We have been unable to use copper wire for pole lines to any extent, for the reason that it is cut down and stolen by the *peones*—the lower-class natives. Iron wire has so far been employed almost exclusively for the construction of pole lines, but I have suggested the use of a steel core copper-clad wire, which will improve the service and will probably not be stolen, as when cut down it will have very little, if any, value as scrap metal. This copper-clad wire will undoubtedly remain up, and it ought to prove especially valuable in a tropical country like Mexico, where even galvanizing does not protect iron wire from corrosion for any great length of time.

The success of the Federal telegraph system of Mexico would lead one to favor a government-controlled telegraph. The service is rendered at rates much below those which would be charged by a private corporation; and the despatch of telegrams is in every respect satisfactory, being prompt, efficient and thoroughly reliable.

(To be continued.)

Telegraphers' Aid Society Quarterly Statement.

The New York Telegraphers' Aid Society financial statement for the quarter ended September 6, 1910, is as follows:

Balance on hand June 6, 1910.....	\$24,902.39
Receipts	1,456.32
Total	\$26,358.71

DISBURSEMENTS.

Sick benefits	\$1,198.27
Death benefits	500.00
Expenses	173.43
Balance on hand September 6, 1910.....	24,487.01
Total	\$26,358.71

RELIEF FUND.

Balance on hand June 6, 1910.....	\$4,878.42
Receipts	5.38
Total	\$4,883.80
Disbursements	101.50
Balance on hand September 6, 1910.....	4,782.30
Total	\$4,883.80

F. J. Nurnberg, J. F. E. Hopkins, H. M. Heffner,
Auditors.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Mavor and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XX.

How could you best describe the Roberson alternating current quadruplex as regards the apparatus used in comparison with that employed in the ordinary quadruplex?

Is there a short end current employed in this arrangement?

What means did Mr. Roberson use to obtain a sensitive instrument which would operate during weather which would destroy the usefulness of other systems?

What is the purpose of the permanent magnet?

How does the strength of a magnet vary with the number of lines of force traversing its core?

What arrangement is used to send alternately positive or negative impulses to line when desired?

How is the incoming signal registered?

What apparatus is used which is not used on the polar side of a quadruplex?

Draw a diagram of the theoretical connections of the Roberson quadruplex.

What is the object of the high resistance carbon rods used?

How would you balance the Roberson quadruplex?

What is the object of the iron crossbar slide at the base of the steel horseshoe?

What strength of current is required for operating this quadruplex?

How does the adjustment of the pole changers or transmitters used with this quadruplex compare with those used on the ordinary quadruplex?

What kind of resistances should always be used in the circuit of this type of quadruplex?

What type of sounders are best for repeating sounders?

Draw a diagram of the actual connections of the Roberson quadruplex which were used by the Western Union Telegraph Company.

CHAPTER XXI.

What was one of the chief disadvantages first found in the operation of the Roberson quadruplex?

How was this difficulty overcome?

Draw a diagram of the connections for the transformer method of operating the Roberson quadruplex.

What is the frequency of the current alternations employed with this system?

Telegraph and Telephone Age is headquarters for electrical, telephone and telegraph books. Write for catalogue.

Obituary.

A. O. Boudreaux, for many years in the employ of the Postal Telegraph and Western Union Companies, having been manager of both companies at Lake Charles, La., at different times, died at that place, September 24.

George A. Hossbach, a well-known telegraph operator of Baltimore, Md., died in that city, September 25, aged fifty-two years. Mr. Hossbach had been employed for many years in the Baltimore Stock Exchange.

R. L. Sawyer, a telegraph operator on the Los Angeles Times, was killed by an explosion which wrecked the plant of that paper on the morning of October 1. Mr. Sawyer was at his key and was about to begin receiving the story of the Vanderbilt cup race from New York, when the disaster occurred.

Arthur E. Crocker, died at New York, September 13, aged seventy years. Mr. Crocker served throughout the Civil War in the Department of Military Railroads and was confined in Libby prison for nearly a year. He was engaged in construction work for the Postal Telegraph-Cable Company during the early eighties, and since 1885, had been connected with the American Telephone and Telegraph Company, being engaged in construction and right-of-way work.

The Electrical Club of Chicago.

BY E. C. DODGE.

In keeping abreast with the progressive era of the Western Union Telegraph Company, the Chicago Office can now boast of a live electrical club, and the increasing interest which is being taken in the work is truly encouraging to the officers and those who have been devoting their time and energies toward making it a success. The meetings are held every other Thursday evening and it should be gratifying to the officials to find that the Chicago office has been able to furnish instructors capable and willing to carry on the work.

Beginning with the elementary laws and phenomena of electricity and magnetism, the course of instruction and study has been carried along the lines laid out by the articles in the Telegraph and Telephone Age, the club having adopted those lessons as their regular course of study. The traders' room of one of the stock brokers is used as a meeting place and the large blackboard is made use of by the instructors for diagrams and explanations. It is proposed to follow out a line of study covering everything pertaining to telegraph and telephone work, and educate the members along lines which will enable them to fill positions where technical and practical knowledge combined will make them capable and efficient and worthy of the advancement which always comes to the man who knows how and why. I emphasize the word "why," because my experience with quadruplex and repeater men has been that while there are an abundance who have a superficial knowledge which enables them to perform their work with a greater or less

degree of satisfaction, so long as instruments and wires are all right, yet, the least abnormal condition arising puts them, so to speak, "up in the air." There are too many men in our line of work who are satisfied with an acquired knowledge of which switch to turn to produce a certain result, but when the result is not forthcoming, some one else must find the reason why. This was all right in former times, but under the new conditions there is a feeling that we must bestir ourselves. With the encouragement offered by the club, every one seems eager and willing to apply himself, and it is predicted that the Electrical Club of Chicago will produce some very gratifying results.

The first meeting for organization was held June 30, with an attendance of fifteen. The roster now contains ninety names and new recruits are coming in at every meeting. The officers are: C. H. Finley, president; J. J. Welch, vice-president, and E. C. Dodge, secretary and treasurer.

A Plea for the Cashier.

The cashier of one of the large city telegraph offices is desirous of knowing when promotion will come to the cashiers in the readjustment of telegraphic conditions which is taking place. He asks why cashiers are never promoted to have charge of offices and thus give those under them a chance for promotion. Cashiers are frequently kept in the same position with no advancement for thirty years, and they naturally get discouraged. They are the real men behind the business, he states, and are a credit to the managers. They do not, however, have time to set forth their capabilities to the higher officials as they are the hardest worked men in the service. They are little appreciated, however, and scarcely ever promoted. They would make first-class auditors and managers as they understand all of the details of the business. They have been forgotten all of these years, however, and he believes that now is the time if ever to give them the promotions that they deserve or to tell them what they may expect in the future. Probably nearly every telegraph cashier in the country will appreciate the force of this cashier's remarks.

Favorable Conditions for Operators in Canada.

The scarcity of competent commercial telegraph operators which has been remarked during the past year throughout the country is especially noticeable in Canada. This seems strange when the fact is taken into consideration that it is generally admitted that the wages paid in that country are better than the average in the United States. Operators who have had difficulty in supporting a family in some of our larger cities have removed to Canada and there been able to live in comfort. It is a significant fact that at the present time there are few telegraphers employed at the key in this country who have worked for any length of time in Canada, while there are hundreds of operators in the Canadian service who have emigrated from this country and are well satisfied with their present employment.

Letters From Our Agents.

DALLAS, TEXAS, WESTERN UNION.

Mr. W. S. Strawbridge, has been appointed chief operator of this office, vice W. P. Davis promoted to be traffic supervisor of the Gulf division.

Mr. R. E. DeLay has been appointed night chief operator, vice Mr. Strawbridge.

Mr. E. E. Lyon has been appointed late night chief, vice Mr. DeLay.

Mr. Burton D. Snyder has been appointed night wire chief, vice Mr. Lyon.

Mr. B. F. Lally has been appointed assistant night traffic chief, vice Mr. Snyder.

BALTIMORE, WESTERN UNION.

The electrical class of this office having had a recess during the heated term, resumed meetings October 6, with a good attendance.

Professor Arthur gave a review of the text-book used in the spring, and he announced that as the class had outgrown this book, he would suggest a more advanced text-book. The class acted upon the suggestion and Swoope's "Lessons in Practical Electricity" was adopted for the fall and winter course.

President Anderson spoke at some length on an editorial in *Telegraph and Telephone Age*, which dealt with "Opportunities for Advancement" to employes extended by the new organization of this company. In his remarks, Mr. Anderson said that there was no illusion about this editorial, that the writer stated actual facts, and that he firmly believed that every man who gave evidence of having developed technically along the new lines, would eventually rise in his profession.

NEW YORK, WESTERN UNION.

Miss Jane Powell, of the Jersey division, has returned from Saratoga after an absence of several months.

Mr. John E. Jenkins, assistant electrician, has returned from a vacation spent in Connecticut.

Mr. C. A. Meyer, eastern wire chief, has gone on a two weeks' shooting trip to the Adirondacks.

Miss Alice McCue, formerly of this department and an operator of ability, died of consumption in this city on October 4.

Dennis Harmon, a veteran in the telegraph service, having become an operator in 1865, and who has been employed in this office since 1873, died October 9, aged fifty-nine years. Mr. Harmon is survived by a wife and two daughters.

The Mansfield Dramatic Society, composed of telegraph operators and clerks living in South Brooklyn, will open their tenth season at Schwaben Hall, on October 21, with a revival of "Crawford's Claim." Miss Ethyl McCarthy, of this office, has been selected to portray the leading female character. Other members of the cast are: W. J. Keegan, Roy Templeton, B. C. Welp, F. A. Turner, R. J. Griffiths, Albert C. Edwards, R. J. Hall, Wilbur Lorraine, Louis Weber, Bert L. Sink, Miss

Margaret Ryan, Miss Mary M. Palmer, and Miss Iola Walton.

OTHER NEW YORK NEWS.

The annual entertainment and reception of the New York Telegraphers Aid Society, for the benefit of the Relief Fund, will take place on Wednesday evening, November 30, at the Lexington Avenue Opera House and Terrace Garden, 58th Street, near Third Avenue. Mr. J. C. Watts, of the main office of the Western Union Telegraph Company, 195 Broadway, has been appointed Chairman of the Entertainment Committee, and judging from the vigorous manner in which the committee is working this year's entertainment will be second to none, of those annual pleasant affairs.

Learn Watchmaking. Refined, profitable labor. Competent men always in demand. We teach it thoroughly in as many months as it formerly took years. Does away with tedious apprenticeship. Positions secured. Send for our free catalogue to-day. St. Louis Watchmaking School, St. Louis, Mo., Dept. N.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, is steadily increasing the amount of business it annually transacts. It has in past years accomplished much in the direction of providing a safe place of deposit for the earnings of telegraphers, and has aided over one thousand in the purchase of homes. It pays five per cent. on deposits. Let us acquaint you with our facilities.

It is a valuable privilege to be eligible for membership in a sound and reliable Life Insurance Association which cannot afterwards cancel or alter the terms of the certificate issued. The payment of the sum called for in a benefit certificate blesses alike the recipient and the provider. The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, now the oldest co-operative life insurance association having been in successful operation for the past 43 years, offers this privilege to all eligible employes of telegraph and telephone service. Write at once for application form and full particulars.

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I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEY-BOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

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Telegraph and Telephone Age

No. 21.

NEW YORK, NOVEMBER 1, 1910.

Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.—V.

A Study of Telegraph Apparatus.

BY WILLIS H. JONES.

THE FREIR NEUTRAL RELAY.

The Freir differential self-polarizing relay, which has been the standard "common side" instrument on Western Union Telegraph quadruplex circuits for many years, differs both in construction and principle of operation from that of the old style relay which it replaced.

However, the student must not be misled by the name to believe that it is a polarized instrument in the sense of the polar relay used on the "A" side of the circuit, or that it responds to the direction of current, as is the case with the former. It is still a neutral relay, despite its name, and responds to quantity or volume of current only, irrespective of polarity. It derives the name "self-polarizing" from the fact that the movable lever becomes polarized by the action of the current flowing through a third coil. The lever itself, therefore, really does respond to direction of current, but since the third coil is so arranged as to be always in series with that coil

of the relay proper which at the moment is carrying the marking current, it does not matter which way the current flows as it works in unison with the particular main or artificial coil which happens to operate the relay.

Under these conditions we obtain an instrument which in some respects operates after the manner of a polar relay, inasmuch as the lever and the magnet in the coil carrying the marking current are respectively opposite poles of that particular magnet temporarily, and the former is thus attracted to the contact point on that side. A reversal of the current itself cannot alter the relation of the polarity in the magnet because, being two extremes of one magnet, the poles will still be unlike and continue to attract each other.

In other respects this relay operates in the same manner as the old type, viz.: It demands a certain volume of current before the tension of the retractile spring, which is purposely made stronger than the magnetic strength of the "short end" current, can be overcome.

One of the chief merits claimed for this instrument is quick action due to the initial tendency the lever itself possesses to assist its own transit across the air gap owing to being a magnet itself. The moving energy thus begins simultaneously from both sides of the gap instead of from one side only as is the case with the former relay.

Again the Freir relay possesses no yoke, the cores of the main and the artificial line coils being entirely separate. This reduces the magnetic strength of the relay, of course, but as the self-induction is thereby quartered, the time constant is correspondingly reduced with the result that a very satisfactory and quick-acting relay is obtained.

The magnet on the left hand side of the lever armature of this instrument should be moved further back than its companion in order to prevent unnecessary magnetic leakage.

"DEAD BEAT" APPARATUS.

It will be noticed by a careful observer that the needles of some voltmeters or ammeters move across the scale, and suddenly come to a dead stop and remain quiet without any tendency to oscillate before stopping. When an instrument possesses a needle that will do this it is said to be "dead beat."

All of the finer types of electrical apparatus used for the purpose of testing are constructed with this end in view in order to avoid losing time waiting for the oscillations to cease, as would be the case if certain precautions were not first taken to prevent it.

The process by which this result is brought about is called "damping," the principle involved

in which is to make the needle create a force in opposition to its own motion by its own act of moving across the scale, and which opposition force ceases the instant the needle stops. That instant is called the "moment of inertia," because the two forces influencing the needle, one forward and the other backward, having both ceased at the same instant, leave the needle "dead" where it stopped.

The damping process may be accomplished in several ways. For example, if a small fan-shaped sheet of paper be attached to one end of a suspended needle the friction of the air will act as a brake or opposition to the needle's motion, but will cease to oppose it when such motion stops.

In like manner a needle caused to move through a somewhat sluggish liquid, such as oil, will also tend to stop "dead."

In galvanometers, voltmeters and ammeters, the usual method is to cause the needle, by its own motion, to create eddy currents in a copper or other non-magnetic metal casing, the influence of which currents oppose the needle's motion as long as the latter moves. When the needle stops, of course the eddy currents die out, and, as in the preceding case, there is then no influence of any kind present to cause the needle to oscillate or alter its position, hence the term "dead beat."

(To be continued.)

Recent Telegraph and Telephone Patents.

No. 971,572, to F. G. Slemmer, Goldsboro, Md., for a telegraph key, for working two circuits.

No. 971,598, to A. H. Dyson, Chicago, Ill., for a telephone system, avoiding the use of ground circuits.

No. 971,619, to J. T. Klugh, Madison, Mo., for a telegraph line insulator.

No. 971,650, to A. H. Weiss, Chicago, Ill., for a telephone party-line ringing key.

No. 971,651, to C. S. Winston, Chicago, Ill., for a telephone trunking system.

No. 972,329, to W. M. Bruce, Jr., for a lockout device for party line telephones.

No. 972,399, to J. W. Nilsson, Balfour, N. D., for an attachment for telephones.

No. 972,424, to L. A. Williams, Lynn, Mass., for an electrical relay.

No. 972,628, to A. D. T. Lubbey, Elyria, Ohio, for a central telephone system.

No. 972,634, to C. H. North, Cleveland, Ohio, for an electrical relay.

No. 971,785, to A. L. Pierce, Wallingford, Conn., for a tree insulator. The insulator is made in two parts, to which the wire is clamped.

The following patents have expired:

Nos. 506,269 and 506,270, printing telegraph system; No. 506,272, printing telegraph exchange system; No. 506,273, printing telegraph; No. 506,274, telegraphy, and No. 506,275, autographic telegraphy, all issued to Robert J. Sheehy, New York.

No. 506,294, telegraph transmitter, issued to Charles Willoughby, San Francisco, Cal.

No. 506,305, magneto-telephone, to James A. Brown, Moline, Ill.

No. 506,415, telephone transmitter, to John V. Capek, New York.

No. 506,658, multiple commutator apparatus for telephone systems, issued to Louis A. Berthon, Paris, France.

No. 506,841, electric alarm system, issued to George F. Bulen, Bayonne, N. J.

No. 506,884, apparatus for suppressing telephone disturbing currents, issued to Frank A. Pickernell, Newark, N. J.

Personal.

Dr. L. M. Rheem, who has been located in Helena, Mont., for several years, has returned to his former home at Minneapolis, Minn., where he is engaged in commercial pursuits.

Mr. C. D. Lee, president, and Mr. Roy W. Howard, general news manager of the United Press, New York, are on a trip of inspection and looking up new business in the West.

Mr. C. E. Sawtelle, for many years manager of the Postal Telegraph-Cable Company at Cincinnati, Ohio, but now vice-president and general manager of the Tool Steel Gear and Pinion Company of that city, was a recent New York visitor and took occasion to call on many of his friends in the telegraph service.

Mr. Béla Gati, manager of the Royal Hungarian Telegraph and Telephone Experiment Station in Budapest, Hungary, is in New York. Mr. Gati was a delegate at the second telegraph and telephone conference which was held in Paris, in September, and is in this country to study long-distance telephony, printing telegraphs and the wireless situations. After an examination of the telegraph and telephone plants in New York, he will proceed to the City of Mexico and return to New York a month later for further investigations. Mr. Gati has made several inventions along telegraph and telephone lines.

Mr. J. Frank Howell, a well-known old-time telegrapher, but who for many years has been engaged in the brokerage business being a member of the Consolidated Stock Exchange of New York, found, during the past summer, a most interesting way to spend a short vacation. Having heard of the possibilities of a trolley trip from New York to Boston, and having a three days' holiday at his disposal, he persuaded a friend to make the trip with him. Mr. Howell has written the story of this little journey and has described in a most entertaining manner the scenes along the way. The trip being made by easy stages, the travelers found time to stop and inspect the places of interest along the route. Mr. Howell evidently has that instinct which so few travelers possess, of being able to discover the beauties of the country through which he travels as well as to appreciate the historical significance of the things which he sees.

Mr. Andrew Carnegie arrived in New York on the steamer *Baltic*, October 23. When the steamer was 600 miles east of New York, he received an invitation by wireless to act as one of the honorary pallbearers at General Eckert's funeral. Mr. Carnegie replied that he would esteem it a great privilege to do so.

Mr. H. A. Tuttle, president and general manager of the North American Telegraph Company, Minneapolis, and Mr. J. H. Thatcher, general agent of the Pacific Telephone and Telegraph Company at Portland, Ore., met in the latter city recently for the first time in forty-four years. In 1866 Mr. Tuttle, then 20 years of age, and Mr. Thatcher, then 18 years old, worked together at Oswego, N. Y., as telegraph operators for the Western Union Telegraph Company. The same year Mr. Thatcher left and went to Buffalo and thereafter, until their recent meeting, the paths of the two men were widely divergent. In spite of the long lapse of years since they had seen each other, however, the recognition was mutual and almost instantaneous.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager of the company, started on a trip of inspection on Oct. 24, which will take him as far south as Atlanta and west to Chicago. He will be absent from his office about two weeks.

Mr. E. B. Pillsbury, general superintendent, New York, accompanied Mr. Nally as far as Atlanta.

Among recent executive office visitors were Mr. N. C. Hall, manager at New Haven, Conn., and Mr. G. H. Mills, manager at Providence, R. I.

Mr. Thos. E. Fleming, manager contract message bureau, has resigned to accept the position of commercial superintendent of the American District Telegraph Company in New York.

Mr. C. A. Rhodes, traveling auditor, has resigned to enter the service of the Western Union Telegraph Company in the auditing department.

Mr. S. B. Haig, superintendent of traffic, has resigned to enter the Western Union service in its traffic department.

Mrs. E. W. Collins, wife of Mr. E. W. Collins, superintendent of this company at Cleveland, O., was a recent New York visitor, and she made it the occasion to call upon many of her friends in the executive offices.

Mr. W. P. S. Hawk, superintendent at Chicago, but for several years past located at Salt Lake City, has just moved his family to Chicago, which will hereafter be his home.

Mr. J. E. Schofield, whose appointment as special agent for the Western Union at Atlanta, Ga., was noted in our issue of October 16, was not manager of the Postal office at Atlanta for the entire time mentioned. He retired from the management in 1905 to engage in other business.

Since that time Mr. A. M. Beatty has been manager of the Atlanta office.

This company has completed a new copper circuit between Seattle and Tacoma. It has also completed two all-copper circuits between Seattle and San Francisco.

Mr. Carl B. Turpin, who was recently appointed manager of the Salt Lake City, Utah, office, was born in New London, Ind., July 28, 1882, and entered the telegraph service at Kokomo, Ind., as messenger and clerk. He afterwards became operator of the Indiana Natural Gas and Oil Company at Kokomo, and later operator for the Western Union Telegraph Company at Kokomo, Logansport and Indianapolis successively. He returned to Kokomo on March 1, 1908, and opened the Postal office there, becoming its manager, which position he held until his present advancement.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

ELECTION OF OFFICERS.

At a meeting of the directors of the Western Union Telegraph Company, held at 195 Broadway, New York City, October 19, the following named officials were reelected: Col. Robert C. Clowry, president; J. B. Van Every, vice-president; Thos. F. Clark, vice-president; G. W. E. Atkins, vice-president; A. R. Brewer, treasurer; J. C. Willever, secretary; E. Y. Gallaher, auditor.

Executive Committee: Edward J. Hall, chairman; Union N. Bethell, Thomas H. Hubbard, Henry A. Bishop, Jacob H. Schiff, Robert C. Clowry, president; J. B. Van Every, vice-president and Theo. N. Vail.

Mr. E. Y. Gallaher, auditor of the company, has appointed Mr. J. Q. Pipkin division auditor of the Gulf Division, at Dallas, Tex., effective Nov. 1.

Among recent executive office visitors were Mr. Richard O'Brien, district traffic manager, at Scranton, Pa.; Mr. N. E. Church, superintendent at Pittsburg, Pa.; Mr. J. W. Reed, superintendent, and Mr. S. M. Custer, district commercial manager at New Haven, Conn.

Mr. M. B. Wyrick, superintendent of construction of the Postal Telegraph-Cable Company of Texas, at Dallas, has been appointed division plant superintendent of this company with headquarters at the same point.

Mr. John G. Sizer, of Richmond, Va., has been appointed manager of the Winston-Salem, N. C., office, vice S. W. Tise, deceased.

Mr. Clifton A. Fonville, for the past six years manager of the office at Montgomery, Ala., has resigned to engage in other business.

Mr. W. R. Jackins becomes chief operator in the Charlotte office. Mr. Jackins was born in Pickens County, S. C., August 10, 1874, and entered the telegraph service at Blacksburg, S. C., in 1888. He has held the position of night chief operator at Charlotte for the past twelve years.

Mr. Herbert L. Hilton has been appointed manager at Allentown, Pa., vice Mr. G. R. Daniels appointed district commercial manager at Scranton, Pa.

Mr. S. J. Gray of the San Francisco office has been appointed chief operator at Los Angeles, vice R. J. Vaughn, who has resigned to engage in the real estate business.

Mr. H. J. Carpenter, chief operator of the Charlotte, N. C., office, has been advanced to the position of District Traffic Chief for western and central North Carolina.

Mr. Aris Brown, chief clerk to superintendent T. P. Cummings at New Orleans, La., has accepted a similar position with W. K. McClarin, district plant superintendent at Nashville, Tenn.

Mr. F. H. Austin, chief operator at Mobile, Ala., has been promoted to the position of district traffic supervisor. Mr. F. E. Aunspaugh has been appointed to succeed Mr. Austin as chief operator.

Mr. W. W. Murphy, manager of the Chattanooga, Tenn., office, has been advanced to the position of Commercial Agent in the district presided over by Superintendent E. E. Williams of Atlanta, Ga. Mr. Murphy's headquarters will be in Atlanta.

Mr. R. H. Tudor, formerly manager of the Corinth, Miss., office, but for some months past an attaché in the office of Mr. J. R. Terhune, superintendent, at Nashville, Tenn., has been appointed manager of the Chattanooga office, vice W. W. Murphy promoted.

The following changes have been made in the Buffalo, N. Y., office:

Mr. T. H. O'Mara has been appointed day chief operator; Mr. P. J. Haley has been transferred to be night chief operator; Mr. C. A. Thulman has been transferred to be assistant day chief operator.

Mr. T. A. Worthington, formerly manager at Newport News, Va., has been appointed district commercial agent at Richmond. Mr. A. H. Cheek, formerly manager at Henderson, N. C., has succeeded Mr. Worthington at Newport News, and Mr. R. B. Crowder has succeeded Mr. Cheek at Henderson.

Mr. E. A. Bennett, formerly of the telegraph department in the general offices of the Atchison, Topeka & Santa Fe Railroad system, at Topeka, Kans., has been appointed inspector of the Third District of the Pacific Division under Mr. H. McPhee, District Commercial Superintendent. Mr. Bennett's headquarters will be at Los Angeles.

The following promotions have been made in the Western Union office at Nashville, Tenn.: Mr. John Fleming, formerly chief operator, has been appointed District Traffic Chief; Mr. Robert Hunt, formerly wire chief will succeed Mr. Fleming as Chief Operator, and Mr. J. M. Sanders, formerly sub-wire chief, has become wire chief.

Mr. F. R. Veale, formerly chief operator at Richmond, has been appointed district traffic chief at that place in charge of traffic in the state of

Virginia. Mr. M. S. Cline has been appointed chief operator at Richmond to succeed Mr. Veale. Mr. E. T. Moore, of Memphis, Tenn., has been appointed manager at Wilmington, N. C., to succeed Mr. W. J. Sale, promoted.

Mr. W. K. McClarin, a notice of whose appointment as District Plant Superintendent at Nashville, Tenn., appeared in the issue of October 16, was born in Granville, Tenn., April 17, 1859. He entered the telegraph service in Memphis, Tenn., in the spring of 1886, and has held positions successively as lineman, assistant to Mr. J. E. Fenn, electrician of the Southern division, foreman, general foreman, assistant superintendent of construction, and finally district plant superintendent.

Mr. George R. Daniels, who has recently been appointed district commercial manager at Scranton, Pa., was born at Pittston, Pa., July 19, 1871. He entered the service of this company as messenger at Plymouth, Pa., in 1886. He afterward became clerk and then operator. In 1896 he was transferred to Wilkes-Barre where he served for six years as branch office manager. In 1902 he was appointed manager at Allentown, Pa., which position he held at the time of his recent promotion.

Mr. John C. Duane, who has been appointed district plant superintendent at Jacksonville, Fla., was born at Goodwinville, Va., July 26, 1877. He entered the telegraph service at Alexandria, Va., in February, 1896, as a member of a construction gang under superintendent J. B. Tree of Richmond. He soon qualified as a first-class lineman and has successively been promoted to be assistant foreman, gang foreman, city foreman and general foreman of construction, which position he held at the time of his recent promotion.

Mr. Charles Raymond Fisher, who was recently appointed district plant superintendent at St. Louis, was born at Three Rivers, Mich., August 10, 1876. He entered the telegraph service in Chicago in 1891 as check boy for this company. He soon qualified as an operator and was later transferred to the Kansas City office where he became night quadruplex chief. He returned to Chicago to become a wire chief but was again transferred to Kansas City as night wire chief. June 1, 1903, he was appointed assistant chief operator of the Kansas City office which position he held at the time of his recent promotion.

Mr. W. G. Sale, manager of the Wilmington, N. C., office for the past eight years, has been appointed district traffic supervisor with headquarters at Richmond, Va. Mr. Sale was born at Richmond, Va., Nov. 29, 1874, and entered the telegraph service at Tate Springs, Tenn., in August, 1889. He held various positions on the East Tennessee, Virginia & Georgia, and Norfolk & Western Railways until 1892, when he entered the Western Union service under Mr. Horner, at Lynchburg, Va. At different times he worked for the same company at Columbus and Richmond, and latterly at Wilmington.

Mr. Herbert W. Drake, assistant of leased wire service of the American Telephone and Telegraph Company, New York, has been attached to the office of W. E. Athearn, engineer of equipment. Mr. Drake was born in Leeds, England, in 1878. He entered the Western Union service in this country at Tonawanda, N. Y., in 1890, and became an operator in 1894. In 1897 he went with the American Telephone and Telegraph Company at Buffalo as wire chief, and came to New York in 1904 to fill the position of chief equipment-man for the same company. In 1908 he was advanced to the position of division supervisor of leased wire service.

Western Union Tariff Book.

The midyear tariff book of the Western Union Telegraph Company contains several newly added features. It gives instructions regarding night letters, and contains very clear sectional maps showing all the submarine cable systems of the world. A number of connecting telegraph and telephone lines have adopted the Western Union night letter system. The work was produced under the direction of Mr. Wm. Holmes, superintendent of tariff.

F. O. Nourse, District Traffic Superintendent, Western Union, Richmond, Va.

Mr. F. O. Nourse has been appointed district traffic superintendent of the Western Union Telegraph Company at Richmond, Va., being promoted from the position of assistant superinten-



F. O. NOURSE,

District Traffic Superintendent, Western Union, Richmond, Va. Mr. Nourse was born in Littleton, N. H., October 3, 1859, and received his preliminary telegraphic education at Wing Road in that state, in 1876. He came to New York and passed through various positions in the telegraph service until he finally became general traffic chief of the operating department of the main office of

the Western Union Telegraph Company. After a temporary retirement from the telegraph service, he returned to it in 1903 and was soon placed in charge of the Western Union office at Macon, Ga., from which about three years later he was promoted to be general inspector of the southern division with headquarters at Atlanta. In July, 1906, he was promoted to the position of assistant superintendent at Nashville, Tenn., which position he held until his latest appointment.

Mr. Nourse possesses a pleasant personality and has, through his wide experience, gained a broad grasp of the telegraph business.

Norman Ringer, Acting Superintendent, Western Union, Dallas, Tex.

Mr. Norman Ringer, who has been appointed acting superintendent of the Western Union Telegraph Company at Dallas, Tex., is one of the youngest men in the service to attain such a responsible



NORMAN RINGER,

Acting Superintendent, Western Union, Dallas, Tex.

position. Mr. Ringer's promotion, however, is well deserved as throughout his telegraphic career he has been a careful, conscientious student of telegraphy and has always been on the alert to serve his employers to the best of his ability. Mr. Ringer was born at Hiawatha, Kans., March 3, 1883, and entered the service of the Postal Telegraph-Cable Company at Fowler, Colo., as operator and manager, May 14, 1897. Two years later he entered the railroad field and was employed first by the Santa Fe and later by the Union Pacific, Colorado and Southern, Oregon Short Line, and the Oregon Railroad and Navigation Company. On May 14, 1906, he re-entered the commercial field as manager for the Western Union Telegraph Company at Rocky Ford, Colo. October 22, 1907, he was advanced to the managership of the office at Colorado Springs. He was transferred to the management of the El Paso office on March 17, 1908, which position he held at the time of his recent advancement.

**G. D. Hood, District Traffic Superintendent,
Western Union, Seattle.**

Mr. George Doane Hood, whose appointment as district traffic superintendent of the Western Union Telegraph Company, with headquarters at Seattle, was briefly announced in our October 1 issue, is



G. D. HOOD,

District Traffic Superintendent, Western Union, Seattle.

another Canadian-born telegrapher who has achieved prominence in the profession. Mr. Hood was born at Yarmouth, Nova Scotia, November 16, 1875. In 1891 he entered the telegraph service as operator on the Intercolonial Railway at Truro, N. S. He later joined the forces of the Western Union Telegraph Company at Halifax, and from there came to the United States and entered the Western Union office at St. Paul, Minn. He next accepted service with the Northern Pacific Railway and was employed at Helena, Mont., as operator, city ticket agent and night wire chief. His next position was as wire chief and manager of the Atchison, Topeka and Santa Fe Railway. From this post he was promoted to be chief clerk to the superintendent of telegraph at Topeka, which position he held at the time of his recent return to the commercial service.

**J. W. McMahon, District Commercial Manager,
Western Union, New York City.**

Mr. J. W. McMahon, whose appointment as district commercial manager of the Western Union Telegraph Company, with headquarters at 270 West 23rd Street, New York, was briefly mentioned in our Oct. 1 issue, has had an interesting and valuable telegraphic experience which admirably fits him for the duties of the new position. Mr. McMahon was born at New Orleans, Aug. 24, 1879, and entered the telegraph service in that city as clerk in the Commercial News Department of the Western Union Telegraph Company in 1896, afterward becoming an operator. In 1898 he enlisted in the Louisiana Volunteer Artillery for service in the Spanish-American War. He later joined the United States Signal

Corps and served for three years in the Philippines. While there he was operator at the headquarters of Generals Grant and Funston and was with the latter when the insurgent leader Aguinaldo was captured.

After leaving the signal corps he was employed as press operator on various newspapers in New Orleans and New York. During the presidential campaign of 1904 he was in charge of the telegraph bureau of the Democratic National Committee. He next served as traffic chief in the New Orleans Western Union office under Mana-



J. W. McMAHON,

District Commercial Manager, Western Union, New York City.

ger T. P. Cummings, and, in 1906, came to New York, taking the position of assistant manager of the Central Cable office at 16 Broad Street. Subsequently he served as solicitor and assistant to Superintendent J. F. Nathan in that office. He left the service about a year ago on account of ill health, but returned on Sept. 15 to accept his present position.

Canadian Notes.

A special office was opened by the Great North Western Telegraph Company of Canada, in the Theatre Monument Nationale, Montreal, on the occasion of a testimonial meeting to Sir Wilfrid Laurier, premier of Canada, on Oct. 10. The details of handling the large amount of press matter incidental to the meeting was placed in the hands of Manager L. S. Humes. A staff of ten operators was in charge of Mr. D. R. Sheehan. Mr. Humes was complimented by the press correspondents, Hon. Mr. Gervais and Sir Wilfrid Laurier himself, on the excellent telegraph arrangements.

In a test case brought before a Toronto magistrate, it was decided that the transmission of horse race news by the Great North Western Telegraph Company is illegal. The case will be taken to the higher courts.

Mrs. Wm. Camp, mother of Mr. W. J. Camp, electrical engineer, Canadian Pacific Railway

Company's Telegraphs, Montreal, died on Oct. 15, in her 78th year.

Two of the wires of the Canadian Pacific Railway Company were crossed recently by being hit by a prairie chicken. The bird was found hanging on the wires. This is a new and interesting way of capturing prairie chickens, but, perhaps, an expensive one.

It is reported that at the next session of the Canadian Parliament, Postmaster General Lemieux, will bring up the question of a general reduction in telegraph rates throughout Canada.

The Cable.

Incoming steamers during the past few days reported severe electrical storms at sea. These storms were of such magnitude and violence as to affect the operation of the Atlantic cables during part of the day and night.

Municipal Electricians.

Recent New York visitors—Mr. J. B. Yeakle, superintendent of fire telegraph, Baltimore, Md.

Mr. John W. Kelly, Jr., chief of the Electrical Bureau, Camden, N. J.

A patent, No. 971,684, has been granted to Mr. W. C. Matthias of Reading, Pa., for a fire alarm.

No. 972,353, to P. W. Eskridge, Rutherfordton, N. C., for a fire alarm switch.

The Telephone.

Mr. C. F. Sise, Jr., general superintendent of the Bell Telephone Company of Canada, Montreal, Que., was in New York recently for a few days and called on many of his friends.

Mr. H. W. Pope special agent for the American Telephone and Telegraph Company, is making a trip throughout the west including Colorado and Oklahoma, in the interest of the Public News Disseminating Service of the Bell telephone companies.

President Theo. N. Vail; vice-president Union N. Bethell, of New York, and vice-president, B. E. Sunny of Chicago, all of the American Telephone and Telegraph Company, have been elected directors of the Michigan State Telephone Company.

Mr. Theo. N. Vail president; Mr. U. N. Bethell, vice-president, and Mr. H. B. Thayer, vice-president, of the American Telephone and Telegraph Company, New York, were in Chicago recently inspecting the plants of the Chicago Telephone Company and the Western Electric Company.

The Telephone Improvement Company has been incorporated at Albany, N. Y., with a capital of \$3,000,000 to manufacture and deal in telephone apparatus. This company is formed by the consolidation of the Telechronometer Company of Rochester and the North Electric Company of Cleveland, and of which Frederick C. Stevens is the organizer and president.

The Pacific Telephone and Telegraph Company has recently installed a loaded cable between Seattle and Tacoma, a distance of 38 miles. Of this length 31 miles is aerial cable and seven miles underground.

Loading coils are placed throughout the entire length at intervals of 8765 feet. By this means it is expected that communication between the two cities will be safe from interruptions by adverse weather conditions.

William M. Stewart, division equipment superintendent of the New York Telephone Company, died October 5 at his home in Westfield, N. J., aged fifty-four years. Mr. Stewart had been in the service of the New York Telephone Company for the past twenty years. During this period he supervised the construction of many new central offices, and did much to develop the telephone service to its present high efficiency.

The injunction issued a few weeks ago in Jeffersonville, Ind., against the Cumberland Telephone and Telegraph Company, enjoining it from furnishing race information to any point in Indiana, has been sustained by Judge Montgomery in the Clark Circuit Court. The company objected to the clause enjoining it from furnishing racing data outside of Jeffersonville. An appeal has been taken to the Supreme Court.

Obituary.

Mr. Milton F. Adams, well known to the telegraph profession throughout the country, but who, in late years, had been engaged in other business, died on October 12, in the hospital at North Wheeling, Va., from the effects of an injury sustained about two years ago, which necessitated the amputation of one of his feet. He was sixty-seven years of age, being born in Richmond, Va., June 7, 1844. He learned telegraphy at Bellaire, Ohio, and worked in many of the principal offices throughout the country for various companies. His remains were buried at Wheeling, on October 14. Mr. Adams is credited with having introduced Mr. Thomas A. Edison to the electrical world in Boston, in 1866.

Judge Lambert Tree, died at Chicago, October 13, aged seventy-eight years. Mr. Tree, who was a native of Virginia, entered the telegraph service in 1850, learning telegraphy under his brother, J. B. Tree, who was for many years superintendent of the Western Union Telegraph Company at Richmond, and is now living in retirement at that place. After about two years at the key, Lambert Tree took up the study of law and was admitted to the bar in 1855. He then went to Chicago and the following year was appointed a judge in the Circuit Court, serving four years. He has also, at different times, acted as United States Minister to Belgium and Russia.

Mr. Edmund J. Murphy, aged 48 years, for the past nine years superintendent of the Stock Quotation Telegraph Company, New York, died on October 18, after a brief illness. Mr. Murphy had been connected with the company since 1892 and from the position of bookkeeper was advanced to that of superintendent in 1901, which position he filled with great business ability and tact. The funeral was attended by a large number of telegraph officials.

The Western Union Telegraph Company's Improved Quadruplex.

BY WILLIAM FINN.

The new quadruplex system, now being introduced in various parts of the Western Union Telegraph Company's service, possesses many novel and valuable features, well calculated to make "four corner working" entirely feasible over long and difficult telegraph lines, and to greatly increase the carrying capacity of such circuits as have in recent years been limited to duplex operation only.

This improvement has been brought about, to some considerable extent, by the use of a pole-changing apparatus designed to minimize the "interval of no current," and a neutral relay provided with an auxiliary magnet that has proved very effective in holding the relay armature closed

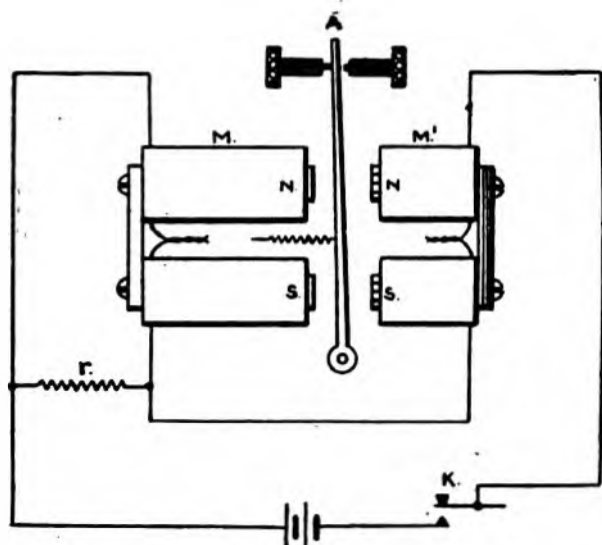


FIG. 1.—WESTERN UNION NEW FORM OF POLE-CHANGER AND TRANSMITTER.

when the distant pole-changer lever is in transit from one to the other of its battery posts, during which period the signaling battery is entirely disconnected from the main line.

The new form of pole-changer (which form of instrument is also used as a transmitter on the common side) is illustrated theoretically in Figure 1, where *M* represents an electro-magnet having a solid iron core, and *M'* a shorter magnet with a laminated iron core. The magnetism developed in the two magnet cores is of such polarity as to oppose each other's action upon the armature, the cores imbued with *N* polarity, and those with *S* polarity being made to face each other in the manner indicated in the figure.

The armature *A* is placed between the opposing magnets and is provided with a light retractile spring which normally holds the armature in the position shown.

When the local circuit is completed by the

closing of key *K*, both electro-magnets become energized, but in the case of the short magnet the magnetism quickly attains a high value, whereas it rises relatively slowly in the long magnet because of its solid core, as also for the reason that a portion of the current is diverted through the resistance *r*, which forms a shunt across the long magnet coils. This difference of magnetic activity between the two cores, results in a rapid movement of the armature in the direction of the short magnet; the reverse of this taking place upon opening the local circuit, for now, the laminated core instantly parts with its magnetism and allows the retractile spring, together with the slowly disappearing or "residual" magnetism in the solid core, to smartly pull the armature in the opposite direction.

Notwithstanding the rapidity of the armature movements, however, the "interval of no current" is still sufficiently pronounced on long circuits to impair the efficiency of working on the common side. To obviate this, the auxiliary or holding coil, to which reference has been made, forms part of the neutral relay equipment. This coil *H*, Figure 2, placed in series with a condenser *HC*, is connected across the main and artificial lines in the manner shown, and is brought into action at the moment battery contact is broken at the distant pole-changer. For at that instant, the magnetism previously excited in the receiving apparatus suddenly collapses and in doing so generates an "extra current" that is utilized by affording for it a path through the holding coil, the direction of the current being made to correspond with the discharge from the holding condenser whose plates had been previously charged by the distant battery current. The path of this extra current (whose strength is greatly intensified by the presence of the impedance coil *5U*) also includes the main and artificial coils of the neutral relay, the armature of which—as the result of a combination of magnetic forces all acting in the same direction—retains its armature firmly on the front contact at a time when it would otherwise tend to fly open.

It will be noticed from Figure 2 that both the "differential" and "bridge" principles are involved in the operation of the new quadruplex system, the coils of the neutral relay being differentialized and connected with the main and artificial lines in the usual way, while the polar relay is placed in the cross wire of the "bridge," the arms of which are represented by the two windings of an impedance or retardation coil *5U*. This impedance coil (whose circular core of iron wire forms a closed magnetic circuit) not only operates to the advantage of the neutral relay in the manner already described, but has also a beneficial effect upon the working of the polar relay. This is due to the fact that the magnetic variations in the core of the impedance coil (brought about by the closing and opening of the distant pole-changer) give rise to momentary extra currents

which partly complete their circuit through the coils of the polar relay, and being in a direction coinciding with that of the incoming currents, aid and assist in the operation of that instrument.

A further incidental advantage of the impedance coil consists in the fact that, in combination with the grounded or "spark" condenser, *SC*, the rise and fall of the signaling currents become so graduated as to materially modify their inductive influences upon neighboring wires.

The balancing of the new quadruplex apparatus is effected in a manner precisely similar to that employed in the old standard system, the home apparatus being rendered insensible to the out-

balanced conditions for the reason that the electrical pressure or "potential" at each of the relay terminals is exactly of the same magnitude, and being oppositely directed, can produce no effect. The same is also true with regard to the holding coil.

In the case, however, of the impedance and neutral relay coils, the outgoing currents do actually traverse their respective windings, but as the magnetism excited in the one coil is exactly neutralized by that excited in the other coil of each instrument, the result in producing a null effect is practically the same as in the case of the polar relay.

At the receiving end of the line, the current

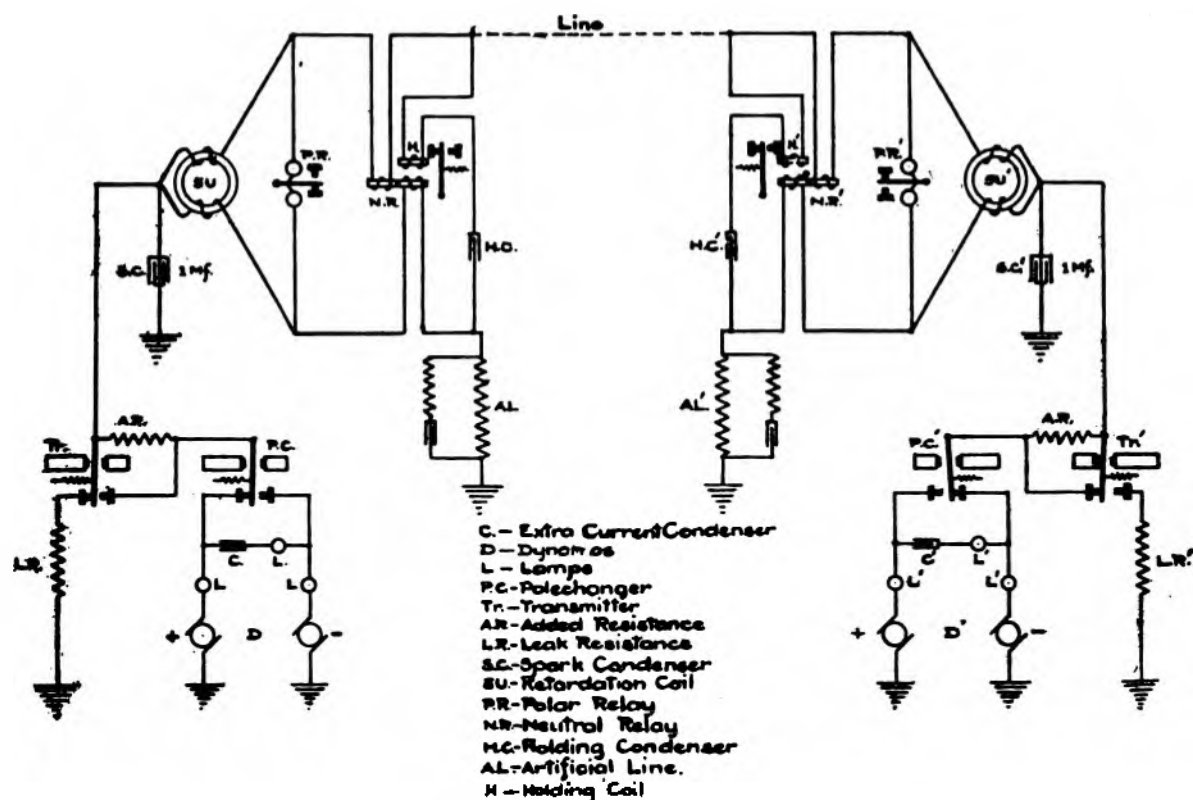


FIG. 2.—THEORETICAL DIAGRAM OF WESTERN UNION IMPROVED QUADRUPLIX SYSTEM.

going currents when an equality of potentials has been established at the terminal points of the polar relay, and an equality of currents through the two coils of the neutral relay.

The general arrangement of, and the underlying principles involved in the working of the new quadruplex, will be more clearly understood by reference to the theoretical diagram Figure 2, in which the polechanger *PC* at the left hand side is represented as sending out a positive or spacing current, the strength of which has been cut down to its "short-end" value by having to pass first through the added resistance *AR*, and then dividing between the leak resistance *LR* and the main and artificial lines. No part of this current will flow through the polar relay coils under well

enters the line coil of the neutral relay, and a momentary impulse traverses the holding coil without practically affecting either, in consequence of the neutral relay armature being "pulled up above the short end." After leaving the neutral relay, the current divides, a portion going through one of the impedance windings, and another portion through the polar relay and other impedance winding, after which the two parts reunite and complete the path to ground by way of the transmitting apparatus and generator.

The amount of current diverted through the polar relay is comparatively small, but this current, as previously stated, is reinforced by the action of the impedance coil, permitting in certain cases, and under favorable weather condi-

tions, a "multiple" arrangement of the relay coils to be employed with advantage. When, however, the strength of the current is considerably reduced by loss through leakage, or otherwise, the magnetic effect of the enfeebled current may have to be increased by connecting the coils in "series."

At the right hand side of Figure 2, the pole-changer, *PC'* is represented as sending out a negative or marking current, which passes directly into the main and artificial lines without encountering the added resistance *AR*, or following the path through the leak resistance *LR*, the former being shunted by the tongue of transmitter, *Tr'*, while the leak resistance is cut out of circuit at the open stop of that instrument. Under these conditions, the full strength or "long end" of the battery is transmitted to line actuating both of the receiving instruments at the distant station.

A current ratio of three to one is ordinarily employed on the longer quadruplex circuits, sixty milliamperes on the "long" end and twenty on the "short" end generally affording sufficient margin for all practical conditions of working.

The coil adjustments of both the polechanger and No. 2 transmitter should generally be such as to make the distance between the long coil and the armature somewhat greater than that between the short coil and armature. When signals are "light" at the receiving station, the long coil at the transmitting station should be pulled away from its armature, and vice versa, should be moved towards it when the writing is heavy.

The adjustment of the polechanger points should be as close as possible without creating a tendency to "arc," such tendency being greatly reduced by the use of a $\frac{1}{4}$ microfarad condenser in series with a twenty or thirty-ohm resistance lamp placed across the battery leads as shown in the illustration. Sparking is liable to occur at the polechanger points, both at the "making" and "breaking" of battery contact. The spark at the "make" represents the static discharge from the main and artificial lines, to modify the effects of which is the purpose of spark condenser *SC*, which opens a path for the direct discharge to ground. The spark at the "break"—which is due to the extra current arising from the high electromotive force of self-induction developed at that instant—is the more serious of the two, since it is likely to lengthen out and create an "arc" as the polechanger lever leaves its battery post. The particular function of the small condenser is to lower this electrical pressure or "potential" at the polechanger points, from which the "extra current" is thus safely diverted.

The method of adjusting the holding coil after a balance has been secured, is to first bring it as close as practicable to the relay armature, then with the No. 2 transmitter closed at the distant office, and while that station is "dotting" on the polar side, plug up the holding condenser until enough—but not more than enough—capacity has

been introduced to keep the neutral relay armature steady on its front stop under the distant reversals. From forty to sixty sheets of a 3-microfarad condenser should generally suffice for that purpose, as too much capacity would have a tendency to bring in inductive or other interference through the holding coil.

The repeating sounder of the old quadruplex system is still retained as a feature of the new arrangement, but the necessity for that instrument would seem to have disappeared with the advent of more efficient transmitting and receiving appliances, which, together with the impedance coils form a combination that has practically wiped out all tendency on the part of the neutral relay to "kick" during distant battery reversals. It is, therefore, possible to eliminate the repeating sounder, and operate the local sounder direct from the front stop of the neutral relay, as has been practically demonstrated in the case of several long quadruplex circuits.

A sufficient number of experiments, however, have not as yet been made to thoroughly test the feasibility of the front contact arrangement under all the various conditions of working; meanwhile all neutral relays will be provided with both front and back stops so as to afford facilities for further trials in the direction indicated.

A Prediction by Mr. Edison.

In a communication from Mr. Thomas A. Edison read before the first annual convention of the Electric Vehicle Association of America, held in New York City, Oct. 18, that gentleman stated that in fifteen years more electric energy will be sold for electric vehicles than for electric light.

The first telegraph instrument used in Grand Rapids, Mich., a Morse recorder, which was installed in 1858, has been presented to the museum of that city by a relative of Edward D. Benedict, who was the first manager of the office.

Mr. L. J. Maxwell, superintendent, Western Union Telegraph Company, Jacksonville, Fla., in renewing his subscription for another year says: "The Age has always been a good paper, but I am glad to note that of late it seems to have taken on additional energy and I congratulate you, and wish you continued success."

Mr. W. B. Eddy, commercial manager of the New York Telephone Company at Albany, N. Y., and a former old-time telegrapher, has been confined to his home by sickness for some time past, but is now entirely recovered. Mr. Eddy in renewing his subscription for another year, says: "Enclosed find check for my renewal. It affords me great pleasure to receive your good publication twice a month. It is the only way I have of hearing about so many of my valued friends in the telegraph and telephone service."

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November 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Operators' Opportunity.

Never in the history of the telegraph in this country has there been a time when promotions have been so numerous and rapid as at the present. They are not made for the sake of advancing a favored few to higher positions, but for more utilitarian purposes. They are made in order to fill the positions created by the rapidly expanding business, whose growth has never been equalled in this country. The telegraph is growing by leaps and bounds, and the opportunities thus afforded to young, ambitious operators to better their condition by fitting themselves for positions of greater responsibility, with the attending advantages of higher salaries, has never been so great.

The demand is principally for men with technical and practical knowledge, and such men, wherever found, are being selected and placed in positions of trust where they can find a wider field for the utilization and expansion of their knowledge.

Every telegrapher in the country can fit himself to occupy such a position if he will. If he feels that he is not already qualified he can prepare himself by diligent reading and study of the technical and practical features of his work. Anyone neglecting these opportunities is simply doing himself an injustice, and if he finds that he is falling behind in the race he has no one to blame but himself.

The remarkable expansion of the telegraph has been indicated in our columns for several months past by the long record of promotions all over the country, and bright and capable men are being snapped up wherever they are found. The telegraph business is being conducted on a new basis, and the public is being better served thereby. It requires ability to manage and carry on a business of such large and widespread interest, and it behooves all the younger members of the profession to be alert and seize the opportunity to place themselves in the way of prosperity and happiness. This can only be done by close observation and study. The opportunity exists now and every eligible person in the profession should take advantage of it.

The Child Labor Question Applied to the Messenger Service.

The Child Labor Committee of the Charity Organization Society of New York, has published in the New York Evening Post an article criticizing the editorial in the October 1st issue of Telegraph and Telephone Age, entitled "The Child Labor Question Applied to the Messenger Service." Our article referred to the agitation in various states for legislation restricting employment of messenger boys, and particularly to the New York law recently passed forbidding the employment of messengers under 21 years of age after 10 p. m.

The Committee, after charging us with befogging the issue, states that the real issue is this: "Is the employment of minors after 10 o'clock at night as telegraph messengers a desirable occupation?"

There are several interesting points for analysis in this statement of the case.

Are the morals of youth any more in danger at the age of sixteen than at twenty-one?

Are the morals of a city more vicious at ten o'clock than at nine o'clock?

Is the delivery of a telegram at night a more undesirable occupation than the delivery of newspapers or the early morning milk?

We assume that the Committee now pressing this child labor legislation is actuated by motives to safeguard the morals not only of minors but also of those past legal age. We assume that the Committee takes into consideration the important feature of not destroying the earning power of the embryo citizen.

Therefore, we venture to suggest to the Committee that if the same degree of effort were applied toward the suppression of existing vices that

are supposed to menace messengers instead of restricting the opportunities of youth for earning his living, a great deal more effective reform would be accomplished.

The way to eradicate an evil is to root it out. Merely trying by law to keep people away from it is like attempts of the New York police department in days past to stop gambling and shut up disorderly houses by stationing policemen on the steps to notify visitors of the character of the place. This proved very valuable advertising to the evils.

If the Committee wishes to really benefit humanity, including boys who are unfortunate enough to be obliged to work to earn their living, let it seek legislation and, above all, enforcement of law that will render the city a safe place at night for the morals of old as well as young workmen.

The first great law of nature is *to live*. Legislation restricting opportunity to honestly earn a livelihood is vicious, cloak how you may with moral precepts. Punishment of the innocent victim of conditions instead of seeking to remove the cancer of evil is a reform method certain to prove not only ineffective but harmful. It is the method of the ostrich, hiding only its head in the sand. It is the action of men who seek to keep people from looking at evil instead of daring to go in and fight the dragon in its lair.

But if immoral conditions must exist, why should not the Committee ask to have them confined to a certain designated district from which young and tender messengers would be prohibited, instead of making the whole state forbidden ground to a large number of boys seeking to earn an honest and absolutely necessary livelihood?

If messenger boys are used to purchase drugs, as the Committee charges, it would seem the logical thing to enforce the existing law forbidding the sale of certain narcotics on the offending druggist instead of on the innocent messenger.

If messenger boys are occasionally called to immoral places, the common-sense citizen would be inclined to think that the way to real reform would be to close the immoral place instead of having a policeman chase the boy away.

Messengers are a necessity of urban life. Boys are best fitted for such work. It is healthful outdoor work, far better physically than indoor confinement. Of the total amount of duty which a messenger boy must do at night, more than 90 per cent. is of an advantageous character.

Men will not work as messengers—only the semblance of men will take the job. Ninety per cent. of the public service must suffer for ten per cent. of reform.

A Question of Dividends.

The newspapers, seconded by the public, are unmerciful in their criticism of the financial management of railroad, telegraph, telephone and other public service corporations and are determined to pre-

vent, as far as they can, such corporations from earning dividends of more than four to six per cent. This stand seems rather inconsistent with their attitude toward private corporations which, in many cases, earn from forty to one hundred per cent., which they commend. One of the leading newspapers of New York City a few days ago printed a list of enterprises that pay dividends ranging from forty to sixty per cent., most of them being engaged in the manufacture of the necessities of life.

New York Electric Lines Company.

Supreme Court Justice Bischoff on Oct. 17 denied an application by the New York Electric Lines Company for a writ of mandamus compelling the Empire Subway Company, which controls the subway through which the underground telegraph and telephone wires are run in Manhattan, to permit the plaintiff to run telephone and telegraph wires through the subway under a franchise granted by the State in 1883. The court said that to prevail on its application the plaintiff must establish its lawful power to operate the lines it proposes to construct and that a writ of mandamus cannot be granted if its legal right is in dispute.

During some field manoeuvres near San Francisco, Company E of the United States Signal Corps made a record of one minute and twenty-nine seconds in establishing a wireless station from the time they started to unpack until they could begin sending. This company also holds a record of one minute and forty-two seconds for laying a quarter of a mile of wire and sending a ten-word telegraph message.

The international jury which was charged with the duty of considering proposals for a monument to be erected at Berne, Switzerland, to commemorate the foundation of the Telegraphic Union, has decided not to recommend any of the designs for acceptance or reward, but to propose the opening of a new competition.

The recent Republican State Convention at Saratoga, N. Y., assumed a National aspect, there being so many newspaper representatives present from other states. Over a half million words of press matter were handled by both telegraph companies with entire satisfaction to all concerned.

Telegraph Line to Punta Arenas.

The Chilean government has under consideration telegraphic communication between Valparaiso and Punta Arenas and intermediate points. The wireless system seems to be considered the most practical, owing to the distance and the rugged and bleak country over which 700 or 800 miles of the line must be built.

The total distance between the two points is 1,220 miles and the estimated cost of the wireless system is placed at \$175,194, United States gold.

TELEGRAPH GROWTH.

Development of Service in United States— Advantages of Private Ownership.

BY S. M. WILLIAMS, NEW YORK.

Special Agent, Western Union Telegraph Company.

An extraordinary development of the telegraph service is taking place in the United States at a time when in some of the older countries of Europe a slow decline is noticeable. There are two general causes for the increase in this country, and one for the decrease in the old world.

In the United States system, under private ownership, an intense activity of science, skill and business organization is being manifested to increase the quality, the flexibility, the scope and the convenience of telegraphic communication. At the same time, the American public, always seeking means to save time and to set a faster pace, is showing a tendency to disregard the mails as too slow for both business and social communications, and turning to the electric wires both telegraph and telephone, for relief.

These two lines of progress, one for the public and the other by the public, moving along together, are producing in America the highest development of electrical communication of intelligence and setting standards for other nations to copy.

Next to the United States, the greatest use of the telegraph has been made in Great Britain. For the past eight years there has been a slow but steady decrease in the number of telegrams sent annually in that country. In the last two reports of the British Postmaster General, by whom the wire service is directed, it is pointed out that "this reduction is due to the increasing use of the telephone, especially for local communication."

France, which comes next in the list of telegraphic countries, has had such miserable Governmental telephonic service in the past, that people were forced to use the telegraph and the decrease, noted by the British Postmaster General has not yet begun in that country.

But in the United States the telephone instead of checking the use of the telegraph is serving, rather, to increase it and thus render dual service to the public. That is because these two services are being conducted along auxiliary lines. One is supplemental to the other. Neither alone would quite fill the public need for quick, convenient, universal communication. Each has its particular field—the telephone in and around centres of dense population; the telegraph connecting these centres.

The collection and delivery by telephone of telegraphic messages is the latest method in this country for saving time and trouble. It has been done here and there in the past, but now is being

developed along organized lines by both companies. The benefits are noticeable in both city and rural life, although each for a different reason.

The city user of the telegraph gains in convenience. He has only to dictate his message through the handy telephone for delivery in any part of the world. There is no need of going to a telegraph office, no necessity of bothering about making change for payment, no loss of time. The message is dictated as to a stenographer, and the charge is made in a monthly account that is accorded every telephone subscriber by the telegraph company.

In delivery of telegrams there is similar convenience and a greater saving of time. We in America do so much of our local business and social conversation by telephone that the adding of long distance communications that have come over the telegraph wires is accepted as a matter of course. The innovation of the past six months bringing these improvements about has met so completely the long felt want of the public that it has become a part of our daily life almost without comment.

An improvement that has met with the warmest commendation is the opening up of rural regions to continuous telegraphic service. This has been brought about by the co-operative action of the Western Union Telegraph Company and the Associated Bell Telephone companies. The ordinary business at thousands of telegraph offices in small communities does not warrant keeping them open all night or on Sundays. Yet, it often happens that telegraphic communication with such points, either in sending or receiving, is sorely needed by individuals in emergency cases during non-business hours.

A system has been worked out by the Western Union whereby certain centrally located points will be selected at which the telegraph office will never be closed. The telephone will be used as an auxiliary to cover the surrounding area so that messages may be sent in or deliveries made at any time without delay or inconvenience. The day and night of isolation are rapidly passing from every section of the country. The new development of the telegraph is bringing the whole world into close and continuous touch, making, as the "New York Times" recently remarked, "the backwoods the very seat and doorstep of civilization."

Another phase of American telegraphic progress is the Night Letter. It is barely six months since the Western Union Telegraph Company promulgated this new service, yet the novelty of last March has become to-day one of the accepted necessities of every day life.

The economic theory of the Night Letter is that it is a by-product of the telegraph business. In computing the cost of any by-product, a manufacturer can disregard many of the fixed charges that enter into regular production accounts. The

principal product of the telegraph company is high speed transmission of messages. Speed in telegraphy, as in a railroad train, a steamship, or automobile, increases cost.

The Night Letter is classified as a delayed service. There is the whole night in which to transmit it, as compared with the minutes and seconds of the day message. The wires are comparatively free at night from the rush of business. Therefore, the ever increasing volume of night letter traffic is moved along in a smooth, flowing current that filters into thousands of offices and homes in the early morning just as the public awakens and prepares for the business of the day.

It is these reasons that enable the Western Union to transmit a fifty-word night letter for the cost of a ten-word day message.

One of the most interesting phases of American telegraphic development resulting largely from the introduction of night letters, has been the new kind of messages now being sent over the wires, and the new uses to which the service is being applied. In the past England used the telegraph for social communications much more than did America. It is an every-day occurrence for the Londoner to invite by wire his guests to dinner, or to run down into the country for over Sunday. Here such a thing was of rare occurrence.

The receipt of a telegram in England conveys no shock to the household through fear that it contains unpleasant news. Here to the great majority of American women, a telegram means that somebody is dead. The idea that a social telegram can convey pleasant news has not been instilled into a considerable part of the public.

The night letter is accomplishing wonders in the transformation of the telegraph as a part of social life. As a means of communication between separated members of a family, its use has spread with lightning rapidity, and instead of a telegram causing momentary anxiety, it is now being welcomed in thousands of homes as an envoy of happiness. It is fair to presume that within another year, the United States will have passed Great Britain in social use of the telegraph.

In business affairs, this country has been telegraphically ahead of Britain for a number of years, but even at that general use of the wire has been confined to comparatively few lines of trade from which originated a very large volume of traffic.

The past six months have witnessed an extraordinary expansion in the business use of the telegraph. This is due to several causes. One is the American desire to do business at higher speed, impatience at the slowness of the mails, demand for instant answers and a breaking away from time-wasting methods of writing long letters and red-tape methods. Another phase is the discovery that use of the telegraph produces business; that spending money on telegraph tolls is not wasting it but investing it in business promo-

tion; that a dollar message often produces two dollars in return.

The clever minds of American business men are discovering a thousand practical advantages of the telegraph. Some very large firms are offering to pay the charges on orders sent in by wire, because in this way they induce new custom. Others use the telegraph as a medium of advertising, sending broadsides of messages proclaiming their wares, with the assurance that the messages will be read intently and not thrown into the waste basket like a mailed circular.

Business corporations having many branches, agencies and representatives are enlarging their use of the telegraph as a part of administrative efficiency and consequent economy. In all phases of American life this remarkable awakening to the advantages of communication by wire is apparent, and the advance has been most noticeable during the past six months.—*Financial America*.

His Distinguishing Mark.

One day a city bank received the following message from one of its country correspondents: "Pay twenty-five dollars to John Smith, who will call to-day." The cashier's curiosity became suspicious when a cabman assisted into the bank a drunken "fare" who shouted that he was John Smith and wanted some money. Two clerks pushed, pulled and piloted the boisterous individual into a private room away from the sight and hearing of regular depositors. The cashier wired the country bank:

"Man claiming to be John Smith is here. Highly intoxicated. Shall he await identification?"

The answer read: "Identification complete. Pay the money."

The state tax commissioners of Ohio, have fixed the valuation of the telegraph property in that state at \$2,734,725, an increase of \$424,517 over the previous year.

Mr. C. T. Currier, of the Central Union Telephone Company, Columbus, O., an old time telegrapher, who has been a subscriber to this publication for some twenty years, in renewing for another year, states that the paper continues to meet with his hearty approval and that it is a pleasure to him to hand in another subscription accompanied by the necessary \$2.00 to cover the same.

The United States Navy Department has ordered telegraph-typewriter equipment for the battleship Nebraska and expects to give this system a thorough test in order to determine its value as a means of communicating range and target observations and fire control orders to any part of the ship desired. The chief points which will be considered in deciding whether to adopt this system generally will be whether the danger to such an instrument from gun fire might not overbalance its advantages and whether it can be operated as speedily and efficiently as the telephone.

The Military Telegrapher in the Civil War.

PART XLVIII.

In our issue of October 16 we published the first part of the story of Mr. James E. Pettit's prison experiences during the civil war, which was found among his papers after his death. Continuing, the story goes on:

"We lived on parched corn that day which we gathered from a neighboring field. A train from Okoloona took us back to town, where we stayed over night; the next morning being Sunday, the boys amused themselves the best they could, sleeping, smoking, cooking and singing hymns. I sold my pocket-book for \$15 and gave the result of the sale to a native for three apples; the next morning we were pleased to learn that the track was repaired, and we started on our way to Meridian; we rode all day through a most miserable country; our efforts to purchase eatables at fabulous prices, were unsuccessful; we finally arrived at Meridian at 4 p. m. We were put into the stockade, a space so cramped and confined, that we were hardly able to all lie down at once. A mouthful each of corn meal, beef and bacon was issued to us here; I with my gloomy comrades composed ourselves as best we could in the mud, to try and sleep.

The next morning at three o'clock we rose from our mud beds and started for Demopolis, Ala. I bought a newspaper at Meridian (a small half sheet) for 50 cents. Meridian presented a most gloomy appearance, for Sherman, in his raid, had left but slight vestige of it; we reached Demopolis at eve; crossed the Tombigbee River and were housed in some old deserted cattle sheds where we slept.

"The next morning we were packed like so many dumb brutes into open cattle cars, and in a drenching rain, we started for Selma, Ala. We reached Selma at midnight, cold, miserable and wet to the skin, the sick and wounded wishing for death. At this point we were forced to wade through a pond of water for a distance of over 500 yards (the whole country was in a flooded state). We stopped in some old barracks over night, and at dawn, in a cold searching mist, we found the way to the boat, and embarked for our destination, the little town of Cahaba, Ala. Shivering with cold we stood around the boilers of the boat. I with many others, crawled under them, to get a little warmth into my benumbed frame.

"We left Selma at daybreak, having had nothing to eat. Gliding down the Alabama, which is one of the swiftest rivers of America, we quickly made the twelve miles, and arrived at Cahaba at 9 a. m. After we had disembarked we were thoroughly searched, and every valuable that escaped our former captors was taken from us. We were then marched to our prison, which consisted of an old cotton warehouse, capable of housing two thousand men, providing they were packed close-

ly. Some 700 prisoners were immured here and on our arrival, as we marched into our future home, we were greeted with cries of 'fresh fish, fresh fish,' and sundry orders were issued to invisible porters to 'take their baggage to parlör G' and kind inquiries were made as to whether our parents knew that we were out, some desired to be informed whether we had registered yet, others inquired as to what line of goods we were carrying in stock, and if the sales were good, also the more pertinent question was asked 'had we anything left'; the grim humor of all this chaffing was most emphatically apparent, when we looked about our miserable quarters, and saw the filth, the misery and despair, and viewed with horror the awful surroundings, and then the rags that formed the attire of these men, many of whom we found, subsequently, had been in this horrible place for many months.

"We looked about us and tried to familiarize ourselves with our environment; the building was a mere shed-like structure, a 'W' roof placed over the outside walls, one-fourth of this roof having been blown off by a tornado; large swinging doors on the north side, gave entrance to the main room, which extended the whole length of the structure, and for the greater part of the distance, the full width. About one-sixth of this space was separated from the main room by a high brick wall, and in this smaller space there had been built up bunks, three tiers in height, fashioned from rough unplanned boards; these were, of course, all occupied before our arrival. The north side of the building, where the door was located, we will call the front. On this front and on the two sides of the prison, were built up stockade fences twenty-five feet in height, enclosing a space, equal in area, to an acre, this was used as a cookyard; and gathered around little heaps of glowing coals, our comrades cooked their cornmeal, in the old-fashioned Dutch oven of our ancestors. On the outside of the stockade, four feet from the top, was a narrow sidewalk which formed the guards' beat, and on these beats marched incessantly the omnipresent riflemen; inside of the stockade, for the distance of six feet, was forbidden ground, and the thoughtless one who stepped over this imaginary line, called 'the dead line,' received not even a caution, but was mercilessly shot. On the inside of the prison also, there was a dead line, and on the space between this line and the walls of the enclosure were the beats of the inside guards.

"The redeeming feature of the prison was the water supply, which came from an artesian well that was located in the centre of the town, the water of which was brought to the prison by means of ditches on the side of the road, entering the prison, they discharged into two large boxes sunk in the ground three or four feet, one of which was used to wash our dishes; in the other was caught our drinking and cooking water; and after reading about the other prisons of the south,

I was satisfied that we were blessed in being supplied with this pure water.

"Six of us picked out a space about six feet square on which we located ourselves, and after this had been done, none dared encroach on our home. On one side next to the dead line was a box-like structure, some six feet square, in which a man, supposed to be a physician, located himself daily, and dealt out to the prisoners opium pills and calomel for every known ill that flesh is heir to. After the doctor disappeared a man would bring in a wheel-barrow load of salt rising bread, which he sold to the inmates at the very reasonable price of three dollars (Confederate scrip) per loaf, also yams at a dollar a yam. Tobacco was brought into the prison, that was so bad that it could not be sold outside and disposed of at three dollars per plug.

When we first entered a large number were half naked, but as winter approached they found means to cover their nakedness. Our little 'mess' consisted of John F. Ludwig (now, 1891, of Burlington, Iowa), a man named Sherman, from Ives Grove, Wis., John Kelley, of Racine, Wis., and myself; we had in our possession two rubber blankets, one of which we placed on the ground for a bed, and the other over us for a blanket. The season was well advanced and I well remember the night of October 10. It was simply impossible to keep warm as we had nothing but our rubber blanket to cover us, and to keep the breath of life in our benumbed frames, many of us were forced to walk all night. On October 12, 120 new prisoners arrived; that night I dreamed of home, and awoke to find myself in a Confederate prison. My hips were all calloused and brown from lying on the hard ground. To make our beds easier we would dig little cavities in the earth and fit our hip bones into them. Rumors of all kinds were rife, the capture of Forrest, that Richmond had fallen, that Sherman was on his way to the vicinity of the prison, and always the same old rumor, that we were to be exchanged; when all other rumors failed, this one always popped up serenely. October 26, 450 more prisoners arrived; the nights were bitter cold, and so many were afflicted with colds that the nights were rendered hideous by the constant coughing and sneezing of our comrades.

"November 4 a squad of citizen prisoners was called out for exchange and I wrote to my father. One of those to be exchanged was Samuel Wireman, my orderly, who had successfully imposed on the Confederates, making them think that he was a citizen, as he was wearing plain clothes, and he took my letter. November 7 I became very ill, it rained all day and I was correspondingly miserable; I had styes in both eyes. From this time to the thirteenth I was very sick, being deaf in both ears. I would fill my canteen three and four times a night and drink it all; I was burned up with fever, followed by freezing chills, and with no way to get warm. On the fifteenth

the prison surgeon took the names of the sick for the purpose of exchange. I stood in the line for half an hour, but being taken with a fainting spell, fell out of the line and thereby missed my chance. November 16, Ludwig, my chum, was taken sick also, with the usual symptoms of the dreaded camp fever. November 19 fifteen citizens were taken for exchange. Names were taken of the sick and wounded for exchange, but mine was skipped as before. Gresham H. Sherman, my mess mate from Ives Grove, Wis., then went to the surgeon and prevailed on him to send me to the prison hospital. When I entered the hospital they doused me in a big tub of ice water, soused my head under two or three times to get the soap out of my hair and eyes, and I became a member in good standing. I was informed by the doctor that I was dangerously ill, for which information I was duly and meekly thankful.

"After donning a coarse, boiled night shirt, I was put into a single cot, and I experienced the luxury of a mattress; as I sunk back on my couch I wondered if there was anything nicer than this in heaven, and I doubted it. I looked around me. I was in a building erected for the purpose of stores, five of them in a block; I was in one of these, a large fireplace occupied the whole space at one end of the room; at the other end, which faced the street, were large doors which were never open. Twelve cots were arranged along the walls, six on each side; in these beds lay the toughest-looking lot of mortals that I ever saw, that had any valid claim to a right to draw breath; I was one of them. The next morning I woke, and for some time I vainly endeavored to locate myself. I turned over and at once ascertained a fact that was not known by any one in the room; viz., that the boy in the next cot to mine had died during the night. I lay there in a semi-conscious state until the 28th, when I became unconscious, all was chaos to me except my many and vivid dreams; I will relate one or two of them, which I will never forget. I dreamed that I was lying in my cot, just as I really was; that my chum, Ludwig, was in the next ward to mine; this was also the fact; I thought that I slowly drew myself up and out of my body through my mouth, and after accomplishing that easy feat, I looked for a few moments down on my poor sick body, as it lay on the cot; I was seized with a desire to visit my chum in the next ward; to do this all I found necessary was to take hold of a beam, that acted as a brace just over my cot, and I could thus swing myself through the solid partition. After visiting with Ludwig for a while, I returned through the partition, the same way that I came, looked for a moment at my body, as it lay on the cot, and without hesitation I crawled in at my mouth, and asserted my rights as tenant of my body again. There was one other dream that remained a salient point in my memory for a long time; I thought that the old pre-historic round-house fort of Rhode Island

was located in this town; that the upper portion of it was occupied by General Sherman, who had captured the place, and I was engaged as his cipher operator; that the general desired me to go to Washington with secret despatches for President Lincoln; that I readily assented and started on my long and perilous journey via Atlanta and Cincinnati; a large portion of this journey remained quite vivid in my memory for several years.

"As I have before remarked, all was chaos until Dec. 4, when I regained my senses, so weak that I could not turn in bed. Until the eighth the doctor fed me on whiskey; it gave me strength to remember that my name had been called for exchange. The door had opened and a soldier in gray stepped inside, looked at a paper that he held in his hand and then spoke my name, as if he were miles away in a fog, but I was too weak to answer. The next twelve days I gained slowly and again my name was called for exchange, but again I could not answer. Afterwards I found that my father was moving Heaven and earth to get me exchanged; one man was held at Fortress Monroe, another was held at Cairo for my personal exchange, all through a powerful influence at Washington; all this was done for a weak, worn out eighty pounds of humanity, on a sick cot in a Confederate hospital, eating opium pills and taking 140 drops of laudanum per day. A week after I had gained much, still another week and I ventured to get up and go to the fire-place and sit on a bench, on returning to my cot I fainted and fell on a neighboring bed.

"Christmas I lay most of the day, ruminating and wondering what they were doing at home, what they were saying about me, what were their thoughts, where would I be a year from then. A dinner of turkey was brought in from a convent near the town, this was a surprise indeed. Two days after, Ludwig came in to see me, looking white as a sheet and the expression of a ghost; I had sufficient influence with the nurse to get him changed to my ward, until he became convalescent. This was indeed a comfort.

(To be continued.)

In Remembrance of the Late John D. Tinney.

BY E. H. HOGSHEAD, MERIDIAN, MISS.

It has occurred to me that a brief sketch of the post bellum life of the late John D. Tinney might be interesting to his comrades of the United States Military Telegraph Corps, among whom he was well known. His name appears in the articles by Mr. T. E. Moreland in the issues of *Telegraph and Telephone Age* of September 16 and October 1. With the view of preparing such a sketch I recently wrote Mr. William E. Flippen, for many years manager of the Western Union Telegraph office at Vicksburg, with whom Mr. Tinney worked most of the time after the war, for such data as he could supply, and I quote freely from Mr. Flippen's letter.

"'Jack' Tinney, as we called him, worked at Jackson, Miss., for a long time. There the writer first met him as a friend whose acquaintance had been made by the daily exchange of business over the wire. He was a manly, genial and generous fellow, honorable and fearless, and he impressed himself as such upon his associates at Jackson and Vicksburg. He became as one with the people of his environment, and their cause and their interests became his—and those were trying times in this part of the country.

"While in the telegraph service Mr. Tinney became well known to the fraternity in the south-west and numbered many friends among them."

Mr. Flippen states that Mr. Tinney was born in Philadelphia, Pa. My recollection is that he told me he was a native of West Virginia, or at least was from there. He had a brother, William E. Tinney, who worked at Vicksburg for some time while "Jack" was there, but of whom I have never heard since.

The last time I saw Mr. Tinney was in Meridian, some fifteen years ago. The tooth of time had furrowed his face; he was greatly changed in appearance, but he was full of vigor and business. He was in quest of laborers for a large contract job he had in south Mississippi. A few years later I saw in the papers an account of his sad end.

Following are extracts from Mr. Flippen's story:

"John D. Tinney was a native of Philadelphia, Pa. He entered the Union army when quite young and served with the Army of the Potomac in Virginia until the war closed. For a while he acted as a courier for General Hancock, and then at City Point, Va., he was one of the operators at General Grant's headquarters. After the war closed he and other army friends started for Mexico, and reached New Orleans on their way, and finding that France had agreed to withdraw the French troops from Mexico, he and his companions separated. Mr. Tinney entered the service of the old South-Western Telegraph Company at New Orleans, and was soon sent to Jackson, Miss., where he remained until he came to Vicksburg in November, 1866. He remained at Vicksburg in the employ of the Western Union until May, 1878, when the cut in salaries of operators occurred. In his case it was a cut from \$125 per month to \$75 per month. He remarked to me that he could go on the street and get more than that in a month. He did no telegraph work after leaving the service in 1878.

"Mr. Tinney married a Miss Emily Cordwent, whose father was a cotton planter living about eight miles north of Vicksburg on a well known plantation called 'Belle Isle,' and was living on this place when the house was burned and he was burned with it. Judging from his well known characteristic of always being ready for danger, which his service as a soldier taught him to be, it was thought by many that he was murdered

while asleep and the house was burned to conceal that fact. This suspicion led to the arrest of a negro who left the plantation soon after Mr. Tinney's death, but no evidence was found to convict him, and the negro was released.

"Mr. Tinney served a full term as postmaster at Vicksburg, and his reputation as such was of the best. He was endorsed by his old commander, General U. S. Grant, for the position.

"As a telegraph operator, particularly as a receiver with pen and pencil, he ranked with the best. I have seen him on presidential election nights receiving Associated Press reports with a room full of talking men, and nothing worried him, unless some one whistled to express his feelings about the news. That was the only thing that made him break. And I have heard him tell the gentlemen to talk as much as they wished, and as loud as they pleased, but not to whistle. That particular kind of noise apparently got on some nerve in his ear and knocked out the tick of the telegraph instrument.

"Mr. Tinney left a wife and two children—a boy and a girl. They are now living, or did live some years ago, at Spokane, Wash. His children are grown and I think both are married."

Mr. Jesse H. Robinson of Washington, D. C., in a recent letter to Mr. David Homer Bates makes the following interesting statement:

"Noting the article on page 675 of the October 1 issue of *Telegraph and Telephone Age*, relating to Sherman's last message to President Lincoln and Secretary of War Stanton at Washington from Kingston, Ga., in 1864, before cutting out for Savannah, I would say that the message was sent by Mr. Charles G. Eddy from Kingston, Ga., to myself at Chattanooga, Tenn., and relayed from there to Nashville. After Mr. Eddy finished sending the message he said, 'good-bye—you will not hear from us again until we reach the sea.'"

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' *Diagrams*. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' *Diagrams* in this way. We will then take up *Maver and Davis' "Quadruplex"* and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XXII.

What is the chief distinguishing feature of the Morris duplex?

On what class of circuits is it most applicable?

What advantages are gained by its use?

Would it work satisfactorily in wet weather?

If not, state the reason.

What is the peculiarity of the relay used with this duplex?

Describe the action of the relay.

How is the Morris duplex balanced?

CHAPTER XXIII.

Why is it that a dynamo can generate sufficient current at one volt pressure to operate several sounders, while a like voltage from a blue stone battery is not sufficient to operate one sounder?

What proportion of the current generated in the cell is available for use outside of it?

Does the addition of cells of battery in series increase the available amperage? If not, why?

If the number of circuits fed by a dynamo machine is reduced or increased, what is the effect upon the other circuits connected with it?

How are cells connected in series?

How are they connected in multiple?

What is the effect of the series combination?

What is the effect of the multiple combination?

Are sounder circuits usually metallic or grounded?

How is the pressure at the distant end of dynamo leads maintained?

Why are fuses used in local circuits when several sounders are connected in multiple to the dynamo leads?

Does trouble on one local circuit affect the other local circuits?

The Wheatstone Telegraph System.

Now that the Wheatstone automatic telegraph system is receiving more attention at the hands of telegraph authorities in this country and is being brought into use more extensively, we are frequently asked by our readers for information concerning the principles of operation and the construction of Wheatstone apparatus. Probably the most extensive description of the Wheatstone to be found in any text book is given in Herbert's *"Telegraphy."* This book is the standard text book of English telegraphy and as the Wheatstone is probably used more in England than in any other country and has there been brought to its highest perfection the description given by Mr. Herbert, which covers seventy pages, will give anyone a good idea of the operation of this system and of the care of the apparatus employed. A chapter in *Maver and Davis' "Quadruplex"* is devoted to this subject and gives a very clear and concise illustrated description of the Wheatstone system. Twenty-five pages of *Maver's "American Telegraphy"* are also devoted to a description of this system and will supply the student with much valuable information. The prices of these books are: Herbert's *"Telegraphy,"* \$2.60; *Maver and Davis' "Quadruplex,"* \$1.50; *Maver's "American Telegraphy,"* \$5.00; and orders may be addressed to J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

Telegraph and Telephone Age is the leading authority in its line in America.

American Telegraph Engineering—Notes on History and Practice.*

(Continued from page 712, Oct. 16.)

LOUIS M. PORTS, BALTIMORE, MD.: The authors make the following statement:

It has long been recognized by telegraph authorities that an ideal system of telegraphy would be a simple and reliable page printer, capable of transmitting and receiving, say from 500 to 1000 words per minute on circuits of from 200 to 1000 miles in length.

This statement is not in accord with my understanding of the requirements demanded by practical men as far as such statements have been made. While it is possibly desirable in some cases that the ideal printer system should be capable of transmitting from 600 to 1000 words over a circuit yet in the great majority of cases the universal printer system would certainly be used at a very much less capacity than this. I take it that this statement of the authors does not necessarily mean a single mechanism to operate at this speed but apparatus capable of giving this capacity to a circuit. A single printer to operate at such a speed as this would certainly involve complications of construction and adjustment such as to preclude its use on short circuits requiring a speed of not more than 40 to 50 words per minute. I suggest that the ideal printer would not be a single printer capable of transmitting and receiving 300 to 500 words per minute each way, but that it would be a printer mechanism capable of operating at such a speed that the number of telegrams handled by the printer is that number of telegrams which can be economically and efficiently handled by a single operator. In a printing system with automatic transmission this number is determined by the capacity of the receiving operator rather than of the sending operator. Of course how many a single operator can handle depends very largely on the accuracy of the system and the traffic handling methods adopted, but from the present state of development of printing telegraphs it would appear that a printer system, manual or automatic, operating somewhere around 50 to 75 words per minute gives an amount of traffic which can be economically and efficiently handled by a single operator. A manual operator does not require a machine of a speed greater than 50 to 60 words per minute. The average operator could not send faster than this whatever the speed of the machine. In an automatic system a machine speed of 75 words per minute should give a sustained rate of about two telegrams per minute. A receiving operator will be fully occupied with this amount of traffic to care for. The operation of a number of printers of moderate speed

on a single wire by some method of multiplex operation appears to meet the conditions imposed by those circuits requiring a high capacity machine better than a single printer of high speed. The use of a moderate speed printer makes possible the construction of a simple, cheap and reliable printer which will be suitable for use on circuits having light traffic. This method of treating the problem results in a universal telegraphic printer, and a variation of the methods of line operation only, to meet the different conditions of traffic.

When a certain rate of transmission is reached on any given circuit, the wire cost is reduced to such a low figure that a further increase of rate is not justified, as the further reduction of wire cost so obtained will be more than offset by the more frequent interruptions and the greater amount of supervision required.

If such a system as the authors suggest, as far as the mechanism is concerned, were in a perfect state of development, I do not believe that it could be successfully operated on the wire plant of to-day on account of the variable electrical state of the wires, the lack of protection against inductive disturbances from foreign sources and a method of construction which also lacks protection against the induction between the different wires on the same pole line, which makes impossible the use of extremely high speed telegraph apparatus on more than a few wires, and which materially reduces the efficiency of even the Morse manual system. In order that a printer system operating at a speed approaching 600 to 1000 words per minute may come into use it is just as important that the wire plant be perfected as the machine itself.

W. J. CAMP, MONTREAL: I would say that the Canadian Pacific Railway used white porcelain insulators to a considerable extent in the years 1890 to 1898, but the cost increased so much that we reverted entirely to glass until three years ago. We found that the manufacture of glass insulators in Canada had deteriorated so greatly that the insulators turned out were altogether unsatisfactory, apparently they were not properly annealed, with the result that from a week to two months after being placed on the line they would go to pieces without any mechanical injury. The price of porcelain insulators had also been so much reduced that for the past three years we have used nothing but white porcelain.

Relative to Wheatstone Automatic operation it may be noted that the British Pacific Cable Board has leased a wire from the Canadian Pacific Railway between Montreal and Vancouver and is now equipping this wire with that system.

The Canadian Pacific Railway method for indicating circuits was adapted from the Japanese system and is by small circles at the ends of straight lines, different markings appearing in these circles to represent the different classes of circuits.

*Discussion of the paper presented by William Mayer, Jr., and Donald McNicol, at the Twenty-seventh Annual Convention of the American Institute of Electrical Engineers, Jefferson, N. H., June 28-July 1, 1910, and which was published in our columns July 16-September 16.

I consider a line of 40 poles per mile to be the most satisfactory, provided that poles are side guyed varying from every 5th to every 20th pole according to danger from storms, and head guyed every half mile. I do not like increasing the number of poles to more than 40 because, besides costing so much more for construction there is also greater reduction in insulation of the wires.

FRANCIS W. JONES, SPRING VALLEY, N. Y.: In addition to the historical and descriptive parts of the paper, allusion is made to disadvantages and defects in the construction of lines and in the operation of electrical systems of transmission, and suggestions for their improvement are advanced. Any ideal construction of telegraph lines, and the employment of the most improved and speedy systems for the transmission of telegrams must inevitably be limited in cost to the capital that can be secured therefor, and engineering suggestions of any value must keep within the limits of practicability, which is determined by several considerations, probably better known to the presidents and general managers of telegraph and railroad companies, as those officers are charged with the success and financial results of operation and maintenance, and are de-facto the engineers who decide all questions involved.

That those officers have been able to attain their ideals in these matters is extremely doubtful.

Capital is discouraged by the enormous difficulties encountered in the upkeep and extension of our American telegraph system, such for instance as securing suitable rights-of-way for trunk lines, with their constant demand for added wires; the frequent attempts in Congress to inaugurate a government system; the unfavorable legislation and taxation of the various states; the encroachment of the use of telephones and wireless telegraphy, not to mention the competition of a splendid mail service, besides the increasing cost of labor and materials, and the rigid account to which the proprietors are held by the Courts, for errors and delays which are practically impossible to avoid. Up to the present time the Morse Telegraph system has withstood the inroads of telephone and mail competition, and continues to be favored with an increasing patronage.

The grave situations in which both proprietors and public are placed by the present inability to obviate interruptions to operation between commercial cities, by reason of breakdown of wires and poles, due to storms, fires, floods, snow avalanches, falling trees, etc., besides the detrimental effects of electromagnetic and electrostatic induction upon the signals, are not confined to any one company, and their free discussion seems to be well within the purview of the Institute and cannot reasonably be considered gratuitous by telegraph proprietors. In my opinion there are insurmountable financial and engineering obstacles to placing entirely underground the trunk lines between all of the widely separated cities

of this continent, except that emergency underground cables may be found an advantage for short distances, such as between New York and Philadelphia (90 miles), yet an overhead structure that would be more elastic, built under rigid engineering rules as to strength, number of supports per mile, gauge and number of wires or cables, etc., with reference to the character of the country traversed, and the maximum stresses, (short of cyclones) to which such structure would probably be exposed, could undoubtedly be built at less cost than an adequate and reliable underground system. Upon engineers will devolve the solution of very important questions such as the proper tensile strength of the wires; their ohmic resistance; character of the insulation; and whether open individual wires, or cables be employed. It is obvious that the suggestions in the valuable paper of Messrs. Maver and McNicol, as to the kind and number of poles per mile, are indefinite. As there are great differences of topography and climate to be encountered, different construction is necessary for lines crossing mountains, prairies, mesas of shifting sand, through canyons subject to cloud bursts, and forests where trees are frequently falling, also along the sea coast indented by rivers and bays, and through the latitude where sleet storms frequently visit. A heavy trunk line in northern latitudes would require considerably different construction from a light trunk line in the south. The annual reports of telegraph companies show an expenditure of many millions of dollars for the repair and maintenance of pole lines.

It is open to engineers to calculate what would be the saving in electric operation, if the conductivity, and consequent tensile strength, were very largely increased over that of the wires at present employed overland. I believe that an increase of at least 50 per cent, in the conductivity of the largest hard drawn copper wires now in use, would much more than compensate for their additional first cost, but, of course, they must be supported by the ideal structure referred to. The average life of a pole line is given as 10 years; this may be true of wooden poles, but not of crossarms, insulators, nor wires.

It has generally been the opinion of engineers, that to secure reliable telegraph lines between the Atlantic and Pacific, over the Rocky Mountains in northern latitudes, it was necessary to have the protection of the railroad tunnels and snow sheds. The recent construction of a portion of an important trunk line over the summit of the Sierra Nevada Mountains, will be watched by engineers with interest.

A very vital question to be decided in erecting an ideal line is the kind and gauge of wire best suited for both trunk and side or way lines, also whether iron, or aluminum, or other metals or compounds could be advantageously used instead of hard drawn copper, in case the cost of the latter becomes excessively high.

The voltage of signaling currents at present in use, particularly for quadruplex, duplex, printer and fast Morse key operation, is at its maximum limits, on account of the detrimental sparks at the contact points of transmitters and of the heating of bobbins of relays, and of the serious menace to the insulation of office wires and underground and river cables.

The increased speed of signals within the last twenty-five years, particularly by the use of mechanical transmitters, and by the rapid electrical impulses required for printing and automatic systems on long circuits of comparatively high resistance, has demanded the highest voltages that could be used in order to actuate the relay armatures with sufficient force and celerity.

The mecograph illustrated in the article has a lever that may be moved by a slight motion, from a central or open position, to the right to transmit dots, and to the left for dashes; and is operated by about 30 per cent. fewer motions of the hand than in the case with the Morse key, but the motions of the mecograph being lateral instead of vertical, afford relief to the operator's muscles that had grown tired from long use of the Morse key.

The Wheatstone automatic system has been employed for several years on the long ocean cables, and on overland wires between London and Persia, and has produced more rapid and reliable signals, increasing the carrying capacity of the cables and wires by obviating the loss of time due to the hesitation of key operators in reading copy, and to other causes, thus changing the cable transmission of business from intermittent, to continuous.

Repeaters are placed anywhere from 250 miles to 600 miles apart in circuits having very widely separated terminal stations. Such repeaters have their location determined by the convenient position en route, of a town or city best suited for the maintenance of operators and machinery and not by the object of securing the best conditions for the electrical operation of the wires. The use of quadruplexes is most seriously curtailed by the false signals produced on the neutral relays when the keys on number two sides of several sets in operation on adjacent wires are simultaneously closed, which frequently occurs, the resultant electrostatic induction is then at a maximum.

It is to be hoped that the "ideal system of telegraph authorities in this country," capable of transmitting and printing from 600 to 1,000 words per minute on long wires will not lead any of our bright ambitious young engineers to chase an *ignis fatuus*. I am at a loss to understand why the limit was not placed at at least 5,000 words. It is obvious that the time-constant of all known line wires, electromagnets, and their connections, for over 200 miles, when operated by the very highest permissible voltage, would absolutely fail to actuate any page printing mechanism at such a speed; it is just as sensible for railroad engineers

to ask for a locomotive and cars to carry passengers from New York to Chicago in one hour's time, upon present tracks.

This ideal system must be required for press or similar service where the message contains several hundreds of words, and is prepared in some way for continuous transmission, on its being placed in the machine at the sending end. It is impossible for me to imagine how individual telegrams of an average of 30 words each can be prepared in any manner to be continuously transmitted over a wire at the rate of 33 messages per minute. At the time of Mr. C. F. Varley's visit, and of the subsequent modification of relay resistances by Madison Buell, comparatively nothing was known in the United States of farads, and henrys. It seems that our engineers were then trying to secure the maximum magnetic pull on relay armatures with a minimum electromotive force, and overlooked the tardy action of the apparatus due to high inductance. The adoption of a standard of 150 ohms for single relays was due to the impossibility of a large telegraph company regulating the resistance to suit each circuit. The late W. W. Smith in patent No. 106,418 in 1870 claimed the multiple connection of a 150-ohm relay to the reduced resistance of $37\frac{1}{2}$ ohms. He found such relays were not so sluggish in action on a wire equipped with a large number of relays, as were the same number of 150-ohm relays. The improvement was one of better service, and not of decreased cost for current.

G. A. CELLAR, PITTSBURG: The employment of reinforced concrete poles for telegraph purposes has not gained much headway hitherto, in this country. I believe the reason to be principally because of the still comparatively low cost of wooden poles, and the lessened expense of handling the latter as compared with that of handling concrete structures. In Europe, however, reinforced concrete masts are more largely used than in this country. The Deutsche Schleuderröhren-Werke has been making hollow concrete poles by machinery, utilizing centrifugal force, for about five years, and with a great deal of success. The Siegwart company, about a year ago, completed at its Swiss factory a contract for several thousands of hollow poles, averaging forty feet in height, for power lines, constructed by machinery utilizing centrifugal force. My information is that throughout Western Europe, especially Germany, Switzerland and France, and to perhaps a lesser extent in England, concrete poles are now considerably used in place of timber.

Until the time arrives when a permanent location can be secured for a telegraph line—and a telegraph line of large capacity—it may not pay to build an open line of wires supported by high concrete poles, unless their cost shall but slightly exceed that of wooden poles, for several reasons, among which are: first, possibility that the low voltage signaling systems now in vogue may be forced underground, or somewhere beyond the

present up-in-the-air location, by the multiplication of electric transmission lines; and, second, by the discovery of a process through which the elimination of retardation in aerial cables may be effected.

I believe that the increase in price of timber, and the advanced cost of handling concrete poles, will result in a revolution in the heretofore accepted models of pole and wire lines, through which there will be evolved a system of short pole lines of either timber or concrete, where reasonably level ground and policing arrangements permit the maintenance of such lines, and for which proper overhead crossings of highways and private roads encountered can be made without grading up and down from each one. It will not be feasible, however, to use extremely short poles in lines traversing rugged country and especially on railroad lines where the undulations of the surface of the ground are frequent and abrupt and the right of way a succession of deep cuts and high fills. Such lines are better calculated for use on highways where the roadway more nearly follows the form of the ground's surface and the ups and downs are not so abrupt. The objection to the use of the very short poles in the lines indicated is that the vertical pull on the pins and insulators is certain to loosen the contacts with the supporters and foster wire troubles in a degree not comparable with the saving in the lessened cost of the line. There is, however, a very considerable expanse of territory in this country in which the use of the short pole line is certainly feasible and desirable, not only through its lessened cost as compared with a line of high poles, but through its lessened exposure to wind pressure and the lessened strain at the ground line in a short pole as compared with a long pole. I am quite sure that for a comparatively small number of wires, a plan of construction can be evolved which will enable the large utilization of short pole lines with, perhaps, dead ended sections where it is necessary to abruptly raise the line in order to carry the wires over road crossings.

The item set forth in the paper as to the housing of insulators is one which I feel will be beneficial in many storms. No doubt the time will come when the expense incidental to such an installation will be more than warranted by the benefit thus to be derived. However, the driving storms of rain, wet snow and sleet which we experience in our western country preclude the entire protection from such storms by any small roofing protection that I think of at the moment.

(To be continued.)

Pigeon breeders in England have been complaining this season that many of their homing pigeons failed to find their way home. One scientific writer now advances the theory that the pigeons lose their way because of the many wireless waves which are passing through the air.

A Veteran Telegrapher.

Mr. I. D. Maize of Philadelphia, is probably the oldest telegrapher in point of service employed in that city.

For 54 years Mr. Maize has been regularly earning his livelihood at the key.

Mr. Maize was born at Millinburg, Union county, Pa., on February 28, 1842. In 1855 he learned telegraphing on the Pennsylvania Railroad, entering their employ on June 15, 1856. He remained with them until May 1, 1860, when he accepted a position with the Atlantic and Ohio Telegraph Company, in Philadelphia. At the time he began work for the Pennsylvania Railroad it had but one track and one wire.

When he went to Philadelphia there were but ten wires between that city and New York, eight between there and Baltimore and three between there and Pittsburg. The office force, which now numbers hundreds, then consisted of ten men. When the Civil War broke out he entered the service of the Government, serving as an operator in Eastern and Western Virginia.

Mr. Maize was employed with the Associated Press for ten years, then with the United Press for four years, until it failed, then with the Publishers' Press for four years. Several years ago he returned to the Western Union, where he has been ever since, and is working one of their first-class wires.

When President Lincoln was running for his second term, he had grave doubts of his election, and he thought it necessary that he should have the constitution of Nevada in his hands at once in order that he might sign the act taking that State into the Union in time to receive its three electoral votes. The constitution was accordingly sent to him by private message, amounting to 25,000 words, which took all of one night and the next day to handle. This message was handled by Messrs. W. S. Burleigh, W. P. Curl and Mr. Maize in relays.

In the tournament held in Philadelphia in 1903 he won the championship for old men, receiving ten messages in eight minutes and 500 words of press matter in thirteen minutes sent by Mr. R. C. Murray.

Mr. Maize has in his possession the "Philadelphia Bible," presented to the operators by Mr. J. D. Reid in 1849, in which are the autographs of 170 operators who worked on the lines at Philadelphia, Harrisburg, Lancaster, Columbia and Pittsburg between the years 1849 and 1882; of these but six are now living, namely, Colonel Joseph S. Greene, retired on a pension; Colonel William Bender Wilson, retired on a pension by the Pennsylvania Railroad; Winfield S. Burleigh, now with a brokerage firm; John W. Benckert, in the superintendent's office; William Porter Curl, still in active duty with the Western Union Telegraph Company, and himself.

Mr. Maize and his wife celebrated the forty-seventh anniversary of their marriage at their home recently, receiving congratulations from scores of old-time friends and acquaintances.

Telephone Service in America.

In the discussion on "Automatic vs. Manual Switchboards" at the International Conference of European Telephone and Telegraph Administrations, held at the Sorbonne, Paris, September 4 to 11, Mr. John J. Carty, chief engineer of the American Telephone & Telegraph Company, New York, made some interesting remarks on the telephone conditions in America.

After defining the meaning of the terms "Manual Switchboard" and "Automatic Switchboard," he briefly analyzed the method of operation of both to the disadvantage of the latter. The so-called manual system, he said, is really one composed of both manual and automatic operations. The so-called automatic system, properly speaking, is not an automatic system, but only partly so, and without the aid of human intelligence at the central office, and without the employment of operators, it has not been possible to operate it on any substantial practical scale. In order to see how thoroughly misleading is the term automatic switchboard as applied to these systems it is necessary to contemplate a telephone system more or less highly developed.

To do this we must consider the telephone system as a whole, taking into account all of the circumstances of the case, not simply one, or two, or three of them, but the whole multitude of factors which enter into such a complex problem.

We must give rigorous attention to a vast amount of data and requirements pertaining to the traffic upon which the design of the system is based, and we must take carefully into account all of those important commercial circumstances which have such a profound, though often unsuspected effect in broadly shaping the results.

It is only after we have done all of these things that we are prepared to begin to design the plant of the telephone company or administration. This word plant, which in the English language is applied to the structure constituting the physical property of the telephone company, is happily suggestive in connection with the point I wish to illustrate, for it brings to mind the idea of growth, and that in a problem such as ours, in order to attain successful results, we must contemplate a plant or system as it must exist at its different stages of development. We are not building something which, as it leaves our hands to-day, is in its final form. Each day, each month, each year, our plant is growing and we must so shape it, and so add to it, that as this growth proceeds it will have the highest efficiency which may be expected of it at each period of time. And above all, we must take care that the principles upon which this growth is planned will be such that when the system is fully developed, it will be working at its highest efficiency.

Our view is not comprehensive if it is confined to the central office switchboard alone. We must always have in mind, that while this is a vital

part of the system, it is by no means all, and that considering the telephone investment as a whole, the money invested in central office switchboards is a relatively small part of the total.

In our American practice we have for years endeavored, and I may say with substantial success, to take this view of the situation. In my office there is a large sub-department devoted to the study of the question from the standpoint of subways and cables; another for buildings; another for all telephone apparatus, including central office switchboards; another and very large department working upon the traffic parts of the problem; one devoted to development studies relating to growth of population and stations and kindred subjects; and still another whose sole duty it is to make fundamental plans based upon all of these data put together and co-ordinated.

These fundamental plans being based upon all of the factors in the case provide in outline for the location and number of the underground ducts and cables, the location and size of the central offices, and the size of the central office switchboards.

It is obvious that if to serve the needs of a given locality it is necessary at the present time to put underground a single duct, it would be a mistake to limit our construction to the immediate needs of to-day, provided, as is nearly always the case, further growth is to be expected. Some provision for the future must be made. To provide for the future, therefore, by adding duct by duct and digging up the streets each time a new duct is needed, would cause a great waste of money.

On the other hand, to take an extreme case, if a sufficient number of ducts were put down to provide for the needs of 100 years in the future (even assuming we could forecast correctly for such a long period), another waste of money would take place, for the interest and other annual charges upon the construction which must remain unproductive for so many years would more than offset the saving which would be made by avoiding the repeated excavations.

We must choose, therefore, in our construction, some point between these two extremes.

In the plans which we have made for New York and for the other cities in America, it has been found, all things considered, most economical when building new subways to plan for a period somewhere between 15 and 20 years ahead.

It should not be understood, however, that we can forecast with precision the requirements for so long a period ahead, but we have worked with these fundamental plans now for so many years that we know that they form a trustworthy guide, provided that they are continually kept under review and modified each year as the exigencies of growth demand.

With such plans before us for a given city, we are able to study the probable conditions of the plant at each period of its growth, and with such

a guide we are deterred from installing a switchboard or other system, however suitable it might seem to be at the moment, that would not be capable of growing into that form and to that magnitude which would be required of it by the conditions which it must encounter before its ille has expired.

Some idea of these conditions at New York so far as they are affected by magnitude may be obtained from the following data. The fundamental plans for that city, not including the vast suburban region outside of the municipal limits of Greater New York, provided in 1900 for a system of 51,398 telephone stations, served from 43 central offices, the population of the city being 3,347,000. In 1910 the plans provide for 376,000 stations, served from 52 central offices with an estimated population of 4,800,000. In 1930 the plans provide for 2,142,000 stations to be served from 109 central offices, with an estimated population of 8,800,000.

Without any commentary whatever these figures at once put us on our guard against the grave danger of assuming, even if the so-called automatic system was suitable for a small number of subscribers, that it would be a proper thing to employ in New York or any other city where it is expected that a proper development of the telephone will take place. It is the grand ideal of Mr. Theodore N. Vail, the founder of the telephone enterprise in America and still its active head, that we shall provide universal service. That is, that each person, firm or company in the United States that ought to have a telephone shall be provided with one, and that any person so provided wherever he may be located, can within a reasonable time be connected to the telephone of any other subscriber and talk satisfactorily.

We already have an effective long-distance service through underground cables of the Pupin type from New York to Philadelphia (90 miles) and good talking with prompt connections is an every day matter between New York and Boston (235 miles). Our long distance wires extend to Chicago and other more distant western cities, and to Washington, Baltimore, Atlanta, and other places in the far south. At the present time we are extending an underground cable of the Pupin type from New York to Washington (235 miles) and are making surveys and plans for an extension from New York to Boston. More than this, by the adoption of phantom loaded overhead circuits between New York and Chicago, and by similar extensions westward as far as Omaha and thence to the Rocky Mountains, we expect by the first of January next to have so greatly extended our long distance frontier that conversation may be held between Denver, Col., and New York City, a distance of 2,200 miles.

Referring to the private branch exchange development, Mr. Carty stated that it forms one of the most satisfactory and important features of the telephone in America.

In 1900, New York City had a total of 1,050 private branch exchange switchboards, located at subscribers' premises and serving 12,650 stations, connected with them. In 1910, there are 11,960 private branch exchange switchboards, to which there are connected 162,560 stations. In 1930, as a result of our studies on this subject, we are planning for 88,400 private branch exchange switchboards, having connected with them a total of 1,079,000 stations. These figures show that in the carrying out of plans upon which construction work is now being done, that we shall reach a point where more than half of the stations connected with the New York City system would require to be handled by operators, even if automatic switchboards were installed at the central office.

"All these things show that the automatic system which has so many alluring features about it when its application to simple conditions is considered, becomes more and more unsuitable as the plant grows. Even when the automatic system is applied to the simple case of a single office district we have yet to find an instance in which the total annual charges lying against it are less than the manual."

The following item taken from a Syracuse, N. Y., paper shows that the promptness of telegraph service is sometimes thought worthy of mention:

"Auburn, N. Y.—What is said to be one of the quickest telegraph messages ever sent over the wire was sent recently from Union Springs to Staten Island by way of Auburn. The message consisted of thirty-five words and was relayed three times from the sending point to its destination, and the answer was received at Union Springs within eight minutes. Operator Fred Grismeyer of the Auburn office of the Western Union sent and received the message and answer."

Mr. T. F. Sloan, who is located at a telegraph test station at McIlvaine, Pa., high up in the Alleghany Mountains, twelve miles from the nearest town, in renewing his subscription for another year, sends us a piece of the first wire run west from Philadelphia to Pittsburg, about 1847. This wire, which is made up of four iron wires twisted together, was abandoned after five or six years' use. Mr. Sloan states that there are now 88 Western Union and telephone wires crossing the mountain at his station. All of these with the exception of 13 are copper.

It is stated that tests are being made in New York City of an electric signal system devised to put a stop to the unauthorized use of automobiles for "joy" riding. When a car is run into the garage it is connected to the signal system and the indicator at the central station shows that the car is in. So long as the car is in the garage the fact is indicated at stated time intervals. If the car is taken out announcement is made of the fact, and of the time of departure.

Quadruplexes and Duplexes.

BY EDGAR C. DODGE, CHICAGO.

I once overheard one of the best quadruplex and repeater men in the service, Mr. B. M. Gosselin, quad chief of the Western Union Chicago office, remark that he would like to see the ground switch removed from every quadruplex and duplex set.

If this were done, the quadruplex men would be obliged to balance their wires under the conditions under which they are worked and not against a ground which is taken off when the wire is started—a ground which may or may not be in good condition as regards switch contact points and compensating resistance.

For illustration, the writer had occasion, only a short time ago, to go in on a duplex where there were two repeating offices. I was informed that the wire would double all right if the first repeating office could be induced to even it up east. It was one of those days when heavy rains had saturated the wires for a great distance and 50 ohms, one way or the other, would make a very perceptible difference. As is my custom, I felt of the polar relay armature and made a few reversals to see how our balance was before calling in the first repeater office and found that our own balance was over 300 ohms too short. I then asked the distant operator to write and found that it came clear and even. The men were started and it doubled without any complaint. My predecessor on the circuit had taken a careful balance to the ground and assured me that our end was all right, while I balanced to his battery and had the wire started inside of 30 seconds without waiting for anybody's ground.

Later I called up the first repeater on this wire and found that he had one of the old style rheostats. Someone had been sticking plugs in the compensating resistance until he was only giving us 250 ohms when he went to ground. After having him add enough to make it 600 I found practically no difference between a balance to his ground and a balance to either pole of his battery and since then have heard no complaint about the other man's balance east.

I relate this merely to illustrate one of the many causes of unnecessary delay by not only waiting for the repeating station to come in with his ground, but by disputes which very often follow when quadruplex men depend on a ground balance and insist that the other man is out of balance. The case I mention is not an isolated or unusual one. These things are happening every day and will continue to happen until quadruplex men discontinue the use of the ground for balancing. Another thing, the ground switches are often smeared with ink and badly corroded, which frequently makes perceptible differences during fog and rain.

By balancing to the battery I do not mean to have the distant man write his arm off while you

attempt to balance by ear. This is not a balance but a guess, and the accuracy of it is always subject to question. While I do not claim anything new in my method of balancing a quadruplex or duplex, I do claim that if it were universally adopted more than one-half of the delays, now directly traceable to the quadruplex department, would be eliminated.

Everyone in the business knows that balancing a quadruplex or duplex means, primarily, getting the battery through differential relays so that the main and artificial lines shall each receive an equal amount of current, thereby neutralizing the magnetic effect on the armatures. Then why not stop the senders for half a minute while you slowly reverse your poles; place your finger on the armature of your polar relay and gently hold it back from the influence of the distant battery; add or take out resistance in your rheostat until you feel no pull against your finger, either way, as you reverse your poles. It is a simple matter and easily mastered by a little practice.

At the same time you should be able to take a perfect static as well as ohmic balance. Try it. Take any quadruplex or duplex; throw it badly out of balance and then bring it gradually back by the method I have described, noting how the pull against your finger lessens by your reversals, until it disappears entirely when you have reached a balance. This takes practice, of course, but once you become familiar with it you will never ask a man to ground.

Now I hear someone say: "How about centering your armature?" "Forget it." How long does your armature stay where you centered it to the other man's ground if, when they start up, it is a little too light or heavy and you can help it by a little change one way or the other? Balance your wire and adjust your armature when they start. If it does not come up just right with a little manipulation you may be sure that the other man's pole-changer needs attention—your balance is O. K.

There are a great many factors, of course, entering into the proper working of a quadruplex or duplex, affording an almost inexhaustible source of study and investigation and I have found it intensely fascinating. The polar relay alone is a marvel in its action and functions, and there are too few men handling it to-day who are capable of giving a clear and concise description of the differentially wound polar relay; how and why it does the different things required of it under the different conditions. It alone affords opportunity for close study and wonderment, as one feels its varying pulsations under the different conditions existing along the wire which leads into it, and endeavors by reasoning and comparison to determine the cause and effect.

"Pocket Edition of Diagrams," etc., the latest revised edition, 334 pages and 160 illustrations, published by Telegraph and Telephone Age, price \$1.50, contains just the information every telegrapher requires.



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The Railroad.

The jurisdiction of Mr. J. J. Ross, Superintendent of Telegraphs of the Michigan Central Railroad, Detroit, has been extended to cover the Detroit and Charlevoix Railroad.

Mr. M. E. Launbranch, manager of the Chicago office of the United States Electric Company, was married at Herkimer, N. Y., on October 18, to Miss Carolyn Perkins.

Mr. J. S. Stevens, Superintendent of Telegraph of the Chesapeake and Ohio Railroad Company, Richmond, Va., is on a leave of absence of three months and is now in California. He will return to the East via Cape Horn.

The telegraph has been displaced by the telephone as the means of despatching trains on 246 miles of the Georgia Railroad. The line from Atlanta to Augusta, 171 miles, is equipped with 28 stations and 5 siding telephones, and the line between Camak and Macon, which is 74 miles in length, has 30 regular stations. Copper wire weighing 210 lbs. to the mile is used for the circuits. The total length of road operated by the company is 307 miles.

The Pennsylvania Railroad Telegraph School at Bedford, Pa., reports that up to September first of this year it had had 243 pupils, of which number 151 were graduated and are now employed as telegraphers. The students are taught all the duties of station agents, and as telephones are now used in train despatching on the Pennsylvania a course in despatching by telephone has been introduced. A pamphlet has just been issued giving a brief description of the work done at the school, and in which the company states that all graduates are given positions on the Pennsylvania.

The quarterly meeting of the superintendents of telegraph of the New York Central Lines occurred in New York, on October 20. Considerable business of a routine character was discussed and disposed of. Those present consisted of Mr. W. W. Ryder, of Chicago, General Superintendent of Telegraph of the New York Central Lines west of Buffalo; Mr. A. B. Taylor, New York, Superintendent of Telegraph of the New York Central Lines east of Buffalo; Mr. C. S. Rhoads, Superintendent of Telegraph of the Big Four, Indianapolis, Ind.; Mr. E. C. Keenan, Superintendent of Telegraph, Lake Shore and Michigan Southern Railroad, Toledo, Ohio; Mr. G. C. Todd, Superintendent of Telegraph of the Nickel Plate, Cleveland, Ohio; Mr. W. L. Connelly, Superintendent of Telegraph of the Chicago, Indiana and Southern Railroad, Gibson, Ind.; Mr. J. J. Ross, Superintendent of Telegraph, Michigan Central Railroad, Detroit, Mich., and Mr. L. A. Lee, Superintendent of Telegraph, Pittsburg and Lake Erie Railroad, Pittsburg, Pa.

Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad Company, Los Angeles, Cal., writes: "Your val-

uable and interesting paper, Telegraph and Telephone Age, I find is almost indispensable.

Meeting of Railway Signal Association.

The fifteenth annual meeting of the Railway Signal Association was held in Richmond, Va., October 11, 12 and 13. Reports were presented by the following committees: On signal education; signaling practice and standards; automatic block signals; electric railways; automatic stops and cab signals; wires and cables and storage battery.

Mr. Charles E. Denney, of Cleveland, Ohio, was elected president. Next year's meeting will be held at Colorado Springs, Colo., in October.

Telephone Despatching on the Louisville and Nashville Railroad.

In our issue of October 1, we printed an article regarding the introduction by the Louisville & Nashville Railroad, of telephone train despatching apparatus on its Cumberland Valley and Kentucky divisions, comprising 304 miles of road.

The company is now similarly equipping its Knoxville division. The despatching circuit from Knoxville, Tenn., to Corbin, Ky., a distance of 105 miles, is equipped with nineteen stations, and that from La Follette, Tenn., to Etowah, Tenn., a distance of 114 miles, has sixteen stations. A message circuit from Corbin, Ky., to Etowah, Tenn., a distance of 163 miles, is equipped with 36 stations. These circuits also connect with the Pine Mountain, Olive Spring and Marysville branches.

The selectors and the bells are operated by energy obtained from motor-generator sets operated directly from the primary sources of energy available, and on alternate days, so that the sets are always in an operative condition. All of the offices may be connected with either the train or the message circuit by this arrangement.

Test panels are furnished at all stations, making it possible to introduce a portion of the message circuit into the dispatcher's line, in case of trouble on the train wire. The patching panels employed in the larger stations are of special design, after specifications furnished by Mr. R. R. Hobbs, who has charge of the telegraph business of the entire Louisville & Nashville Railway system.

Work trains and repair trains on this division will be equipped with portable telephone sets, which, used in conjunction with special line poles, make it possible for the employes to get in immediate touch with either the dispatcher or the message operator.

The conduct of the business of this division is carried on under the jurisdiction of Superintendent R. C. Morrison, Trainmaster H. M. Brownie and Chief Dispatcher E. H. McIntosh.

Mr. C. M. Baker, superintendent of construction of the Postal Telegraph-Cable Company, Chicago, says: "I do not see how any one can keep well posted on telegraph and telephone affairs without the Age."

Death of General T. T. Eckert.

General Thomas Thompson Eckert, former president of the Western Union Telegraph Company, died at his summer home at Long Branch, N. J., at 7.30 a. m., Oct. 20. General Eckert was born at St. Clairsville, Ohio, April 23, 1818. His death was probably due to the effect of a peculiar accident which happened to him Sept. 2. He was preparing to retire and in turning around fell and injured his right thigh. He was assisted to his bed and suffered greatly from the shock. From that hour his decline was apparent. He was in a semi-conscious condition several days prior to his death.

In 1847, while residing with his parents at Wooster, Ohio, he read in the National Intelligencer of Washington, about the successful installation of the telegraph between that city and Baltimore. This awakened in him a desire to see and learn more of this new invention. He worked his way to New York and witnessed a demon-



THE LATE GENERAL THOMAS T. ECKERT.

stration of the operation of the telegraph at the Astor House, being present at the opening of the office in that hotel. He remained several days in New York devoting nearly all his waking hours to the study of the telegraph and, before he started homeward, he had mastered the rudiments and learned most of the alphabet. One year later, when the telegraph reached Wooster, he became the operator at that place where he also acted as postmaster.

In 1851 Gen. Eckert took a contract jointly with J. H. Wade, of Cleveland, Ohio, to build a telegraph line on the Fort Wayne Railroad from Pittsburg to Chicago. He afterward became identified with the Western Union Telegraph Company, remaining with it until 1859 when he resigned and went to North Carolina to superintend the affairs of a gold mining company. Returning to the North at the outbreak of the war he was called by Col. Thomas A. Scott to enter the government telegraph service at Washington, first as

manager of the office at McClellan's headquarters, and in January, 1862, as chief of the War Department telegraph staff and superintendent of telegraph lines of the Army of the Potomac. These positions he held until after the close of the war, receiving a commission first as captain, then as major, next as lieutenant-colonel, and on March 13, 1865, was made brigadier-general for "meritorious and distinguished service." He was also appointed assistant secretary of war under Edwin M. Stanton. He resigned from the government service August 1, 1866, to become general superintendent of the Eastern Division of the Western Union Telegraph Company. In 1875 he became president of the Atlantic and Pacific Telegraph Company and five years later president of the American Union Telegraph Company, both of which systems were consolidated with the Western Union Telegraph Company in 1881, when he went back to that company as vice-president and general manager. Upon the death of Dr. Norvin Green in 1892, he became president of the Western Union Company and in 1902 retired from active management and was made chairman of the board of directors, which position he held until the latter part of 1909 when he relinquished all active telegraphic duties.

General Eckert was a man of commanding presence and of great force of character. He possessed an excellent physique which he preserved by careful habits of living. He is survived by two sons, Clendenin and Thomas T. Their mother, nee Emma D. Whitney, of Wooster, Ohio, died in 1868. General Eckert in 1878 married Mrs. Seitzinger, of Reading, who died eleven years ago.

The funeral exercises were held on October 24, at St. Patrick's Cathedral, New York.

A solemn requiem mass was offered by Bishop James A. McFaul, of Trenton, N. J., an intimate friend of the deceased. Many other Catholic clergymen participated in the exercises.

The honorary pallbearers were Mr. Andrew Carnegie, Mr. R. M. Galloway, General Thomas H. Hubbard, Dr. John B. McMahon, Col. Albert B. Chandler, Mr. David Homer Bates, Mr. Charles A. Tinker, Mr. James Merrihew, Mr. P. J. Casey and Mr. William S. Hawk.

Large delegations from the Loyal Legion, the United States Military Telegraph Corps, and the Western Union, Postal Telegraph-Cable, Commercial Cable, and other telegraph and cable companies, were present.

Later in the day the body was placed in the family vault at the old St. Patrick's Cathedral in Mott Street, where the deceased's second wife is buried.

Mr. J. M. Barnes, manager of the office of the Canadian Pacific Railway Company's Telegraph at St. John, N. B., in renewing his subscription, writes: "The Age is as attractive as ever and is always a welcome visitor to my office."

The Turner Monument Fund.

The committee which has been appointed by the Old Time Telegraphers' and Historical Association and the Association of Railway Telegraph Superintendents, to secure funds for and erect a monument at Turner, N. Y., to commemorate the sending of the first telegraphic train order, is making preparations to begin a systematic canvass for subscriptions for this purpose. Circulars will be issued shortly setting forth the object for which the monument is to be erected and the plans of the committee. These circulars will be sent as far as possible to every one who may be interested in this worthy object in order that all may have the opportunity to subscribe to the fund. The committee has found that a very suitable monument may be erected for \$3,000, and will endeavor to raise that amount in order that one of the most important events in railroad telegraphic history may be worthily remembered by future generations.

The committee which has the matter in charge consists of: E. P. Griffith, superintendent of telegraph, Erie Railroad, Jersey City, N. J., chairman; C. Selden, superintendent of telegraph, Baltimore and Ohio Railroad, Baltimore, Md.; E. A. Chenery, superintendent of telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railroad, Montreal, Canada; J. B. Taltavall, editor Telegraph and Telephone Age, New York; Colonel W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia, Pa., and F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All contributions should be sent to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who will act as treasurer of the committee. Acknowledgment of the amounts received will be made in the columns of Telegraph and Telephone Age as soon as possible after their receipt.

Facts Regarding the First Railroad Telegraphic Train Order.

BY WALTER VAIL, DEPOSIT, NEW YORK.

In the Erie Railroad Employees' Magazine of January, 1908, there was an article regarding the first telegraphic train order ever issued in the world. That it was issued by Charles Minot, from Turner to Goshen on the New York and Erie Railroad in 1846.

In an article written by George F. Brigham of Sharon, Wisconsin, and published in the Erie Employees' Magazine of May and June, 1908, it was stated that the New York and Erie Railroad was completed to Middletown in 1846, and to Port Jervis, in 1848, and that there may be a grain of truth regarding Charles Minot's railroad telegraphic train order in 1846. The New York and Erie Railroad was completed to Binghamton in 1848 and was opened to that point on December 27, 1848, by running two excursion trains from Piermont to Binghamton on that date.

It is true that Charles Minot issued the first railroad telegraphic train order that was ever issued in the world, and that it was on the New York and Erie Railroad, and from Turner to Goshen, N. Y.

The two best reasons in the world why the telegraphic train order was not issued by Charles Minot in 1846, is because there was no telegraph line along the New York and Erie Railroad in 1846 between Turner and Goshen, also that Mr. Minot did not come to the New York and Erie Railroad until May 1, 1850.

The first telegraph line built west of the Hudson River, started down town in New York City, ran up the east side of the Hudson to Cold Springs, crossed the river to West Point, then up the river to Newburgh, then to Goshen along a turnpike highway; to Port Jervis, to Narrowsburg, to Honesdale, Pa., to Carbondale, to Binghamton, N. Y., to Owego, to Ithaca, to Buffalo, to Fredonia. It only paralleled the New York and Erie Railroad between Goshen and Narrowsburg.

The New York and Erie Railroad built a telegraph line from Piermont to Port Jervis, and had it the Fall of 1851 to Dunkirk. The line was not in operation in February, 1851, and completed it in through line. It ran from Piermont to Port Jervis, then to Susquehanna, to Hornellsville, to Dunkirk. It was built in four separate sections, and each section was operated independently.

One day in June, 1851, Charles Minot was going west on train 1, which was to meet and pass train 2 at Turner. After waiting about an hour, he went into the telegraph office and asked the operator to call up Goshen and ask him if train 2 had left Goshen yet. The operator replied "No." Then Mr. Minot wrote out that famous telegraphic train order, telling the operator at Goshen to hold all east bound trains there until he arrived on train 1. "Do you understand?" asked the Turner operator. The Goshen operator answered, "I understand that I am to hold all east bound trains here until you arrive on train 1, and will do so." Mr. Minot wrote out the order for the engineer and told him to go ahead; he refused to run on the order, so Mr. Minot took charge of the engine and ran safely to Goshen. That was the beginning of running trains by telegraph. It was adopted on the New York and Erie Railroad its entire length during the summer and fall of 1851. The system was not adopted by other roads until about 1855-6.

Mr. Minot was a railroad engineer, also a telegraph operator. He was on the Boston and Maine as engineer, and finally became superintendent of the road. He came to the New York and Erie from the Boston and Maine, May 1, 1850, as general superintendent.

The first railroad accident ever reported by telegraph was by Wilmot M. Vail, from Goshen to Port Jervis in the spring of 1851, and he was not a telegraph operator either.

When Ezra Cornell's line reached Goshen, the office was located in a store kept by Lebbeus L. Vail,

father of Hector, Nathaniel and Wilmot M. Vail. Hector and Nathaniel learned the telegraph business. Hector went to Port Jervis, and Nathaniel remained at Goshen. They operated the Cornell line. There was no railroad telegraph line at that time.

John R. Irwin, Wireless Operator of the Airship "America."

Mr. John R. Irwin, who was the wireless telegraph operator on the Wellman airship "America," which started from Atlantic City on October 15 to cross the Atlantic Ocean and which was finally abandoned at sea October 18, has returned to *terra firma* with the rest of the crew, none the worse for his remarkable experience. He is now stopping at the Waldorf-Astoria Hotel, and is enjoying a degree of public attention that seldom comes to man.

Mr. Irwin's experience on board the "America" was naturally full of excitement and interest. He says that during the entire trip, which lasted seventy-two hours, the wireless worked perfectly, and that he was in communication with Atlantic City and Siasconsett, Mass., for thirty-five hours after leaving. The instrument he carried on the "America" was only strong enough to send messages 100 miles through the air.

After the "America" began encountering heavy winds and high seas off Nantucket and farther up the coast, Mr. Irwin got outside the sending zone, and found himself in a strange plight. He was able to pick up all sorts of messages, but could not answer any of them. Messages came from Mr. Wellman's wife, from steamers and land stations. All were messages of inquiry, but Mr. Irwin could not respond.

"It was a strange thing," said Mr. Irwin. "Here I was sitting in the lifeboat under the framework of the airship, getting all kinds of inquiries, and not being able to answer them.

"The longest sleep I got was on Monday night. On Tuesday morning I received a message from Cape Cod, and in my log wrote: 'It seems like home.' After that I went to sleep and did not wake up until they called me and said a steamer had been sighted."

Mr. Irwin's log, giving the wireless messages exchanged between the airship and the steamer "Trent" from the time the "Trent" was sighted until the rescue, is a deeply interesting one.

Mr. Irwin first tried to raise the "Trent" by wireless but failed. It was then nearly four o'clock in the morning. He concluded that the wireless operator on the "Trent" was asleep, and then he brought out a pocket electric light and began flashing the Morse code with it. The look-out on the "Trent" saw what Mr. Irwin was trying to do, and the following messages were exchanged between the airship and the "Trent" by this unique, improvised system of telegraphy:

Irwin: "We are in distress; have lost control

of our airship; we need help; am on the airship 'America.' I have wireless on board. Use your wireless." (This was kept up for half an hour, when the wireless apparatus on the "Trent" began working.)

The Trent: "Do you want our assistance?"

Irwin: "Yes, come at once. In distress. We are drifting; not under control."

The Trent: "What do you want us to do?"

Irwin: "Come ahead full speed, but keep astern, as we have a heavy trail dragging."

The Trent: "O. K. Am standing by wireless in case of trouble."

Irwin: "You had better pick us up by daylight. You will be better able to see us then. Come in close and put bow of your ship under us. We will drop you a line, but do not stop your ship or you will capsize us. Who are you, and where are you bound for?"

The Trent: Steamship "Trent," bound for New York."

Irwin: "Have you any of your boats ready to launch, as we will probably capsize when we launch our boat."

The Trent: "O. K. Boat manned. Are we gaining on you?"

Irwin: "Yes, we are getting ready to launch."

The Trent: "Shall we stop for you?"

Irwin: "Don't stop. We will drop a sea anchor, and try to check our ship."

Irwin: "Have a motor going above me. Can't hear your signals now. Will say when I can. We are pumping air into airship ready to bring her down level."

The Trent: "We are going at full speed, waiting for your orders."

Irwin: "We are going to launch boat. Stand by to pick us up."

Wireless communication was then closed.

Mr. Wellman, the head of the expedition, gives unstinted praise for his comrades for the courage and resolution displayed by them. "Jack" Irwin, he says, smiled and cracked jokes in the hour of greatest danger, and scored a remarkable technical feat for the Marconi Wireless Telegraph Company by being the first to send messages ashore from a ship sailing in the air over the ocean.

Mr. Irwin was born at Echuca, Victoria, Australia, in 1881, but his home, almost from infancy, was in West Australia, where he learned telegraphy. He worked in South Africa during the Boer War, and has been in this country five years in the service of the Commercial Cable Company and the Marconi Wireless Telegraph Company. During this time he has filled the position of wireless operator on several ocean steamers, his last being on the *St. Louis*, of the American line. At the time of the loss of the steamer *Republic* by collision with the steamer *Florida*, in February, 1909, he was the operator on duty at the Siasconsett, Mass., station when the "C. Q. D." signal of distress was sent out by "Jack" Binns, from the *Republic* as that steamer was sinking.

Mr. Irwin is a frequent caller at the office of *Telegraph and Telephone Age*, and is also a contributor to the paper. He is well known to the telegraph fraternity in Australia, South Africa, as well as in New York.

Radio-Telegraphy.

Mr. Robert H. Marriott, of Brooklyn, N. Y., has been granted a patent, No. 972,004, for an antenna.

A patent, No. 972,721, has been granted to Mr. O. Rochefort, Paris, France, for a receiver for wireless telegraphy and telephony.

A patent, No. 971,935, has been granted to Mr. E. J. Simon, of New York, for a spark gap for radiotelegraph systems.

The *Telefunken Gesellschaft* claims to reach in a normal plant an efficiency of 75 per cent., and the *Lepel Wireless Syndicate* claims to get higher than 60 per cent.

Mr. G. W. Pickard, of Amesbury, Mass., has been granted patent No. 972,715 for a telephone receiving apparatus for wireless telegraph and wireless telephone systems.

An international conference on radio-telegraphy will be held in Berlin in the spring of 1911. Invitations to participate have been sent to all the nations who were represented in the 1906 congress.

The *Deutsche Ost Afrika Linie*, of Hamburg, whose ships carry on trade around the African continent, is installing the *Telefunken* wireless telegraph system on its nine main-line vessels, and a new boat now approaching completion will be similarly equipped.

A committee representing the United States Navy, the Army and the Philippine Insular Government is making an investigation of the requirements and preparing plans for the establishing of a wireless system which will place every section of the archipelago in touch with Manila.

In compliance with the law passed by Congress requiring all vessels calling at United States ports which carry more than fifty passengers to be equipped with wireless, the owners of the *Blue Funnel Line* which plies between Tacoma, Wash., and Liverpool, England, have ordered *Marconi* wireless apparatus for all their vessels.

The revolution in Portugal has directed attention to wireless telegraphy in connection with its political value in a manner that has hardly been appreciated up to the present. Owing to the fact that the land telegraph lines had been cut wireless communication was maintained with foreign countries from the war vessels in the harbor at Lisbon.

It is reported that the *Fessenden Wireless Telegraph Company* of Canada, has made a proposal to the Royal Commission on Trade Relations between Canada and the West Indies, looking to the estab-

lishment of a chain of wireless stations to link together Great Britain, Canada and the English possessions in South Africa and the West Indies. It is stated that this company expects to be able to reduce the rate for trans-Atlantic messages to one-half pence per word.

In a recent number of a German publication Mr. Paul Schwarzhaupt gives the results of some extensive observations made of abnormal transmission of electromagnetic waves. The general results of these observations show that the phenomenon of abnormal range occurs only at night and that in regard to atmospheric troubles such disturbances always begin in the afternoon, reaching their maximum toward midnight, and disappearing almost completely by sunrise. They are most frequent in tropical climates. They are more violent in summer than in winter, in consequence of the more frequent thunderstorms. They are particularly noticeable in the neighborhood of high mountains, e. g., the Red Sea, the coasts of Italy and Spain. In the Mediterranean Sea the disturbances in winter are relatively weak. Frequently violent disturbances are observed when the sky is quite clear; it is assumed that these proceed from a distant thunderstorm.

Canada the Telegrapher's Opportunity.

Canada offers better opportunities today for the success of enterprise in business life than can, as a rule, be found on this side of the border, for the reason that it is a comparatively new and growing country. The wave of expansion is on the increase and many men in the "States" are seizing the opportunity to better their condition by taking up their abode in Canada. Telegraphers are no exception. The country is rapidly developing its great natural resources and business is expanding in a corresponding degree. Increasing business means an increasing demand for greater telegraph facilities, and the demand for operators is therefore naturally growing. Canada has unlimited power of absorbing telegraphers, and this demand results in a higher wage-level, as compared with the salaries paid in this country. Young telegraphers, and older ones too, even those with families, will find greater independence and comfort on Canadian soil than in the United States, where life and freedom are confined to comparatively narrow limits. Here is something for ambitious spirits to ponder.

LETTERS FROM OUR AGENTS.

JACKSONVILLE, WESTERN UNION.

Mr. F. M. Houser, chief operator in this office, has been promoted to be district supervisor with headquarters in this city.

Mr. R. L. Branton, night chief, has been appointed chief operator to succeed Mr. Houser.

Mr. C. A. Nichols, all night chief, has been advanced to be night chief operator to succeed Mr.

Branton, and Mr. J. H. Nelson has been appointed night traffic chief.

Mr. G. C. Harris, wire chief, has been appointed district traffic chief with headquarters in this city.

Mr. J. C. Wright has been appointed wire chief to succeed Mr. Harris.

Mr. W. J. Delaney, assistant day traffic chief, has been advanced to the position of day traffic chief, and V. T. Reynolds from operator to assistant day traffic chief.

Messrs. V. G. Shearer and T. F. Wallace have been appointed repeater chiefs.

Mr. W. R. Shearer has been appointed all night chief operator.

Mr. J. W. Ware has been appointed District Commercial Agent.

NEW YORK NEWS.

Assessment No. 515 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of John J. Barry, at New York; Robert W. Chapman, at Brooklyn; Henry S. Bruner, at Oakland, Cal.; William H. Cohn, at Berkeley, Cal.; James S. Garwood, at Lynn Haven, Va., and Alfred T. Noarse, at Sherbrooke, Que.

The annual meeting of the Telegraphers' Mutual Benefit Association, will be held at 195 Broadway, New York, on the afternoon of November 16, and the visiting delegates will be the guests of the Magnetic Club at its fall dinner, which will be held in the evening of the same day at the St. Denis Hotel.

Signal Corps Camp Organized in Chicago.

A new camp, named after General A. W. Greeley, and composed entirely of Signal Corps men who served in the Philippines, Porto Rico and Cuba has been organized in Chicago, and has been affiliated with the United Spanish-American War veterans. The officers are: Captain J. W. McConnell, commander; R. S. Gill, senior vice-commander; H. S. Deacon, junior vice-commander, M. J. Connelly, adjutant; J. W. Konigsmark, quartermaster; D. F. Delahunt, chaplain; A. L. Ewing, surgeon; George Lee, L. H. Wilson, P. A. Johnson, trustees; S. W. Wooster, officer of the day; J. W. Bowen, officer of the guard. Colonel Glassford, chief signal officer of the department of the Lakes is a member of the new camp.

The object of the organization, which is composed principally of telegraphers employed in Chicago at the present time, is to enroll all honorably discharged Signal Corps men who served during the Spanish-American war.

Wanted.

A telegraph operator, single man, to fill the position of telegraph and telephone inspector in one of the Central American Republics. The salary is \$110 per month for the first year, and after that, if services are satisfactory, \$125 per month, and actual traveling expenses. The applicant must be experienced in construction, maintenance, etc., pertaining to telephone lines. The right man will be eligible for promotion within a year, to a more important division with increase of salary. Address "Inspector," care Telegraph and Telephone Age, 253 Broadway, New York.

The Serial Building and Loan Savings Institution is essentially a telegrapher's institution, conducted by and for telegraphers. Telegraphers can become their own landlords by paying to the association what they pay for rent and at the end of a certain period have their house entirely paid for. The association has been in existence for twenty-five years and more than 1,100 persons have secured homes through its aid. Think of this record and the good accomplished, then write to headquarters at 195 Broadway, New York, for information as to how to become a shareholder.

A certificate of membership in the Telegrapher's Mutual Benefit Association, 195 Broadway, New York, affording protection for the family and dependents in the amount of \$500 or \$1,000, which is at once available and cannot be diverted from its mission, should be held by every eligible person between the ages of 18 and 45 engaged in telegraph and telephone service, either commercial or railroad. If those not now members could realize and fully understand the stern necessity for beneficial help too often experienced by bereft families, would they not make earnest effort to secure such provision? Write for particulars.

This publication office is headquarters for all electrical and other technical books.

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Columbia, Pa. R. F. D. No 1

Telegraph and Telephone Age

No. 22.

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Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY—VI.

A Study of Telegraph Apparatus.

By WILLIS H. JONES.

THE POLECHANGER.

A polechanger, as the name signifies, is an instrument used for the purpose of reversing the polarity of the battery.

One might naturally conclude that almost any device possessing two contact points would answer the purpose, but a little reflection will show that such is not the case. Otherwise the present cumbersome walking-beam pattern would long ago have been discarded.

There are at present only three patterns that are used to any great extent, viz: The walking-beam, the clock-face, and the double-lever relay instrument used by the Postal Telegraph-Cable Company. These polechangers perform the same service, but do it in a different way, and the reason they do it differently is the point the student should study.

Every quadruplex attendant knows that where a sounder and a walking-beam pattern polechanger

are connected in series that the sounder will work solid and natural in nearly every case, while the polechanger will feel almost every alteration in the volume of current when a different loop is substituted, and require a different adjustment in many cases.

In view of this fact the writer has frequently been asked why the sounder itself, if provided with an upper and lower contact point, and the lever insulated, might not be made to serve equally well as a polechanger.

The explanation is that the sounder method would require so great an air gap between the one set of contact points in order to prevent excessive sparking that the period or duration of the break would be greatly increased.

It should be remembered that where the dynamo is used the tension across the air gap is always just twice as great as the value of the electromotive force which supplies current to the line. Thus, where each pole is, say 320 volts, there would be 640 volts across the air gap.

In order to minimize the harmful effect of this double pressure the walking beam pattern was adopted with the view of providing a second air gap, which, while creating twice the resistance would not necessitate widening the contact point space in so great a degree. Where the dynamo is employed the "break" is an unavoidable necessity, otherwise the old continuity contact preserving method would be preferable in many respects.

Apropos of this subject it may not be out of order to call attention to the fact that since the former long quadruplex circuits have been quite generally reduced to polar duplex circuits, the walking beam pattern has been giving considerable trouble for no other reason than that the attendants have grown somewhat careless in many instances in the matter of keeping the polechanger adjusted closely. On quadruplex circuits it was absolutely necessary to maintain a close adjustment of the contact points in order to not "break over" on the common side. Hence the mechanical inertia was so small that slight alterations in the volume of local current when different loops were substituted caused but little trouble.

Now-a-days, owing to the fact that a slightly wider play of the lever on duplex circuits does not materially affect the line work, the habit of giving the lever an abnormal play in order to better hear one's sending has increased the mechanical inertia so much that the polechanger feels every alteration in the local current when a loop is changed, and instead of remedying the fault by a proper readjustment the usual cry is for "more current." Where the volume of current is normal there is no reason why it should not be as efficient as heretofore and cause just as little trouble.

The polechanger used by the Postal Telegraph-Cable Company obtains the double break or two air gaps by employing two relays, which work in unison, the respective levers of which each furnish one gap. By this means each air space may be made very small and yet create sufficient resistance to prevent undue sparking at the contact points.

THE CLOCK-FACE POLECHANGER.

The clock-face pattern, so-called because of a slight resemblance to a clock, has four contact points instead of two, and was designed for the chemical battery system. No break or airgap results when the polarity of the battery is reversed, hence the name, "continuity preserving contact" polechanger. When the four contact points are properly adjusted it is the ideal polechanger for multiplex circuits, but unfortunately it cannot be used in connection with the dynamo and leakbox system except on very short circuits which require only a very low electromotive force.

With this polechanger only one battery is required, and when the polarity is to be reversed, the duty of this device is simply to turn the battery around, so to speak. It accomplishes this by connecting first the positive end of the row of jars to the line and grounding the other end in one position, and the negative to line and positive to ground when the position of the lever bar is reversed. Hence only one battery is required, and aside from a momentary shortcircuiting of the battery while the contact points are passing, there is nothing to cause excessive sparking.

The student will thus see that the different patterns are not merely selected through choice or fancy but that there is a good reason for each construction.

(To be continued.)

Recent Telegraph and Telephone Patents.

No. 972,814 for an electrical relay, to J. F. Cadell, Baltimore, Md.

No. 972,839 for a telephone attachment, to W. C. Fisk and H. L. White of Orofino, Idaho.

No. 972,874 for a self acting telephonic line connecting system, to B. Kugelmann of Bad Kissengen, Germany.

No. 972,988 for indicating means for party lines telephone, to J. H. Blythe of Denver, Col.

No. 972,994 for an insulator for telegraph and telephone wires, to J. H. Campbell, Ripley, Ohio.

No. 973,198 for a telephone receiver holder, to J. F. Hines, Pittsburg, Pa.

No. 973,898 for signaling system, to E. Parsons, Chicago, Ill.

The following patents have expired:

No. 507,170. Electric Signal Alarm for Railway Trains, issued to James M. Rupel, Kansas City, Kan.

Nos. 507,205 and 507,206. Electric Selecting Device, issued to Samuel S. Bogart, New York, N. Y.

No. 507,510. Railway Time and Block Signal, issued to Adelbert H. Thorp, Toledo, Ohio.

No. 507,518. Electric Apparatus for Controlling

Signals, issued to Michael B. Leonard, Richmond, Va.

No. 507,568. Telephone Circuit, issued to John S. Stone, Boston, Mass.

No. 507,604. Telephone-Transmitter Circuit and Apparatus, issued to John S. Stone, Boston, Mass.

No. 507,715. Telephone Transmitter, issued to James H. Mason, Brooklyn, N. Y.

No. 507,728. Telephone, issued to Stephen D. Field, Stockbridge, Mass.

No. 507,791. Machine Telegraphy, issued to Patrick B. Delany, South Orange, N. J.

No. 507,918. Electric Train and Switch Signal Device, issued to George E. Miller, Saugus, Mass.

Personal.

Mr. George C. Maynard, a forty-niner of the telegraph and a military telegrapher, for many years past identified with the Smithsonian Institute, Washington, D. C., was a recent New York visitor.

Mrs. John Brant, wife of the late John Brant, for many years secretary of the Old Time Telegraphers' and Historical Society, who died August 26, 1908, has just returned to New York after touring Europe for the past nineteen months.

His Excellency the Hon. R. Nakakogi, vice minister of the Department of Communication of the imperial Japanese government, and party, whose presence in this country was noted in our issue of October 16, recently visited Chicago on their way home. Mr. B. E. Sunny, president of the Chicago Telephone Company and Mr. Angus S. Hibbard, vice-president, showed the party through the main exchange. The visitors were afterward taken to the main operating room of the Western Union Telegraph Company where they witnessed the complementary operation of the telegraph and telephone. A luncheon was given to the party at the Union League Club, among those present being Mr. W. J. Lloyd, Division Traffic Superintendent of the Western Union Telegraph Company, Mr. J. G. Wray, chief engineer of the Chicago Telephone Company, and Mr. G. E. Cullinan, assistant manager in Chicago of the Western Electric Company.

Mr. Marvin Hughitt, of Chicago, who has retired as president of the Chicago & Northwestern Railroad, started his business career as a telegrapher. He went to Chicago from Buffalo when the late Emory Cobb became manager of the Western Union Chicago office in the early fifties. Mr. Hughitt afterward became train dispatcher on the Illinois Central Railroad and later general superintendent. He was in the service of the Chicago & Northwestern Railroad for thirty-eight years, twenty-three of which he was president. On his retirement from the presidency he was elected chairman of the Board of Directors of the company.

Mr. Hughitt has been succeeded as president by Mr. William A. Gardner, also a former telegraph operator. Mr. Gardner is fifty-one years of age,

and learned telegraphy on the Chicago & Alton, and Illinois Central Railroads. He spent the greater part of his life in the service of the Chicago & Northwestern Railroad, starting as telegraph operator and being rapidly promoted through every step of the operating department, until he now is regarded as one of the ablest railroad officials in the United States.

Mr. Thomas Ahearn, of Ottawa, Ont., well-known in the telegraph, telephone and electrical fields in the United States and one of the most able and successful promoters and managers of electrical properties in Canada, is the subject of a very interesting sketch in the *Toronto Saturday Night*, October 29. Mr. Ahearn started his business life as a telegraph messenger in Ottawa, and after becoming an operator he worked for two years in the New York office of the Western Union Telegraph Company. As a result of the great success of his many electrical enterprises in Canada he is now classed as one of the wealthiest men in the Dominion.

Mr. Francis W. Jones, formerly, and for many years, electrical engineer of the Postal Telegraph-Cable Company, New York, has gone to West Palm Beach, Fla., for the winter. Mr. Jones retired from active telegraph service three years ago.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager of the company, has returned to his office after a trip through the southern and western divisions. While in Atlanta he attended a conference of district superintendents of the Southern Division. The following named gentlemen were in attendance: Mr. E. B. Pillsbury, general superintendent, New York; Mr. George H. Usher, general superintendent; Mr. G. E. Paine, assistant general superintendent; Mr. B. S. Price, superintendent of construction and Mr. J. P. Edwards, division electrical engineer, Atlanta; Mr. G. W. Ribble, district superintendent, Richmond, Va.; Mr. Jesse Hargrave, district superintendent, Birmingham, Ala.; and Mr. C. B. Arrington, district superintendent, Nashville, Tenn. Mr. Usher entertained the visitors with a dinner at the Capital City Club, after the business of the meeting was disposed of.

Mr. Charles P. Bruch, vice-president, has been confined to his home for the past three weeks, suffering from an affection of the eyes. He expects to return to his desk within a week.

Mr. James P. O'Donohue has been appointed division electrical engineer of the Eastern Division, to succeed Mr. F. E. d'Humy, resigned.

The "Postal Telegraph" for November contains several pages of interesting and instructive reading matter of a general character, besides a good deal of information that every telegrapher should know. The article on "The Child Labor Question Applied to the Messenger Service," which was published in *Telegraph and Telephone Age*, October 16, is re-

produced. The frontispiece consists of a full page portrait of Mr. W. C. Lloyd, the manager of the New Orleans office.

This company has laid another large cable across the Hackensack River for the Pennsylvania Railroad Company, near the entrance to the New York tunnels.

Mr. D. H. Gage, Jr., district electrician at Philadelphia, has been attached to the Electrical Engineer's office, New York.

Mr. F. W. Towne, of Bridgeport, Conn., has been appointed manager of the Poughkeepsie, N. Y., office, to succeed Mr. C. E. Williams, resigned.

Mr. S. M. English, president and general manager of the Postal Telegraph-Cable Company of Texas, announces the following changes in the service of that company:

Mr. W. L. Jones has been appointed secretary and auditor to succeed Mr. J. Q. Pipkin, resigned.

Mr. L. A. Ott, manager at Austin, Tex., has been appointed manager at Dallas, vice W. L. Jones.

Mr. Ed. Bennett has been appointed superintendent of construction and equipment to succeed Mr. M. B. Wyrick, resigned.

Mr. S. S. Scothorn, formerly chief operator at Dallas, Tex., has been appointed manager at Austin, Tex.

James P. O'Donohue, Division Electrical Engineer, Eastern Division, Postal Telegraph-Cable Company.

Mr. James P. O'Donohue who has just been appointed division electrical engineer of the Eastern



JAMES P. O'DONOHUE,
Division Electrical Engineer, Eastern Division, Postal Telegraph-Cable Company, New York.

Division of the Postal Telegraph-Cable Company, at New York, was born in Ireland, June 2, 1873. He began his telegraph career as a messenger in Boston, Mass., in August, 1885, and has since held positions as operator, branch office manager, quadruplex chief and wire chief, and held the position of district electrician in Boston, and was in 1908 transferred to the office of the Electrical Engineer in New York, where he remained until his appointment as division electrical engineer.

Magnetic Club Aeronautic Dinner.

The autumn meeting of the Magnetic Club, to be held at the St. Denis Hotel, New York, November 16, will be an Aeronautic dinner. Mr. Clifford B. Harmon, the well-known American aviator and Mr. John Barry Ryan, commodore of the United States Aeronautical Reserve will be guests and speakers at the meeting. Many prominent telegraph people will be present on this occasion. An excellent entertainment programme has been arranged.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee, has gone to London on business connected with the service.

The entire State of West Virginia has been added to the Eastern Division. Some portions of the State were formerly in the Eastern, Southern and Western divisions. General Superintendent A. G. Saylor, and division commercial superintendent, E. M. Mulford recently visited those offices in West Virginia which have been transferred to their territory.

Mr. William Finn of the office of the engineer of equipment, is making a trip in the South which will take him as far as Jacksonville, Fla., on company business.

The general superintendents and the division commercial superintendents from five of the six divisions are this week holding a conference in New York on business connected with the service. The Pacific division is not represented at the conference.

Mr. John F. Wallick, superintendent at Indianapolis, Ind., has been appointed general agent of the Company, with headquarters in that city.

The following appointments have been made in the Eastern Division:

THIRD DISTRICT, PITTSBURG, PA.

N. E. Church, district commercial superintendent.
E. W. Dodge, district traffic superintendent.
W. W. Oldheiser, district plant superintendent.

FOURTH DISTRICT, PHILADELPHIA, PA.

W. A. Sawyer, district commercial superintendent.

J. M. Creamer, district traffic superintendent.

R. J. Meigs, district plant superintendent.

FIFTH DISTRICT, BOSTON, MASS.

L. D. Wilbourn, district traffic superintendent.

SIXTH DISTRICT, ST. JOHN, N. B.

C. W. McKee, district commercial superintendent.

D. C. Dawson, district traffic superintendent.

A. D. Wetmore, district plant superintendent.

The following appointments have been made in the Western Division:

FIRST DISTRICT, CHICAGO, ILL.

A. B. Cowan, district commercial superintendent.

J. J. Welch, district traffic superintendent.

W. C. Titley, district plant superintendent.

FIFTH DISTRICT, CLEVELAND, OHIO.

J. Fitzpatrick, district commercial superintendent.

F. J. Dayman, district traffic superintendent.

W. W. Watt, district plant superintendent.

SIXTH DISTRICT, INDIANAPOLIS, IND.

A. C. Cronkhite, district commercial superintendent.

E. Parsons, district plant superintendent (sixth and seventh districts).

SEVENTH DISTRICT, CINCINNATI, OHIO.

J. N. Miller, district commercial superintendent.

A. A. Montgomery, district traffic superintendent (sixth and seventh districts).

EIGHTH DISTRICT, MINNEAPOLIS, MINN.

A. D. Bradley, district commercial superintendent.

R. W. Kean, district traffic superintendent.

A. Young, district plant superintendent.

The following appointments have been made in the Mountain Division:

FIRST DISTRICT, DENVER, COL.

George R. Allen, district traffic superintendent.

SECOND DISTRICT, SALT LAKE CITY, UTAH.

E. C. Labadie, district traffic superintendent.

R. P. Cowardin, district plant superintendent.

THIRD DISTRICT, OMAHA, NEB.

C. B. Horton, district commercial superintendent.

J. P. Barnhart, district traffic superintendent.

W. Salisbury, district plant superintendent.

The following appointments have been made in the Gulf Division:

FIRST DISTRICT, DALLAS, TEX.

W. P. Davis, district traffic superintendent.

SECOND DISTRICT, NEW ORLEANS, LA.

T. P. Cummings, district commercial superintendent.

H. Vandevender, district traffic superintendent.

THIRD DISTRICT, OKLAHOMA.

A. R. Lingafelt, district commercial superintendent.

These appointments are additional to those already noted in these columns.

Mr. E. S. Anderson has been appointed chief operator of the Baltimore, Md., office to succeed Mr. L. D. Wilbourn, transferred to Boston.

Mr. W. W. Murphy, who was recently promoted from the managership of the Chattanooga, Tenn., office to a position in the Atlanta, Ga., office, was presented with a handsome walrus hand bag by his associates in the Chattanooga office on the eve of his departure.

Mr. J. H. Therrell, of Thomasville, Ga., has been appointed district commercial agent in Georgia and South Carolina, with headquarters in Atlanta. He is a brother of Mr. D. M. Therrell, division traffic superintendent of the Southern Division.

Mr. B. P. Hancock has been appointed division traffic supervisor of the Southern Division, with headquarters at Atlanta, Ga. Mr. Hancock was formerly with the Postal Telegraph-Cable Company, at Birmingham, Ala.

Mr. J. M. Green, of San Francisco, has been appointed manager of the office at Sacramento, Cal., vice Mr. William Dumars, who was transferred to a position in the superintendent's office in San Francisco.

Mr. H. A. Emmons, formerly of the Boston office of the Postal Telegraph-Cable Company, and later with the American Telephone and Telegraph Company, has been attached to the office of Mr. W. N. Fashbaugh, traffic engineer, New York.

Mr. Walter A. Houghtaling, of the Rowland Printing Telegraph Company, Baltimore, Md., has accepted a position in the traffic department, New York. Mr. Houghtaling is 41 years of age and has had a wide experience in telegraph and telephone engineering. He graduated from the position of telegraph operator to be an assistant in the engineering department of the Postal Telegraph-Cable Company, New York. For the past eight years he has been identified with the Rowland printing system and did excellent work for the Company in introducing its multiplex apparatus in Germany and in the United States.

The Western Union Telegraph Company is building a copper wire circuit between Wichita, Kan., and Amarillo, Tex., on the Pan Handle branch of the Atchison, Topeka & Santa Fe Railroad for telegraph and telephone purposes. The line is to enable the Western Union Company to reach by wire those towns along the Panhandle line in which the railroad company does not keep a telegraph operator. Telephones will be placed in the several depots in lieu of telegraph instruments.

**T. E. Fleming, Commercial Superintendent,
American District Telegraph Company
of New Jersey.**

Mr. Thomas E. Fleming, who was recently appointed Commercial Superintendent of the American District Telegraph Company of New Jersey, and attached to the office of Vice-President W. H.



THOMAS E. FLEMING,
Commercial Superintendent, American District Telegraph Company
of New Jersey, New York.

Baker, New York, began his business career as a messenger in the Western Union Telegraph Company shortly after the removal of that company to

195 Broadway, New York. The advantages of an excellent common school education told in young Fleming's behalf, for he speedily received promotion, first serving as a clerk in the cable department, later going to the French Cable Company, afterwards to the American Union Telegraph Company and the American Telegraph and Cable Company, subsequently serving for a brief term in the superintendent's office of the Western Union Telegraph Company. After a further career of several years, both in and out of the telegraph service, during which time he served as chief clerk, first in the operating department of the Baltimore and Ohio Telegraph Company, New York, he was employed as chief clerk under Mr. W. J. Dealy, when that gentleman was manager of the operating department of the Western Union Telegraph Company. Mr. Fleming served from 1888 to 1897 as secretary of the Telegraphers' Mutual Benefit Association. On June 1 of the latter year he entered the employ of the Postal Telegraph-Cable Company, as chief clerk in the general manager's office. He was appointed special agent of the company in 1899.

In 1906 Mr. Fleming was elected assistant secretary of the Postal Company and in 1907 was appointed manager of the Contract Message Bureau. When the Postal Employees Association was formed he was elected its secretary and the detail work of the Association was under his direction. Notwithstanding his varied duties, Mr. Fleming found time to write several short stories and sketches, generally of a humorous character. He was a frequent contributor to, and later became editor of "The Postal Telegraph." It will be seen that he has returned as superintendent to the building where he started his telegraph career over thirty years ago as messenger.

F. E. d'Humy.

Mr. F. E. d'Humy, who has just been appointed to a position in the office of the engineer of equipment of the Western Union Telegraph Company, New York, was born in London, England, in 1873, and received his education in private schools



F. E. D'HUMY,
of the office of Engineer of Equipment, New York.

in England and France. He came to the United States in 1888 and entered the service of the Water Primary Battery Company. Early in 1890

he went to Nova Scotia as a photographer, but returned to the United States and accepted a position with the Western Electric Company, New York, as wireman.

In June, 1891, he entered the service of the Postal Telegraph-Cable Company at Boston and was placed in charge of the dynamo plant. During the Spanish-American war he was, in 1898, relieved from duty in Boston to accept an appointment as first lieutenant in the Volunteer Engineering Corps, in connection with electrical work for the defense of Boston harbor.

Mr. d'Humy was transferred to New York in 1904 as district electrician. In 1906 he was appointed division electrician of the Eastern Division of the Postal Company, and, in 1907, was promoted to the position of assistant electrical engineer, which position he held at the time of his resignation.

Mr. d'Humy's professional experience will be a valuable addition to the Western Union Company's engineering department, and with the wider opportunities offered in his new position he will make himself felt in the work of developing the company's large plans. He possesses an irreproachable character and is regarded as one of the most painstaking and active young men in his profession. His departure from the Postal Company's service was attended with many regrets on the part of his superiors and associates, all of whom wish him much success in his new field of work.

**J. E. Peacock, District Traffic Superintendent,
Western Union Telegraph Company,
Jacksonville, Fla.**

Mr J. E. Peacock, district traffic superintendent of the Western Union Telegraph Company at Jacksonville, Fla., whose appointment to this



J. E. PEACOCK,
District Traffic Superintendent, Jacksonville, Fla.

position was noted in our issue of October 16, was born in Decatur County, Ga., December 15, 1865.

In the summer of 1884 he entered the Western Union Telegraph Company's service as manager and operator at Waynesborough, Ga. He afterward went to Savannah, Ga., as operator for the same company, and later became manager of the St. Augustine, Fla., office. He was out of the telegraph service for two years, but returned to it, becoming manager of the Jacksonville Western Union office which position he held from January, 1894, until October 1, 1910, when he was promoted to his present position.

**R. W. Whitehead, Division Plant Superintendent,
Western Union Telegraph Company,
Denver, Colo.**

Mr. R. William Whitehead, whose appointment as Division Plant Superintendent of the Western Union Telegraph Company at Denver, Colo., was noted in our issue of October 1, was born in New York City, March 30, 1872. He was educated at Yale University, receiving a degree of Ph.B. from the Sheffield Scientific School in 1893.

In 1894, he went with the New England Telephone and Telegraph Company in Boston, being associated with the engineering and construction departments. He was finally made construction engineer. In 1902, he went with the Western Telephone and Telegraph Company, with headquarters in Detroit, Mich., where he occupied the position of construction engineer for one year. In 1903, he went with the Michigan Telephone Company in the same city as assistant engineer resigning in 1904 as acting engineer. In 1904, he became assistant engineer of the Southern New England Telephone Company, a position which he held until May 2 of this year, when he was appointed assistant superintendent of plant and plant engineer. On October 15, he received his present appointment.

**L. H. Beck, Division Plant Superintendent,
Western Union, Atlanta, Ga.**

Mr. Lewis Howard Beck, who has recently been appointed division plant superintendent of the Western Union Telegraph Company at Atlanta, Ga., has had an extensive experience in construction work which admirably fits him for the duties of his new position. Mr. Beck was born at Boston, Mass., September 15, 1872. In 1888 he entered the general offices of the American Bell Telephone Company at Boston. In 1890 he was attached to the engineering department of that company. In 1899 he became assistant engineer of the Bell Telephone Company of Buffalo, and in 1902 was advanced to be superintendent of construction. On January 1, 1910, when that company was consolidated with the New York Telephone Company, Mr. Beck was appointed district plant superintendent of the Buffalo district of the latter company. This position he held at the time of his transfer on October 1 to the Western Union service at Atlanta.

**U. G. Life, District Commercial Superintendent,
Western Union Telegraph Company,
Salt Lake City, Utah.**

Mr. U. G. Life, district commercial superintendent of the Western Union Telegraph Company, Salt Lake City, Utah, mention of whose appointment was made in our issue of October 16, was born in Virginia, Nov. 6, 1869. He entered the telegraph service at Beattie, Kans., in 1882, and has held positions as operator, manager, railroad agent and dispatcher at various points, and chief clerk to railroad general superintendent. He also occupied the position of adjuster and was engaged in transportation service, finally becoming assistant superintendent of telegraph of the St. Joseph & Grand Island Railway, from which position he received his present promotion.

**R. H. Tudor, Manager, Western Union Telegraph
Company, Chattanooga, Tenn.**

Mr. R. H. Tudor, whose appointment as manager of the Chattanooga, Tenn., office of the Western Union Telegraph Company was mentioned in our issue of November 1, was born at Paint Lick, Ky., February 1, 1885, where he began his telegraph



R. H. TUDOR.

Manager, Western Union Telegraph Company, Chattanooga, Tenn.

career at the age of fifteen. After mastering telegraphy he became the agent of the Louisville & Nashville Railroad Company at the same point. Later he left the railroad service to enter that of the Western Union Telegraph Company. He filled positions as operator at Memphis and Nashville, Tenn., and afterwards was manager at Barbourville, and Middlesboro, Ky., Baton Rouge, La., Johnson City, Tenn., and Corinth and Greenville, Miss., successively. He travelled through the fourth district for two years checking accounts, making transfers and acting as temporary relief to managers at various places. Mr. Tudor is a close observer, and is also of an inventive turn of mind. He has recently obtained patents on two telegraph repeaters,

which were described in these columns March 1 and May 16 of this year.

**Mr. S. J. Gray, Chief Operator, Western Union
Telegraph Company, Los Angeles, Cal.**

Mr. Samuel J. Gray, chief operator of the Western Union Telegraph Company at Los Angeles, Cal., was born in Hancock County, Miss., September 3, 1877. In February, 1899, he entered the telegraph service in the general offices of the Gulf & Ship Island Railroad, at Gulfport, Miss. He has been operator at many places in the South, Southwest and the Pacific Coast, for various railroads, both telegraph companies and the press associations. He was night chief and afterwards chief operator for the Postal Telegraph-Cable Company at Houston, Tex., and at the time of his appointment as chief operator at Los Angeles was wire chief in the Western Union office at San Francisco, where he had previously held various other positions.

Mr. Amos Young has been appointed district plant superintendent of the Eighth District, Western Division, with headquarters at Minneapolis, Minn. Mr. Young was born in Sittingbourne, England, September 1, 1875, and entered the telegraph service in Chicago, October 20, 1895, as lineman. He finally became superintendent of construction after occupying intermediate positions, and held this office until his present promotion.

Mr. Howard Lombard Esch, has been appointed to the position of chief clerk to Mr. S. E. Leonard, division commercial superintendent of the Mountain Division, at Denver, Col. Mr. Esch was born at Memphis, Tenn., September 12, 1888, and entered the telegraph service at Colorado Springs, Col., July 20, 1901, as messenger. He subsequently occupied positions as clerk, bookkeeper and operator and was cashier at the time of his recent promotion.

Mr. Albert A. Montgomery, district traffic superintendent of the sixth and seventh districts, Western Division, with headquarters at Cincinnati, Ohio, was born in Montgomery, W. Va., November 17, 1862. He entered the telegraph service in Ironton, Ohio, January 25, 1875, as a messenger, and has been continuously in the service of the Western Union Company since that time, filling the positions of operator, traffic chief and assistant chief operator. He has been in the Cincinnati office since 1885.

Mr. Emory Parsons, district plant superintendent, sixth and seventh districts, Western Division, with headquarters at Indianapolis, Ind., was born in Orland, Ill., February 2, 1870, and entered the telegraph service at Worth, Ill., June 6, 1888, on the Wabash Railroad. From that date until May, 1894, he worked as operator on various railroads. From May, 1894, until February, 1908, he filled the positions of night chief operator, chief operator and assistant superintendent of telegraph of the Illinois Central Railroad in Chicago. Mr. Parsons left the

telegraph service in February, 1908, and was engaged in commercial business in Chicago until his appointment as district plant superintendent, which brings him back to the telegraph service.

Mr. Robert Purcell Cowardin, wire chief of the Denver, Col., office, has been appointed district plant superintendent, with headquarters at Salt Lake City, Utah.

Mr. Cowardin was born in Nashville, Tenn., October 7, 1877, and first entered the telegraph service at Waverly, Tenn., in October, 1892. He held positions as operator on the Nashville, Chattanooga & St. Louis Railway, operator and wire chief in the Western Union Nashville office, operator in the New Orleans office, wire chief in the Norfolk office, chief operator in the Memphis, Tenn., office and operator in the St. Louis office. He has held the position of head wire chief in the Denver office for the past four years.

Canadian Notes.

Mr. S. B. McMichael has been appointed assistant general manager of the Great North Western Telegraph Company of Canada, with headquarters at Toronto, Ont.

On November 7 the Canadian Pacific Railway Company celebrated its twenty-fifth anniversary as a trans-continental railway system. On that date, in 1885, the Hon. Donald A. Smith, now Lord Strathcona, drove the last spike which united the eastern and western sections of the road. The railroad has worked marvelous changes in the development of the country through which it passes.

The Cable.

The Maritime Telegraph and Telephone Company of Nova Scotia has laid a 12-wire cable across Northumberland Strait, between Waterside, and Wood Island, near Charlottetown, P. E. I. The distance is 35 miles.

The report of the English Royal Commission of Inquiry into the Postal Telegraph services recommends, among other things, the appointment of a board of management to administer the department, and the nationalization of the cable services connected with Australia.

Various Boards of Trade and Chambers of Commerce in the United States are co-operating in the campaign inaugurated by the American Chamber of Commerce in Paris to secure quicker delivery of cablegrams in that city. Cablegrams are now delivered in Paris by letter carriers through the ordinary postoffice channels.

Reduction in Cable Rates.

Mr. Clarence H. Mackay, president of the Commercial Cable Company, on November 10 issued the following statement regarding a proposed reduction of rates for cablegrams:

"The Commercial Cable Company has been at work for some time past in formulating a plan by which the rates for cablegrams sent by the general public, in other words, cablegrams in plain language as distinguished from code language, be reduced about one-half. That plan has now been worked out, and inasmuch as it will require the co-operation of the telegraph lines in Europe, where the Governments own the lines, our plan involves a proportionate reduction in the land line rates, charged by the European Governments, and hence the co-operation of those Governments will be necessary. At present the cable rate is twenty-five cents per word. The proposed plan is to charge twelve and a half cents for every five letters in that class of cablegrams. We have found by careful investigation and examination of a great number of cable messages that plain language averages only five letters to the word and hence if we charge only twelve and a half cents for five letters, (every letter in the cablegram being counted as though the whole cablegram was one word), the result would be that the public in sending cablegrams would pay but one-half of what it now pays for those cablegrams, it being a part of the plan that these reduced rate messages will be subject to prior transmission of messages paid for at a higher rate. We hope to be able to put the plan into operation in a short time, it being necessary first to make the requisite arrangements with the European Governments. I would add that this new mode of charging for cablegrams will be of decided advantage, also to the business public which uses a code, inasmuch as it will be an inducement to them to put a portion at least of their cablegrams in plain language rather than use a very complicated code which requires a great deal of time on their part, first to code and then to uncode. After the most careful consideration and study of this whole subject, we are satisfied that this new method of charging for cablegrams will not only reduce the charges for ordinary cablegrams one-half, but that the plan itself will be logical, simple, workable and satisfactory."

Press Associations.

Mr. H. E. Maule, formerly manager of the Detroit office of the United Press, is now manager of the Boston Bureau. Mr. W. E. Hall, late of the Pittsburg office, takes Mr. Maule's place, and the Pittsburg office is now in charge of Mr. S. D. Bradley of St. Louis.

Col. Charles S. Diehl, assistant general manager of the Associated Press at Chicago, is on a tour of the South. He will visit Galveston, Houston, New Orleans and Atlanta.

Mr. T. L. Malone of the Star, Oneonta, N. Y., has transferred his services to the Albany, N. Y. bureau of the Associated Press.

During the recent storm along the Atlantic Coast states telegraph and telephone lines were badly damaged, particularly between Philadelphia and Washington. All companies suffered alike.

Career of the Late Milton F. Adams.

In the death of Mr. Milton F. Adams, at Wheeling, W. Va., October 12, which was announced in our issue of November 1, the telegraph profession has lost one of its most unique characters. Mr. Adams was a typical bohemian in his manner of living and frequently his friends would suddenly miss him to hear from him later in some far-off corner of the globe in a new role.

An account of his wanderings and doings, published in 1895, reveals a career of remarkable activity and versatility, and yet not one-tenth of his actual experiences has ever been recorded. Prior to 1870 he worked as a telegraph operator in nearly all the principal cities of the United States. He first met Mr. Thomas A. Edison in Cincinnati, in 1865, and it was through his instrumentality that Mr. Edison got a position in Boston as operator for the Western Union Telegraph Company, in 1867. Soon after this Mr. Adams first brought to public attention the promising genius of Mr. Edison, and about twenty years later introduced Mr. Nikola Tesla to the electrical world.

Mr. Adams left the "Hub" in 1869, and crossed the continent on the first through railway train. He arrived in San Francisco in 1870, during the strike among the operators. He aided their cause by selling patent medicine on the street corners and kept the strikers well supplied with pocket money for a considerable time.

When next heard from he was a tamer of lions in a circus. Later he went to Peru and joined the expedition to take charge of telegraph construction on the Oroya Railroad in the Andes. He was frightened away from this equatorial climate by the high death rate along the line, and went to Lima, Peru, where he sold maps. Travelling in Peru, Bolivia and Chili, he finally landed in Buenos Aires, Argentina, where he was engaged in commercial business. His prosperity here was great, but success and affluence did not mean everything to such a restless spirit as his. He sacrificed his prosperity to engage in civil and electrical engineering in Pernambuco, Brazil, in 1872, but he was ahead of the times, and while he did not make a particular success in scientific work the record shows that he succeeded in contracting a large hotel bill. The liquidation of this indebtedness called for a high degree of financial ability, and having more or less successfully met many such situations previously he was equal to this particular emergency. He bought the hotel and as proprietor cancelled the indebtedness. The hotel was reopened as an American house, and it is recorded that he made money, but the environments were not to his liking, so he went to Rio Janeiro and engaged in telegraph construction work, afterwards being appointed chief of government telegraph construction. He later resigned and ran a show, skating rink and bull pen.

It is related that during his experience as a show man in Brazil, he received an invitation to meet the Emperor, Dom Pedro. While waiting to be pre-

sented to the monarch, Mr. Adams became very friendly with the Emperor's secretary, and the two made frequent excursions to the imperial wine cellar to cement the friendship that had sprung up between them. The result of this diversion was that when the time arrived for the presentation ceremony, Mr. Adams was not to be found.

Mr. Adams' experiences in Brazil were extremely varied, but the country had now become too narrow for him so he next tried the unexplored regions of Africa. He started a "Paradise Lost" panorama in the diamond fields, but his efforts were not appreciated, nor were his attempts at journalism successful, his utterances probably being of too radical a nature. On one occasion he attended a banquet at which many high functionaries were present. In the course of the remarks Mr. Adams made an allusion to the then reigning monarch which deeply offended the loyal Britons and he was compelled to hastily depart from the locality.

He was next heard from in various European capitals engaging in projects of many sorts that would have made Col. Sellers hesitate on account of their audacity, and finally returned to New York in 1884, when he was employed by Mr. Thomas A. Edison to exploit the Edison electric light in Venezuela and Colombia, South America, which project was abandoned later. He tried his hand at developing a telephone, and afterward drifted into the store-carrier service business. He introduced the carrier system in the New York Western Union and the Baltimore & Ohio telegraph offices. Desiring to get rid of Mr. Adams the store-carrier service company sent him to Helena, Mont., with instructions to report to Lewis and Clark for further orders. Arriving at Helena Mr. Adams learned that there was no such firm there, but did learn that two men by that name had been in that vicinity in 1804 in the service of the United States Government, as explorers and engineers, but were then dead. He wired these facts to headquarters and requested a further supply of funds if he was to continue researches in ancient history. He suspected that the concern was trying to eliminate his personality from its employ, so he returned east and in attempting to maintain his legal rights he was arrested on the charge of breach of contract, but the charge was not sustained. He brought suit against the company for damages and this was compromised. He then turned his attention to the lecture platform as a means for gaining a livelihood and addressed audiences before the Drexel Institute, the Press and Clover Clubs in Philadelphia, with more or less success. However, success to Mr. Adams had no particular meaning.

He rendered valuable assistance to Mr. E. G. Acheson, of Niagara Falls, in the introduction of carborundum, the well-known abrasive. Mr. Adams had great faith in this new product and remarked that he had good prospects of being able to "scratch" along.

In comparatively recent times he sold patent medicines in New York, and introduced an electric water filter. On one occasion he represented a typewriter

company at a convention and in order to bring the merits of the machine to the attention of the association and gain its good will he presented each member with a typewriter with his compliments. This display of prodigality resulted in his release from further work in the company's behalf. He sold electric mine lamps in the Pennsylvania coal regions, and later went to the diamond fields in Arkansas. It was here, two years ago, that he received the injury to his foot which resulted in his death.

Mr. Adams had not the slightest conception of values. One hundred dollars did not appeal to him any more than one dollar did. The result of this deficiency in his nature was that money did not abide with him very long at a time. Some people called him extravagant, but parting freely with money does not necessarily always indicate extravagance. Mr. Adams helped many a friend more unfortunate than himself. He was strictly honest and was always willing to share his possessions with a brother in need.

He was never discouraged; he was an optimist at all times and under all circumstances and what has been here related of him does not begin to enumerate the variety and number of his experiences. His life was an extremely active one, such as it was.

Mr. Adams was a member of the United States Military Telegraph Corps and was frequently an attendant at social telegraph functions in New York, and was familiarly known to all of the older members of the profession.

Telegraphy and Telephony in Germany.

Telegraphy and telephony in Germany is the subject of an article by Mr. G. Dettmar in the *Elektrotechnische Zeitschrift* of Berlin, an abstract of which is given below:

There were at the end of 1908 in Germany 41,394 telegraph stations and 33,541 cities or towns with telephone connection. The total length of telegraph and telephone lines was 202,000 miles while the total length of telegraph and telephone conductors was 3,200,000 miles. There were transmitted 54,098,541 telegrams and 1,519,370,970 telephone messages in 1908. The number of parties with telephone connection was 560,016, with 849,784 telephones. The total receipts of the telegraph and telephone departments of Germany, except Bavaria and Württemberg, were \$36,250,000 in 1908. About fifty telegraph lines were equipped for duplex operation by means of the Hughes system and 178 telephone lines were also used simultaneously for transmission of telegrams, and 448 telephone lines were equipped for duplex telephony. Of high-speed telegraph systems those of Baudot, Murray and Wheatstone are employed at some places. The Siemens & Halske high-speed telegraph system, using a photographic method, has proven technically efficient, but there is no commercial need at present for such a high-speed system. The central battery system is gradually finding greater favor in German telephone stations.

What Is Electricity?

At a recent meeting of the Chicago Electric Club, Dr. Charles P. Steinmetz, of the General Electric Company, Schenectady, N. Y., who was the guest of the club, spoke on the subject, "Electricity." He said that if he were asked the question, "What is Electricity?" he would answer after his questioner told what gravity is. "In trying to reason out the ultimate nature of things," he said, "we get tangled up in contradictions."

"Electrical energy," he continued, "is that form of energy that has become familiar to us latest. It is convertible into other forms of energy. Without a continuous supply of energy civilization could not exist. Energy is not created; it exists in some place and form and time and there is need for it perhaps in some other place and form and perhaps at some other time. It is the function of the engineer to bring this supply and this demand together. Of the various forms of energy only two may be conveniently utilized, and these are chemical energy and mechanical energy. Chemical energy is represented by fuel and mechanical energy by water-power.

"The transportation of energy is often required to make it available. Chemical energy and electrical energy may be transported, the former as coal and the latter over wires as in the transmission of electricity. It is interesting to remember that we have practically no use for electrical energy as such. Intrinsically, electrical energy is almost useless; it must be transformed into some other form of energy for use; it is useful simply as an intermediate form of energy. Chemical energy can be converted easily only into heat. Electrical energy has the great advantage that it may be converted easily into other forms of energy as well.

Electricity cannot be stored. In the storage battery it is really chemical energy and not electricity that is stored. Electrical energy must be used when produced and produced as needed. Therefore the cost of electricity depends on the degree of uniformity with which it is used, in other words, it depends on the so-called load factor, which is the ratio of average use to maximum use."

In closing his remarks Dr. Steinmetz referred to the economy of supplying many varied utilities from a central source of energy, as has been so successfully done in the case of the central-station company in Chicago.

The Edison Medal Association which was formed five years ago by the friends and admirers of Mr. Thomas A. Edison to found a gold medal in the American Institute of Electrical Engineers celebrating the invention of the incandescent lamp and twenty-five years of its successful use has closed its accounts. Five thousand dollars were placed in the hands of the Institute for the medal award fund and this amount has since grown considerably. The recipient of the first medal awarded was Prof. Elihu Thomson this year for "meritorious achievement in electricity."

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November 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientele. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Development of the Telegraph.

The efficiency of any organization depends upon the strength of its component parts. If the foundation is solid and the component parts are sound then a corporation established along these lines should endure. The best results in any organization are obtainable through the mutual confidence established between employer and employe and in the case of a corporation such relationship cannot fail to be productive of good results in both directions, particularly if this confidence should permeate the entire organization from the lowest grade of employe to the highest. A public service corporation based on such principles is well equipped to maintain proper relations with the public and to render the public a service that will meet its requirements.

We have watched the evolution that is now going on in one of the telegraph companies and we have been astonished at the degree of harmony and co-operation that has been brought about. If our observation is correct it is evidently the intention to

place with officials full responsibility in connection with their respective duties and on the other hand to vest with them corresponding authority. This appears to be a broad and conservative policy and will be productive of good results. It likewise shows a disposition on the part of the management to place confidence in each official, it being a recognized fact that under a functional organization the weakness of the operation of any department is reflected in the character of the subordinate officers. With subordinate officials qualified to properly perform their duties, an opportunity is thereby afforded to obtain the best results. This action is not only a step in the right direction but is in recognition of the principle that without a competent personnel an organization, no matter how well planned in theory, is ineffective in practice.

In the welding together of the telegraph and telephone facilities the management will apparently leave nothing undone to give the public full benefit of its far-reaching plans. The combination of the two interests is creating an entirely new feature in the electrical transmission of communications which will unquestionably prove of inestimable value to the public. While it may be that the company is for the present adding greatly to its operating cost yet the result will be a universal telegraph-telephone service throughout the entire country whereby any telephone subscriber will be able, at any time, day or night, to send a telegram to all parts of the United States, or to foreign countries and receive a reply delivered over the telephone.

When such a comprehensive service is completely established, a telephone subscriber, no matter where located, has the same means available for the transmission and receipt of telegraphic communication as though a telegraph office was established in his place of business or residence. It brings to the use of those living in suburban or rural districts the same prompt and efficient service as those residing in the larger business centers. In fact, the plans of the operating company contemplate such a comprehensive service that it is difficult to at once realize its far-reaching effect.

If our review of the situation is correct the rank and file of the telegraph company's organization may feel assured that there will be ample opportunity in the future for each individual who will qualify to fill more important duties. It must be apparent that the plans as outlined will require not only the best thought and intelligent work of those engaged in perfecting such an extended service, but it likewise opens a field that heretofore has not existed in the telegraph business.

Mr. Owen R. Lovejoy, general secretary of the National Child Labor Committee is the author of an article in the November *Review of Reviews*, under the caption "A Six Years' Battle for the Working Child," in which he says: "We know that one Industrial School in New York State shows that of 378 inmates examined, 59 had been at one time

night messengers." Inasmuch as there are about 1,500 telegraph messengers employed in New York City alone the figures given are not very alarming. Mr. Lovejoy does not say, but probably it will be found, that an equal percentage of the 378 inmates of the Industrial School were at one time Sunday School boys, but we would not accept that statement as an argument against the Sunday School.

The Child Labor Question Applied to the Messenger Service.

BY AN EX-MESSENGER.

I have read with great interest the articles in your paper bearing on the child labor question, so called, as it relates to the messenger service of the telegraph companies.

The Child Labor Committee of the Charity Organization Society of New York agitating the question of the employment of boys under twenty-one years of age for night messenger service seems to forget that the messenger boy is the telegraph apprentice, and the best operators are those whose apprenticeship began between the age of twelve and seventeen. Very few acquire the art of telegraphy after the age of twenty.

There are upwards of 2,000 main and branch telegraph offices in New York State. With few exceptions every male manager is a graduate from the messenger ranks and investigation will show that almost every day and night delivery clerk, as well as thousands of operators, employed in New York State, started their telegraph career at the messenger bench. It is therefore certain that the telegraph companies, as employers, must of necessity and for their own protection encourage morality and personal cleanliness among their apprentices.

It must not be lost sight of that the telegraph is a public servant and hundreds of offices in the State are kept open until midnight and later as an accommodation to the public and in many places at a loss. Again the telegraph companies in response to request from landlords or tenants or both, installs, without charge or rental, its call boxes in residences and apartment houses as a convenience. Should the character of these houses change the telegraph companies are as much in the dark as the police department claims to be. The Association asks that men be employed for service after 10 p. m., for in its opinion the stroke of ten is the dividing hour between business and vicious activity. Such is not the case. There are many business activities in operation after 10 p. m., *i. e.*: newspaper offices, which must be served, public assemblies, hotels, etc., not to mention the many commercial houses whose work is carried on into the night.

But after all the chief reason for not employing men messengers day or night is because the duty is not men's work and the public would hesitate to entrust its telegrams or important communications to men who are capable of performing only boy's labor; such men are likely to prove very untrustworthy servants.

This is the age of quick service. Telegrams must be delivered as promptly as possible and the telegraph companies are doing all in their power to expedite delivery; and they must depend upon the enthusiasm of youthful messengers for this work. Satisfactory boys cannot at all times be secured for telegraph messengers—it is not a question of wages—in fact, in many cities, it is almost impossible to keep the messenger force up to the standard. Now it seems to me that the Committee, which is doubtless composed of public spirited men, should, instead of deterring, encourage the youth to seek employment in an occupation from which thousands of our best citizens have graduated.

Let the boy have an opportunity to develop into decent manhood by learning the great lesson of "value of time" and by instruction in honesty and alertness, as taught in the telegraph offices. Give him a chance to help the family as many a boy has done and is doing today. These are good things to legislate for, not against.

[This communication is from a telegraph official who graduated from the messenger bench. He believes in the boy; and has had experience with hosts of boys. He points with pride to a list of "boys" who ran messages with him in the early '80s, and whose successful careers he has watched with interest. The list includes: newspaper editors, two; telegraph officials, two; telegraph managers, two; telegraph operators, seven; telegraph clerks, two; theatrical stars, two; lawyers, two; bank cashier, one; post office clerks, three; brokers, two.—*Ed.*]

Legal.

The Court of Appeals of Kentucky, in the case of the Western Union Telegraph Company *vs.* Price, has decided that a telegraph company owes the duty to the public of exercising reasonable diligence in transmitting and delivering in due time messages received, and though the ordinary method of delivering messages is by messenger, and though the addressee is entitled to a delivery of the telegram received, the company must use the telephone, where its business and the settled rules of law do not require it to be prepared to promptly deliver the written message by hand.

Judge A. L. Sanborn, of the United States District Court, at Madison, Wis., has rendered a decision in the electrolysis case of the Peoria Water Works Company *vs.* Central Railway Company. The substance of the decision is that a street railway company having a defective return system, permitting leakage of current which causes electrolytic damage to property of other public utilities occupying the streets under equal rights, may be enjoined from operating the system in its defective condition after the lapse of a reasonable time for repairs.

The Telephone in Turkey.

It is reported that the Department of the Telegraph of Turkey intends to install telephone systems in all Turkish cities.

American Telegraph Engineering—Notes on History and Practice.*

(Concluded from page 736, November 1.)

DONALD McNICOL, NEW YORK: Mr. Jones questions the likelihood of the development of a printer system capable of transmitting 600 words per minute over ordinary circuits. That one cannot readily conceive of the probability of such speeds being attained, is probably due to the fact that he confines his speculations regarding mechanical operations and movements, to what it has been possible to accomplish in the past by means of electromagnets.

The KR limitations of circuits (including lines, and windings of instruments) where such circuits are spaced into repeater sections of approximately 500 miles, are in the case of aerial lines, of such consequence, that with ordinary voltages, with lines worked duplex; speeds of 300 words per minute are about as high as it is possible where the operations are dependent upon electromagnetic control. There is one printer system in use in Europe for which a speed of 350 words per minute is claimed.

It would be, as Mr. Potts implies, a highly desirable feature of a universal printer telegraph system if its operating capacity were as elastic as is the telegraphic traffic in volume on any given circuit, provided, of course, that its general application to circuits having varying loads at different periods of the day, would permit of economical operation as compared with Morse methods, when the volume of traffic is far below that of the maximum capacity of the machine. Flexibility of operating capacity, with a high maximum rate, would serve to take care of varying loads and of the accumulations of traffic due to temporary loss of wires.

With reference to Mr. Jones' remarks dealing with the fate of the engineer's recommendations.

The practical engineer realizes that even in the reconnaissance stage any engineering proposition must be worked out with practicability and economy as factors. Even if for temporary considerations an engineering proposition may not be adopted, it still remains that by virtue of the thought and effort devoted to its development, the proposition will survive as a basis for future undertakings along the same lines. Naturally where the engineer is a traffic economist he has given due thought to the requirement that any proposition he may submit calling for the outlay of comparatively large sums of money for new or for additional equipment, must provide for economical results, or in some manner for enhanced advantages over the methods it is intended to improve, which will insure adequate return on the investment. Although the live engineer is professionally zealous, his conservatism would seem to

be well established by virtue of the fact that the major number of the propositions submitted to him for investigation are found to be and reported as impracticable or unprofitable.

W. MAVER, JR., NEW YORK: The President is very desirous of getting to the other matters scheduled for the program this evening, and I shall therefore at present only say a few words in reply to the points brought out in the discussion.

Mr. Pope queries the statement that places the distance of transmission by the House printer at 1,000 miles. The statement is traceable to the officers of the original House telegraph company and may be found in "Electrical Telegraph," Jones, 1852, page 112, as follows: "The longest line we have is about 1,000 miles—extending from New York to Cincinnati. Messages are transmitted that distance with ease; and no doubt we shall be able to telegraph direct from New York to St. Louis as soon as our line, now building, is completed." Possibly the discrepancy between this statement and Mr. Pope's experience may be explained by a superior conductivity of the newly constructed wires in 1852 as compared with the wires of Mr. Pope's time. It was the common experience of those days, 1865-1870, that, owing to the manner of making joints then in vogue, (a simple twisting of the ends of the wire without solder), the resistance at the joints in a few years amounted almost to a break in the continuity of the wires. For instance, one of the New York-Bridgeport wires tested by Mr. Varley and mentioned in his report (see page 1289) showed it to have a resistance of 241 ohms per mile—normal resistance 13 ohms per mile.

In regard to early attempts to produce a page printing telegraph it may be noted that Charles Wheatstone, about 1840, devised a page printer telegraph system, but it was rather slow and did not get into general operation. Described Sci. Am., May 31, 1884.

Mr. Taylor expresses the opinion that some of the present trouble on multiple telegraph circuits is due to the mutual induction between parallel wires. About twenty years ago I had a very large experience in the practical operation of multiplex telegraph circuits while I was the electrical engineer of a large telegraph company in this country, and the statements on this point in the paper are based upon that experience—we operated circuits between New York and Boston, five or six quadruplex circuits on parallel wires at top speed, obtaining an efficiency virtually of one hundred per cent., except in very bad weather. I found, when we already had five or six parallel quadruplex circuits, the imposition of additional circuits did not have any detrimental effect upon the operation of the others. Hence, I feel safe in saying what is said in the paper—if it were possible to get rid of the stretches of underground cable and the inductive disturbances from high tension transmission circuits, it would be possible to restore the former conditions of multiplex operation.

The disuse of the Rowland printer in this country is probably due to a number of causes, chiefly per-

*Discussion of the paper presented by William Maver, Jr., and Donald McNicol, at the Twenty-seventh Annual Convention of the American Institute of Electrical Engineers, Jefferson, N. H., June 28-July 1, 1910, and which was published in our columns July 16-September 16.

haps the somewhat complex nature of the apparatus and its unreliability at times. Mr. Taylor himself suggests some of the causes for the present non-use of high speed chemical automatic systems, to which it is assumed he refers, having the phenomenal speed capacity of 1,000 words per minute. Numerous other causes have been cited at times without number by those who have had practical experience with such systems. It is pointed out in the paper that automatic systems capable of transmitting at the high speeds mentioned were in operation in this country 30 years ago and are still freely available when desired.

As to the statement relative to the extent of use of the vibroplex, mecograph, and similar instruments to which Mr. Dunn has referred, namely, that four-fifths of the operators now use such instruments, it may be said that investigation will probably confirm that statement. So far as the feasibility of transmitting speedily with this device is concerned, it can be stated that duplex circuits are being operated now between New York and San Francisco, with, I think, three sets of repeaters, by means of semi-automatic transmitters at the highest speed of manual Morse transmission.

CHARLES F. SCOTT, PITTSBURG, PA.: Is that repeating done automatically?

MR. MAVER: Yes, regular automatic repeaters, duplex repeaters. The method is described in the paper. The matter of displacing the spaced letter or American Morse alphabet as used in the United States and Canada, by the Continental Morse alphabet has been proposed frequently within the past 50 years without result. There is no question that for manual sending the American Morse alphabet is the speedier, there being 183 time units in the American to 214 time units in the Continental, exclusive of numerals, and the liability to errors due to the spaced letters of the American Morse alphabet is minimized by the fact that the operators by habit almost universally exercise extra care in the transmission of words containing spaced letters. In automatic transmission, however, as by the Wheatstone system, the use of spaced letters is a source of delay as it is virtually necessary to double space words containing spaced letters in order to avoid errors. Thus the situation stands at present. Possibly the use of the Continental alphabet by wireless telegraph operators may assist in leading to the general disuse of the spaced letter alphabet.

Exception may be taken to Mr. Jones' statement that the presidents and general managers of telegraph and railroad companies are de facto the engineers who decide all questions involved. They may act adversely or favorably upon the reports of their engineers for financial or other reasons, but that does not constitute them the engineers of the company. Apropos of this may be quoted the following sentences from a recent paper by Mr. George Westinghouse: "In view of the fact that there had

been no considerable demonstration of the single-phase system by actual use, and that the New Haven trains would be obliged to operate upon twelve miles of lines already equipped with the direct-current third-rail system, it must be conceded that the directors and management of the New York, New Haven and Hartford Railroad showed great courage and confidence in the judgment of their experts." Mr. Jones is quite in accord with the authors of the present paper in expressing his opinion that the financial and engineering obstacles to placing entirely underground the trunk telegraph lines between all of the widely separated cities of this continent are insurmountable.

Mr. Jones' statement that the resultant electrostatic induction is a maximum when the keys on the No. 2 sides of several adjacent quadruplex sets are simultaneously closed will bear considerable qualification. For instance, there must be a particular coincidence of polarities to line on the No. 2 sides to bring about this maximum. One can easily conceive of a condition of complete neutralization of ill effects, depending on the polarities to line at a given instant, when all the No. 2 keys are closed. Furthermore, instances are cited in the paper in which many adjacent quadruplex sets have been operated without any impairment due to the cause stated.

Concerning Mr. Jones' wonderment that the limit of transmission of an ideal printing telegraph system was not placed at 5000 words per minute, instead of 600 words per minute, the reason may be that the authors were desirous of keeping within limits that are at least eight times nearer attainment than Mr. Jones' system. Mr. Jones' arithmetic is perhaps astray in the computation that a transmission rate of 600 words per minute would involve preparing 30 word messages at the rate of 66 messages per minute. Twenty messages per minute is nearer the mark and twenty operators could easily prepare the messages at that rate. Mr. Jones seemingly bases his dictum that the time constant of all known line wires, electromagnets and their connections for over 200 miles would utterly prevent the operation of a printing telegraph system at the rate of 600 words per minute, upon the assumption that present methods must be strictly adhered to. This was not made a condition of an ideal printing telegraph system by the authors. The Buckingham-Barclay printer to-day has a capacity of 100 words per minute in each direction over circuits 1000 miles in length. In transmitting by this system each letter requires an average of nine time units made up of short and long pulsations of current of opposite polarities. The Murray printer of 150 to 180 words per minute employs five time units for the transmission of each letter. For the Creed printer, employing the Wheatstone alphabet, it is claimed that 225 words per minute may be transmitted.

The Wheatstone automatic telegraph system which employs an electromagnetic ink recorder is

*A paper prepared for the joint meeting of the Am. Soc. M. E. and the Inst. M. E., London, July, 1910.

capable of transmitting messages over regular telegraph wires at the rate of 600 words per minute, using the continental Morse alphabet, which requires an average of eight time units per letter; the equivalent of eight pulsations of minimum duration per letter. It is therefore perhaps not the time constant of the line or apparatus that stands in the way of a 600 word per minute printer so much as the present cumbersome methods of selecting the letter to be printed; together with the more or less cumbersome printing apparatus. Hence it is conceivable that by the use of a method in which the time units required per letter may be halved or quartered the speed of transmission may be doubled or quadrupled without any change in the line or receiving apparatus, a result that would bring the speed of transmission quite close to if not beyond 600 words per minute. So in this respect as in some others Mr. Jones' railroad analogy is not as apt as at first sight it might appear to be. But the suggestion of an ideal printer telegraph as noted in the paper does not confine the prospective inventor to existing electro-mechanical apparatus. Photography and other physical agents controllable by electrical impulses are open to the ambitious and qualified inventor, who, however, could not say that the context of the paragraph in the paper relating to an ideal telegraph system conveys the impression that the realization of this ideal system is devoid of difficulties.

Mr. Cellar's remark relative to the housing of insulators indicates that he misses the suggestion of the paper that relates to the housing of the wires for mechanical protection against storms. Mr. Cellar's immediately following comment on the destruction of open wires by storms however emphasizes the said suggestion; as does also Mr. Jones' mention of the annual expenditure of millions of dollars for the repair and maintenance of pole lines.

With reference to Mr. Pott's remarks concerning the impracticability of operation of high speed printing telegraph systems on wires subjected to severe inductive disturbances, it may be pointed out that a perusal of the paper will show that the authors are in strict accord with Mr. Potts in this view.

It is noteworthy that many of the important inventions in mechanics and electricity have not been due to men directly engaged in the industrial application of those arts. Watt, for instance, was an astronomical and mathematical instrument maker. Morse was an artist by profession. Stearns, Bell and Pupin were not in the telegraph or telephone service when they produced their notable inventions in telegraphy and telephony respectively. Murray, the inventor of the successful printing telegraph that bears his name, was a journalist. Creed left the telegraph service to devote his time to the development of his ingenious punching and printing telegraph, and the list might be continued almost indefinitely.

One explanation of this fact may be that in the majority of cases the active engineers in an art are fully occupied with the successful operation of existing apparatus or with problems connected there-

with, and are given neither the time nor the financial aid necessary to undertake original research for the advancement and betterment of the art with which they may be associated. Another explanation may be that in many cases the engineers in question are operating engineers, but not inventors. This suggests the question whether men thoroughly familiar with the requirements of telegraphy and of all the conditions to be met with in the technical telegraph service and largely endowed with the inventive faculty might not be selected to prosecute investigations relative to the improvement of the telegraph service as relates to the transmission of messages, analogously as selected men in the medical and other professions and arts are now exclusively employed in matters relating to the advancement and improvement of those professions and arts.

Railway Telephony.

Several systems of communicating with a moving train have been invented, but none has been very extensively adopted. Considerable interest, however, has recently been aroused in this country, says a London contemporary, by experiments on the London, Brighton & South Coast Railway. As a result of these experiments, the necessary equipment is to be installed to enable passengers travelling between London and Brighton either to send or receive telephone messages during a considerable portion of the journey.

The apparatus to be employed, which is known as the "railophone," is due to Mr. H. Von Kramer, of Witton, near Birmingham. It consists of a large coil of wire in a vertical plane installed on one of the coaches, the end of the coil being connected to a telephone instrument placed in a sound proof box on the train. The stationary circuit consists of a cable on the track connected to a telegraph wire as a return circuit.

Telephonic currents are induced in the wire fixed to the track in the case of messages transmitted from the train; and are induced in the coil when messages are being received. The coil, which consists of a number of turns, can be fixed in casing on the coach, and extends throughout the length of the latter in a vertical plane, as mentioned.

In the first experiments the track conductor was installed on insulators, but it is now proposed to lay the conductor in conduit close to one of the rails. One conductor is to be installed for each track, and the ends are to be connected to telephone apparatus at the stations. From these points the messages are telephoned or telegraphed to their destinations.

Harper's Weekly, of October 20, contains an interesting story headed "Western Union's Move Toward Co-operation Publicity." It is an account of the recent reappraisal of the Western Union Telegraph Company's property and readjustment of its finances. It required eight months to carry the work to completion.

Telephone Poles and Pole Lines.

BY F. L. RHODES.*

Adapting the design of pole lines to conditions to be met requires a study of the stresses on the poles, cross-arms, pins and wires under wind and sleet loads, and of the strength and durability of different kinds of timber. Recently the problem of prolonging the life of wooden poles and obtaining some practical commercial substitute, such as reinforced concrete, has received attention.

The annual cost depends upon the first cost and the length of life. The length of life depends upon a variety of factors, the principal of which are the character of the timber and the local climatic conditions.

Of the timbers used for poles, the white or eastern cedar, Idaho cedar, chestnut and the yellow pines are of the first importance; red cedar, juniper, cypress, catalpa, redwood and several varieties of oak are used locally to a limited extent. Throughout the New England and Middle Atlantic States chestnut is the principal pole timber, with, however, considerable use of cedar, particularly in Northern New England. In the South, yellow pine is the principal timber, with some use of chestnut, juniper and cypress. The yellow pine has to be creosoted. If this is not done, owing to the severe climatic conditions, not only the part near the ground line, but the whole length of the untreated pole will decay with great rapidity. On the Pacific Coast and in the Rocky Mountain States, Idaho cedar, Douglas fir and redwood poles are used. The redwood trees grow to great diameter, so that poles of this timber have to be sawed. In the Central West, the Mississippi Valley and prairie states, Eastern cedar, Idaho cedar and yellow pine are the principal species in use. The selection is governed chiefly by railroad connections with the timber regions and by freight rates. In long-distance lines, out of all the poles in use, sixty-two per cent. are cedar, thirty-one per cent. chestnut, five per cent. juniper and two per cent. creosoted yellow pine.

The comparative strengths of the principal pole timbers are as follows, the figures representing fair average values for the fibre stress in pounds per square inch: Cedar, 3,600 pounds; chestnut, 5,000 pounds; yellow pine, 6,000 pounds. From these figures it will be seen that, size for size, a chestnut pole is nearly fifty per cent. stronger than a cedar pole, and that yellow pine is a trifle stronger than chestnut.

There is considerable difference in the weights of the different pole timbers. This has a direct bearing on the cost of transportation and distribution, and to some extent affects the cost of erecting. Chestnut and creosoted yellow pine poles weigh about twice as much as cedar poles of the same size. In the case of yellow pine, the treating process adds about a third more to the weight of the pole.

Different kinds of poles taper more or less rapidly,

the average diameter taper being about one inch in six feet of length for cedar, one inch in seven feet length for chestnut, one inch in ten feet of length for Idaho cedar, one inch in ten feet of length for yellow pine.

Leaving out of account the compression load due to the weight of the wires, and considering only the horizontal load due to wind pressure on the poles and wires, a pole may be considered as a beam fixed at one end and loaded at a point at the center of the cross-arm system. Owing to the taper, a pole is a beam of non-uniform breaking strength. The section where the breaking strength is theoretically less than at any other section is at the point where the diameter is one and one-half times the diameter at the center of the applied load. Except in poles more than about thirty-five feet in height this section is at the ground line, and even in the case of very tall poles, the weakest section rapidly falls to the ground line due to decay at that point. For poles of a given length and kind of timber, the breaking strength varies with the cube of the diameter at the breaking section. This fact shows why stout poles are so very much stronger than slim poles.

Taking the strength of a pole ten inches in diameter as 1,000 the rate of increase in strength for each additional inch of diameter up to fifteen inches is shown by the following table:

Diameter, Inches.	Relative Strength.
10	1,000
11	1,330
12	1,730
13	2,200
14	2,740
15	3,280

Chestnut rots considerably faster than cedar. The results of measurements on more than a thousand poles indicate that the average annual decrease in diameter of sound wood is about 0.1 of an inch in cedar and about 0.15 of an inch in chestnut. The largest decay with chestnut poles is usually found from four to six inches below the ground line. With cedar poles the greatest decay usually occurs closely at the ground line.

PRESERVATIVE TREATMENT.

It is the increasing scarcity of timber which has brought the question of prolonging its life prominently to the front in this country. In the early days many schemes for preserving the butts of poles by charring, by coating with tar or asphalt or by setting in concrete were proposed and tried. Experience has demonstrated that these expedients are entirely ineffectual and useless. It is now generally accepted that an effective timber preservative must be of an antiseptic nature, that it should penetrate the wood to a considerable depth below the surface, and that it must not wash out.

The decay of timber is caused by the activity of low forms of plant life, principally in the form

*Abstract of a paper read before the New England Telephone Society.

of fungus threads, which produce ferments that exert a soluble action on the walls of the wood cells. These small organisms can grow either in light or in total darkness, but all of them require certain amounts of air, food, moisture and heat.

It is near the ground line, where the earth holds the moisture and keeps the wood damp for long periods in the presence of air, that decay is most rapid. Preservatives act antiseptically to kill the fungus growths that produce decay, and also to some extent by plugging up the pores of the wood, thus preventing the entrance of the moisture.

It is also a fact that creosoted wood poles are practically free from attack by woodpeckers. In some sections of the country, notably in the eastern central states, Texas, Arizona and California, the destruction of poles by woodpeckers is a serious matter.

The economy of treating pole butts with preservatives is closely connected with another question, namely, that of extending the life of poles, which have become rotted at the ground, by some form of reinforcement. These have consisted in general of setting a stub of new timber close alongside the old pole and binding the pole and the stub together by means of twisted wire wrappings. As a result of various tests three styles of stub reinforcement, differing from each other in the method of attaching the stub to the pole, have been adopted. The simplest form used for the lighter and less important lines makes use of the old plan of wire wrappings alone, although some improvements have been made in the method of applying the wrappings. For the more important lines, the wire wrappings are supplemented by two bolts extending through both pole and stub. Special tightening bolts are provided for the wire wrappings. In some portions of the country creosoted yellow pine stubs promise the best economy. In other places there are found local timbers which, although not growing in the proper size for poles, may yet possess good strength and long life.

REINFORCED CONCRETE POLES.

The great advances in the use of reinforced concrete which have been made in recent years have set many people at work designing and building concrete poles. The results thus far obtained show that the poles are remarkably uniform in strength, and that their actual breaking loads are close to the computed values. As a fair average of all the poles it can be said that the weight is about 2,000 pounds, of which about 300 pounds is steel and 1,700 pounds concrete. Cedar and chestnut poles of equal height and strength weigh about 500 and 1,000 pounds respectively. The poles will probably cost about \$10 as against \$5 for cedar poles. These figures do not take into account the costs of transportation and erection.

A considerable number of these poles will be made and erected, in order that experience may be had as to the effect upon them of stresses, vibrations, frost, lightning, and other actions of the

elements. If, as there is every reason to expect, the prices of wooden poles continue to increase, a stronger case can be made out in the future for concrete poles than at the present time. So far as can now be seen, for a number of years to come, their use will be restricted to especially important lines and to permanently located poles in exchange work, such as poles for interior block distribution.

CROSS-ARMS.

At one time Norway pine was used almost exclusively for cross-arms. About ten years ago yellow pine was introduced as a cross-arm material. This wood in its natural state does not have the necessary life, and cross-arms of yellow pine are therefore treated with dead oil of coal-tar. At the present day these creosoted yellow pine cross-arms form a large portion of the total supply. The strength of ten-pin creosoted pine standard cross-arms is such that they will sustain a downward load of about 250 to 300 pounds at each pin.

INSULATOR PINS.

Locust is pre-eminently the best wood for insulator pins. It is not only of high strength, but also of long life, and possesses the valuable property of high resistance to decay even when in contact with decayed wood.

Although steel insulator pins have been largely used in telegraph work, they have not commended themselves for use in telephone construction. Locust pins have an average breaking strength of about 1,200 pounds. The usual form of steel pin bends under a load of about 700 pounds. Moreover, steel pins cost from two to three times as much as wooden pins, are more expensive to place in the arms, and have a shorter length of life.

LINE WIRE.

The hard-drawn copper wire, which constitutes the bulk of the wire plant, has a tensile strength of from 62,000 to 65,000 pounds per square inch, and will elongate about one per cent. of its length before breaking.

On account of the fact that wires expand at high temperatures and contract at low temperatures, the temperature has to be taken into account in stringing wires. If wires strung in the summer are stretched too tightly, they are liable to break in winter as the result of contraction. Aside from the temperature effects the actions which occur in a span of wire under load are very complicated. For a span of given length the stress in the wire diminishes as the sag increases. Owing to the elasticity of the wire, when it is subjected to load, as by sleet, it stretches. The increase in length due to this stretch allows it to sag more than before. This increase in the sag tends to relieve the load. A condition of equilibrium is therefore reached where all the stresses are balanced.

The behavior of the wire under any given conditions can be very accurately computed. For the ordinary span of 130 feet the specified sag at

sixty degrees Fahrenheit is seven inches. Due to contraction this decreases to about four inches at zero Fahrenheit. The stretch of one per cent. is sufficient to allow the sag to increase six or seven feet before the wire breaks. The specified sags are such that the wires under the loads due to wind pressure and sleet have about the same factor of safety as the pole lines.

Complementary Operation of Telephone and Telegraph in Chicago.

The problem of making the telephone assist the telegraph to the best advantage by utilizing it as much as possible for the collection and delivery of messages has probably been worked out more

shown in the picture there is a private branch exchange with a two-position switchboard containing thirty incoming trunk lines and connected with the exchange system of the Chicago Telephone Company. The ordinary telephone business of the various departments of the telegraph company is conducted through this switchboard, which is also connected directly with the branch offices in the downtown business district within a radius of half a mile from the main office.

For handling telegrams, however, special arrangements have been made. In the telephone room are two recording tables, each with positions for ten telephone operators who sit five on a side facing each other. In front of each operator is a miniature lamp signal system, multiplied throughout, so that any incoming call flashes a



VIEW OF TELEPHONE GALLERY IN CHICAGO OFFICE OF WESTERN UNION TELEGRAPH COMPANY.

fully in Chicago than in any of the other large cities of the country. The accompanying illustration of the telephone room of the Western Union Telegraph Company in Chicago will give an idea of the extent to which the telephone is being used in that city as an adjunct to the telegraph. This department is placed in a gallery at one end of the main operating room, and is cut off from the noise of the telegraph instruments by a sound-proof partition. At the back of the tables

white light to all operators, while a red light shows that any particular outgoing line is in use. All incoming calls pass through the switchboard, and if the call is for general office business the switchboard operator makes the desired connection. If the call is to send a telegram, the operator connects with the recording tables. Instantly a white signal is flashed at each of the twenty positions, and the first free operator plugs in. This action extinguishes the lights on that line at the other

positions, so that all operators know that the call is answered and the message is being taken.

For the delivery of telegrams by telephone there are fifteen outgoing lines running directly from the recording tables to the telephone company's exchange. This provision obviates congestion of the private branch switchboard and provides an equipment capable of receiving a total of twenty messages and delivering fifteen at the same time. While the number of messages delivered by telephone is greatly in excess of those received in that way, the incoming equipment must be large, because an average of three messages can be delivered by telephone in the time consumed in receiving one.

There are about twenty employes engaged in this work, the department being in charge of a trained woman supervisor. The switchboard operators do nothing but make connections, while the operators at the recording tables receive and deliver telegrams only. An effort is made to concentrate the receipt and delivery of telegrams by telephone in the main Western Union offices in Chicago; that is, the public is being instructed to telephone its messages there instead of to the nearest branch office when there is no toll charge involved.

All telegraph messages addressed to Chicago received in the main operating room go directly from the wire to the distributing table in the city lines department, where they are routed to a branch-office wire, or a telephone number is written on the message and it is sent immediately by automatic carrier to the telephone room. The search for telephone numbers is made at the distributing table, so that the telephone operators are not delayed. Thousands of messages received daily are immediately telephoned to the person addressed, and later, on request, may be delivered by messenger. Thus the slowest link in the chain of telegraphing—that is, the messenger boy—is eliminated from the transaction to a large extent.

Preservative Compound for Poles, Etc.

Owing to the growing scarcity of timber suitable for telegraph and telephone poles, cross ties, etc., the problem of extending the life of available material by preservatives is becoming more and more pressing. Coal tar creosote oil has been very generally used for this purpose but the increasing cost of this substance has rendered it necessary to find an efficient substitute.

Decay of wood is generally caused by the entrance of destructive growths of bacteria from without at some time after the timber is cut and while it is seasoning. For the development of these growths the presence of moisture, heat and air are necessary. By eliminating any of these factors in whole or in part the life of the timber is prolonged.

Indian "Timberasphalt" Oil is stated to be a superior substitute for creosote, etc., and an unexcelled weatherproofing material, effectually and per-

manently preventing the entrance into the wood cells of moisture, heat and oxygen, without which elements the destructive fungi cannot thrive. The oil is stated to be very durable and not affected by the elements. It is composed of 65% asphalt and is practically non-inflammable, non-volatile and very stable in composition. The manufacturer asserts that it is equally as good a preservative as creosote, if not better. It plugs up the pores of the timber thus arresting and preventing decay. This asphalt oil is stated to be harmless to the workmen handling it. It is also stated that "checking" in timber treated with "Timberasphalt" Oil is reduced to a minimum.

It is claimed that timber can be treated with this substance at a cost of one-half that of creosote and one-tenth that of other preservatives compounded from coal tar.

The Atchison, Topeka and Santa Fe Railroad Company has been treating its ties with asphalt oil for some years, and tests have demonstrated its value. Ties thus treated lasted eight and one-half years compared with two years, in some cases nine months, for untreated ties, tested under like conditions. The National Railroad of Mexico is also using the asphalt treatment with like success.

The Indian Refining Company, Incorporated, Cincinnati, Ohio, is the manufacturer of this substance.

"Timberasphalt" Oil is particularly valuable for the treatment and preservation of telegraph and telephone poles. It may be used as a paint and is applied by brush, open tank and pressure methods.

New Book.

"Edison: His Life and Inventions" is the title of a new work just issued by the Harper Bros., in two octavo volumes with many rare portraits and illustrations. This biography is the work of Mr. Frank Lewis Dyer and Mr. Thomas Commerford Martin. Mr. Dyer is general counsel for the Edison laboratory and its allied interests, while Mr. Martin is a close friend of Edison's and former president of the American Institute of Electrical Engineers, and an editor of great ability and wide experience. Mr. Edison went over every page of their MS. and in the book is reproduced the characteristic Edison signature with: "This book is published with my consent." The life story of Mr. Edison is here told for the first time and there is much additional matter, including a complete list of the Edison patents and a technical description of a score of his most important inventions. The price of the work is \$4.25, and copies can be procured by addressing J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

In Belize, British Honduras, there are at the present time 176 telephone subscribers and 198 telephones and an independent fire alarm system. A line running in different directions from Belize is used for both telegraph and telephone purposes. The telegraph and telephone services in British Honduras constitute a governmental department, Mr. Morton Cuthbert being superintendent.

The Military Telegrapher in the Civil War.

PART XLIX.

(Concluded from page 731, November 1.)

The pathetic story of the sufferings and privations of the late Mr. James E. Pettit, and his comrades, in a Confederate prison during the Civil War, which was begun in our issue of October 16, and continued in the issue of November 1, is concluded herewith. Mr. Pettit's narrative continues:

"From this time on it rained every day; the river had risen 35 feet and now overflowed a part of the prison yard. January 20 was an eventful day; the inmates of the prison seized the guards that were inside the prison, disarmed them and put them under guard; the commandant of the post brought three cannon to bear on the prison, backed by a regiment of infantry; the prisoners were forced to deliver up the captured guards, and thus quickly was ended one of the most foolish attempts to escape, for the whole country was under water. The whole force of prisoners were obliged to strip to the skin; a close search was made and all weapons were seized. Rations were stopped and the Colonel commanding the post declared he would furnish no more until the ringleaders were surrendered to him.

"On January 23, my comrade Ludwig was remanded to the prison, convalescent and rations were given to the prisoners, five men having turned informers. There were twelve beds in my ward in the hospital and there were eleven deaths there during my sickness. January 25 was the coldest day of the winter and I was sent back to prison; I found my comrades on a top bunk of a tier of three. I was helped up to it, but I was weak and I am afraid I did not sufficiently appreciate the modern conveniences and comforts of my new home, at least I thought it was too open and draughty. On January 26 ice formed two inches thick and hundreds of the boys were forced to walk all night to avoid being frozen to death. Many were without blankets and poorly clad, having no other covering at night than the clothes that they wore in the daytime. January 27 it continued cold and frozen ears and feet were so common that they were scarcely noticed. After the outbreak barely sufficient rations were issued to sustain life; we then numbered 2,500 prisoners. About this time I again wrote to my father and sent the letter through the lines by one of my mess, who was the subject of a special exchange. It still continued to rain so that it seemed as if the windows of heaven were open; and all this time the same old rumors of exchange were repeated so often that they became sickening. It being rumored that the prisoners were going to make another attempt to break out, the Colonel commanding the post gave orders to shoot anyone seen up after bedtime.

"On February 25, at roll-call we were counted out into the rain where we were obliged to stand for nearly two hours, wet to the skin; the prison was one mass of mud and it was still raining.

Peanuts sold in the prison at \$3.00 per quart. On March 1, at 12 o'clock at night, all who were sleeping on the ground were routed out of their beds, and by daybreak the whole prison was under water; a small skiff came in containing a Confederate lieutenant and sergeant; both were tipped out in the deepest part of the water by the boys. Three days rations were issued the next day, consisting of a small piece of bacon the size of one's hand, and five hardtack. By March 4 the water had risen over 40 feet, so that the shallowest place in the prison was three feet under water; cordwood was floated in and platforms were constructed on which my companions perched themselves; chips, dirt and offal of every description, together with the two weeks collection of the prison sink floated around the bunks; these with myriads of dead rats combined to make the scenery anything but romantic; one thousand prisoners were taken out on that day, rumor said, for exchange, but we had been deceived so often that we did not credit it. On March 6 one thousand more were taken out. By March 7 the water had fallen about eight inches and two days rations were issued. I was again taken with a very severe attack of camp sickness. The boys began selling their mess pans, blankets, etc., to the guards at fabulous prices, as they began to think that it was a sure thing that we were to be exchanged soon.

"On March 7 we were ordered to clean up the prison, as the water had receded. On March 11 the water was still high enough to overflow our washing sink; the damp ground fairly steamed where the sun's rays struck it, and the effluvia arising from the offal ran the sick list up with rapidity, a variety of diseases being the result. On March 13 we were taken out to the office of the exchange officer to sign our paroles, agreeable to the exchange cartel. I was afflicted with a severe toothache, headache and ague pains, owing to the damp condition of the prison.

"On March 14 we were ordered to turn over all our blankets (heretofore considered personal property) all the pots, kettles, etc., and we marched out of the dreary place; it then began to dawn on us that it might be a real exchange this time.

"We received a salute of two guns from the prison battery and embarked for Selma, hardly knowing what to think; was it an exchange or merely a transfer to another prison? We reached Selma at 8 p. m., and were marched to the stockade. The next morning we were awakened early, marched a mile through the mud and rain, and then marched back again on account of the non-arrival of the train; everyone was wet, cold and miserable, for we had no blankets. On March 15 we were marched to the cars again, and after some delay we were off to Demopolis on the Tombigbee river. Several of the boys were sinking from fatigue, having just left the hospital; but the flowers were in full blossom, and the leaves of the trees were beginning to come out; the bright sunshine and warm bracing air combined to make our homeward journey pleasant and cheerful. We reached Demopolis at 4 p. m., and camped on the side of a hill, in a heavy rain storm.

After the storm was over the Confederate officers came out from their shelter and we were marched to an old stable on the river bank. Here two days rations were issued to us and the next morning we were aroused from our filthy beds at one o'clock, and stood in the cold searching mist two hours waiting for the boat to unload. We then embarked for McDowell's Station, four miles up the river, on the steamer Sumpter; disembarked; waited until 4 p. m. and then we boarded the cars and started for Meridian, Miss.

"When within four miles of Meridian we ran off the track, someone having purposely turned a switch, happily without disastrous effects this time and we were soon back on the road and no one hurt. Arriving at Meridian we were put in the old familiar stockade with all its filth, and there we lay down to sleep in the same old vermin-infested mud; the next morning we took the train for Jackson, Miss. We reached Pearl River at 5 p. m., and, the bridge being burned, we crossed on a pontoon. Entering the town we marched past the State capitol, and after waiting half an hour we started for an old camping ground some two miles out in the country. Everything wore the frightful aspect of war; blocks of buildings had been destroyed by fire, nothing remained but the blackened walls; fences torn down and grass growing in the streets were fit emblems of the hopelessness of the Southern cause. We each drew a half pint of meal and a small piece of bacon, the latter weighing about three ounces. This was to last us two days; we also drew clothing here which had been sent to us by our authorities at Vicksburg. The Confederates seemed very anxious that we should enter our lines well clothed.

"On Sunday, March 19, we started on our homeward march toward Vicksburg. We marched twelve miles that day and were thoroughly tired. The next morning we started on the hardest march that I ever experienced; the road was either flooded with water or else it passed over steep hills of red, slippery clay and for a quarter of a mile we marched through water ten inches deep. We passed over many a desperately fought battlefield, the trees showing unmistakably the signs of hard fighting, and every minute of this long, weary day, it rained. An accident that had happened to my knee many years before, developed a weakness in it, and I was compelled to walk with one stiff leg all day. We reached the Big Black River just at dusk, but on account of the exchange officers not being willing to labor that evening we were obliged to march back for half a mile, where we camped around log heaps which we set on fire to keep ourselves warm and cook what little provisions we had.

"Those log heaps were in a large field that had just been reclaimed from the wilderness; the ground, lately plowed, was a mass of mud. I, with my weary comrades, lay down in this mud and slept as I had never slept before. We had marched thirty miles, and I but a short time out of the hospital. The next morning we could see the exact impress of our forms where the mud had been dried by the

heat of our bodies. Here for the first time we experienced the exquisite pleasure of eating Uncle Sam's hardtack with coffee and sugar, which had been sent from our lines to us. At 9 a. m. we were counted off and took our joyous way over the pontoon bridge which crossed the Big Black River at this point.

"We were just twelve miles in the rear of Vicksburg; a Federal soldier guarded one end of the pontoon and a Confederate the other, and we accepted as a good omen the clear sky that showed itself after the storm. What sighs of relief passed from our bosoms as we were greeted by the sight of our old flag and trod the ground as free men again. We marched about two miles and boarded the cars for the parole camp, which was located four miles back of Vicksburg, and there we bivouacked without blankets or covering of any sort. Little did I think when I was there during the siege that I should be on this spot again in the guise of a prisoner on parole.

"The next few days were spent in righting our camp; for tents were soon issued to us, and the Christian Commission gave us pipes, tobacco, pens, ink, towels, reading matter,—in fact everything that we desired; and, as we found time to renew our prison acquaintances, we joked and laughed over our past experiences, and life took on a brighter hue.

"On March 26 I was informed that the authorities had detailed me for duty on the flag of truce line that ran from Vicksburg to the Big Black River. I also received that day a letter from Charles Goff (an old schoolmate) in which he conveyed the sad intelligence of the death of my brother Egbert, who had died at Nashville months previously while I was in prison, and this was my first knowledge of it.

"For the next week or so there was nothing of importance to record. There were about 6,000 prisoners on this strip of parole ground, 2,500 of whom were from Andersonville, many of them bearing the marks of the horrible usage of that lazaret house. On April 12 I took my little pocket telegraph instruments and went out to the Confederate exchange headquarters at the river. Here I was furnished a tent near the railroad, where I tapped the telegraph wire and was at once placed in direct communication with Vicksburg. Almost the first news that I received was the surrender of Lee and the fall of Richmond.

"I was occupying a rather queer position, being detailed by the Federal authorities as operator at the Confederate headquarters, while my comrade Ludwig, occupied the same position at the other end of the bridge in the Federal headquarters. Such an occurrence was never known during the whole war.

"On April 23 I felt a relapse of my prison sickness coming upon me, which was caused by exposure to the weather, in my tent. The prisoners were being sent North as fast as facilities could be furnished, and that day the last batch embarked on the ill-fated Sultana, leaving the camp deserted with the exception of the hospital. I was too sick to go with the boat; thus my life was saved, for it was on

this trip that the boat's boilers exploded near Memphis, and over 1,000 paroled prisoners lost their lives. Some of them had been in Southern prisons over two years and were almost in sight of home when this horrible accident cut them down. Many of them were my comrades.

"The next few days my fever ran high, and I was very weak, but I managed to keep my feet; growing worse, however, I accepted the kind invitation of Lieutenant Seymour (an officer in the Heavy Artillery) to make his quarters in Vicksburg my home. From this time I was on my back with the old camp fever in full possession of my worn out and emaciated frame. From April 23 until May 19 I struggled against this relapse. Thanks to my strong constitution, however—a result of persistent athletic exercise all my life—I was enabled to pull through safely. Through the good offices of my comrade, Ludwig, my transportation was procured as far as Cairo, and I started north on the steamer Clara Dolsen, on May 22.

"I reached Cairo at 3 p. m., on the twenty-fifth, where I was surprised to meet an old friend, a well-known telegrapher, John Q. Mason, by name, who was then manager of the telegraph office at that point. He procured a pass for me to Chicago, which city I reached the next evening. I stopped at the old Metropolitan Hotel, and on the morning of May 27, about 10 o'clock, I arrived at the depot in the city of Kenosha, Wis., my home, thus ending a captivity of nearly eight months in a Confederate prison.

"I cannot express the emotions which filled my heart as I approached my father's house, the dear old home of my boyhood days. All was quiet. I opened the gate, walked along the gravel path, and up the steps, where I hesitated an instant, and rapped timidly at the door. A moment after, it was opened by my cousin Alice, who met me with greetings of joy. My old father, hearing the noise we made, came hastily from a distant room and I was enfolded in his loving arms. After we had visited to our heart's content I learned of the persistent and almost superhuman efforts made by my father to enforce my exchange. Through all means and channels did he work for me, his youngest son; and although on account of my sickness his efforts proved fruitless, it explained the frequent calls for me while I was sick on my back, a living skeleton in a Confederate hospital."

Annual Report of Proceedings of Military Telegraph Corps Reunion.

The report of the proceedings of the twenty-ninth reunion of the Society of the United States Military Telegraph Corps, held at Chicago, Ill., September 8, 9 and 10, has been issued. It is a neat book of 38 pages and contains an obituary notice of the late General Thos. T. Eckert. It was produced under the supervision of Mr. David Homer Bates, the able secretary of the Society.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Mavor and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XXIV.

Given two parallel wires carrying electric current, what is the effect upon the wires of the action of one current upon the other?

How can the interaction of the currents be increased or decreased?

What is the cause of self-induction?

Why does an electromagnet develop self-induction?

Is self-induction in the magnets of ordinary telegraph instruments desirable or undesirable?

Describe the action of a relay magnet at the moment the circuit is closed. Does it attain its full magnetic strength at once? If not, why not?

On opening a circuit at the key why is a spark produced at the contact points?

How can self-induction in magnets be minimized?

What is the effect on self-induction of winding the wire on the magnet in parallel and cutting the yoke and armature across the middle?

Describe Dr. Sylvanus Thompson's experiments with relay magnets.

What benefit is derived by the insertion of non-inductive resistance in a circuit?

What is non-inductive resistance, and what effect has it upon the current?

Why do the four-ohm duplex and quadruplex sounders respond more quickly and clearly to the influence of the current actuating them than do those of the 100-ohm pattern arranged in multiple on single wire circuits?

What was the method adopted to make local circuits non-inductive without interfering with the plan of connecting sounders in multiple?

Describe the benefits resulting from the change.

What is the law governing the development of self-induction in magnet coils?

Examinations for Position of Government Operator.

The United States Civil Service Commission will hold examinations on Nov. 23 at various places throughout the country to secure eligibles to fill a vacancy in the position of telegraph operator at the Pensacola, Fla., Navy Yard. The salary is \$2.80 per day. Those desiring to apply for the position should write at once to the United States Civil Service Commission, Washington, D. C., for examination forms 304 and 1140. Applicants must be 20 years of age or over on the date of examination.

The Telephone.

Arrangements are being made in Peking, China, for placing the telephone wires in that city underground.

The Cumberland Telephone and Telegraph Company reports a surplus after charges for September of \$206,462, an increase of \$16,114.

There are now 939 telephones in use in Ceylon, and the average daily calls at the Colombo Telephone Exchange number 4,432.

The Australian Commonwealth on July 18, 1910, had 30,150 metallic telephone circuits, 34,947 single wire circuits and 350 exchanges.

The State Board of Tax Commissioners of Indiana has placed the valuation of the telephone lines and property in that state at \$11,146,832.

Mr. Henry T. Hall, traffic superintendent of the Bell Telephone Company of Pennsylvania, at Harrisburg, died in that city, October 10, at the age of 31 years.

The German Consul at Sao Paulo, Brazil, reports that concessions have been granted for the establishment of three important telephone lines in the State of Sao Paulo.

The American Telephone and Telegraph Company expects by January 1 to establish telephonic communication between New York and Denver, a distance of 2,200 miles.

Mr. C. M. Seeley, division commercial superintendent of the Pacific Telephone and Telegraph Company in southern California, resigned on November 1 to enter other business. Mr. J. W. Gilkison, division plant superintendent for the same company, with headquarters at Los Angeles, has been appointed to succeed Mr. Seeley.

The Hudson Terminal building in New York, contains 750 miles of telephone wire. To handle the telephone business in five of the largest office buildings in the city, 2,360 miles of wire are required.

The Independent Telephone Company of Seattle, Wash., has been bought by a syndicate of New York capitalists for \$2,000,000. The stock in the Seattle company was largely held by citizens of Youngstown, Ohio.

The gross income from the telegraph and telephone system owned by the Government of Sweden amounted in 1909 to \$458,000. The cost of maintenance amounted to \$266,000, leaving a balance to the credit of the system of \$192,000.

The American Telephone and Telegraph Company reports an increase in gross earnings for the nine months ended Sept. 30, 1910, of \$11,396,105, and in net earnings of \$1,556,369. The sum of \$8,186,210 was carried to the surplus account.

Mr. Frank J. Clarke, who was equipment engineer for the Southern Bell Telephone and Telegraph Company, resigned recently to accept a position in the southern division of the American

Telephone and Telegraph Company, with headquarters at Atlanta, Ga.

The joint liability for the diversion of a high voltage electric current due to the falling of a telephone wire across an electric light wire was sustained by the Indiana Appellate Court, in the case of Dolby against the Indiana Light and Heat Co., and the Indianapolis Telephone Co.

It is stated that a telautograph system will be used for transmitting and recording trouble reports from the trouble desk at the central office to the various substations of the new automatic telephone system now being installed for the Illinois Tunnel Company in Chicago.

Mr. Earle Harlan, for the past eleven years connected with the wire chief's department of the American Telephone and Telegraph Company at St. Louis and other points, has resigned to accept a position with the Atchison, Topeka & Santa Fe Railway at Albuquerque, N. M.

Mr. Volney Delos Cousins has entered the service of the Pacific Telephone and Telegraph Company, in the plant engineering department, with headquarters in San Francisco, Cal. Mr. Cousins was an instructor in telephone engineering at Purdue University, Lafayette, Ind.

The Board of Estimate, at New York, at a recent meeting, revived the old offer of the New York Telephone Company to pay the city a large amount of money annually if an exclusive franchise were guaranteed to it. The proposal was referred to the Corporation Counsel for investigation. The offer was first made in 1906.

The Illinois Tunnel Company, of Chicago, is wiring its automatic system and installing its switchboard equipment and it is expected that the system will be in partial operation by January, 1911. When the installation of telephones begins the company will install 400 to 500 daily. It is stated that there will be 30,000 telephones in service, or 10,000 more than the ordinance requires, by June, 1911.

The results of comparative talking tests, recently made by Messrs. W. R. Cooper, W. Duddell, W. Judd and J. E. Kingsbury, upon the new and the old telephone cables, laid between Dover, England, and Calais, France, were very satisfactory. Tests were first made on each over the cable alone, after which successive units of an artificial cable were added to the circuit until the limit of commercial conversation was reached. The range of variation on the new cable was found to be from twenty to twenty-four miles of test cable at each end, the average being twenty-one miles, while on the old cable the range was from twelve to thirteen miles, the average being twelve and one-half miles at each end.

An investigation into the telephone rates established by the New York Telephone Company between the Boroughs of Greater New York, to determine whether such tolls are unjustly discriminatory or unduly preferential, is to be made by the Public Service Commission. The com-

pany has been directed to appear before the commission in New York on November 28 for a hearing.

The Society of the American Telephone and Telegraph Company, New York, was addressed, on November 15, by Mr. H. B. Thayer, vice-president of the American Telephone and Telegraph Company. Mr. T. H. Lawrence is secretary and treasurer of the society, which meets occasionally to discuss matters of an educational and practical character. The society is made up of employees of the telephone company.

The committee on supplies of the New York board of education, in the estimates for the year 1911, requests the board of estimates to appropriate \$26,000 for installing a telephone service in the school buildings of Manhattan, the Bronx and Brooklyn, connecting them with the offices of the district superintendents and with the hall of the board of education in Manhattan and with the borough offices in Brooklyn.

Arrangements have been made by the Philippine Telephone and Telegraph Company to instal a long distance system including connections between Baguio, Batangas and Los Baños so that each of these points will be reached from Manila. After these extensions, representing an outlay of 300,000 pesos, it is the purpose of the company to connect Cebu, Iloilo and Zamboanga with the capital. In this connection it will be necessary to lay a submarine cable between those three points.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, speaking of the telephone service in London, says it is faulty because Londoners do not know how to use the instrument. "They haven't been educated up to it," he said. He saw a person answer a call and then put the receiver down and keep the caller waiting several minutes. No matter how efficient the central station may be, he continued, the service must be bad if the public is slack.

The Pacific Telephone and Telegraph Company announces that it will soon instal an aerial telephone cable between Tacoma and Seattle, which will be the longest telephone aerial cable in the world. The total length of cable between offices will be 38.2 miles, of which 30.8 miles is 31 pair No. 16 gauge strung aerially, and the remainder 7.4 miles, being 70 pair No. 16 gauge and 37 pair No. 13 gauge full size composite cable in Tacoma and Seattle underground. The aerial portion is loaded at intervals of 8,763 feet with 18 loading pots, each containing 28 coils. The underground portion is loaded at the same intervals with 10 loading pots, each containing 35 coils, there being two pots at each underground loading point. The cable represents an expenditure of \$650,000.

A conference of officials and employees of the Cumberland Telephone and Telegraph Company was held recently at Memphis, Tenn. The fifty-three out-of-town delegates in attendance were

tendered a banquet at the convention hall by the Chickasaw Bluff Telephone Society, an organization composed of Memphis employees of the Cumberland Company. At the business session many subjects pertaining to the maintenance and betterment of the service were discussed, following the presentation of papers by officials in charge of each particular branch. Those who read papers were Mr. W. G. Pfingst, superintendent of telegraph; Mr. J. H. Atchison, manager of directory and advertising department; Mr. J. T. Jagoe, assistant superintendent of the Nashville plant; Mr. H. Blair Smith, general auditor; Mr. E. D. Reynolds, construction engineer; Mr. K. C. Hardcastle, toll traffic manager; Mr. C. L. Meyers, general contract agent, and Mr. T. W. Gardner, chief electrical engineer. Discussions were held on the subjects: "Handling Material," "Rural Line Construction," "Repairs" and "Duties of Managers."

Arrangements have been made for the transfer of Mr. A. C. Terry, district manager of the American Telephone & Telegraph Company, from Pittsburg to Philadelphia. The centralization of the executive offices of the Bell Telephone Company of Pennsylvania and controlled companies, including the Central District & Printing Telegraph Company of Pittsburg, at Philadelphia, has made it unnecessary to longer maintain a district manager's office for the American Telephone & Telegraph Company at Pittsburg. Mr. Terry was formerly employed by the Western Union Telegraph Company, at Buffalo, N. Y., for twelve years. In 1896 he assisted in planning and supervising the installation of the Western Union offices in the Ellicott Square Building, Buffalo, N. Y., which, when completed, were conceded to be the finest offices in the telegraph service. As a result of his work in connection with the equipment of the Buffalo offices he was, in 1898, assigned to superintend the reconstruction of the building and had full charge of the equipment and installation of the Western Union Telegraph Company's present offices in Fifth Avenue, Pittsburg. In 1899 he was transferred to Syracuse as electrician of the Fifth District, and in 1901 he was detailed to investigate the condition of the underground cable system for the Western Union at Pittsburg. In the latter part of 1901 Mr. Terry accepted the managership of the American Telephone & Telegraph Company, having charge of territory in Western Pennsylvania and parts of Ohio, West Virginia and Maryland, with headquarters at Pittsburg. When the functional organization of the American Telephone & Telegraph Company was inaugurated in 1908, he was made district manager, having charge of the commercial department in the same territory. He has made many friends in Pittsburg, particularly among the members of the Chamber of Commerce, because of his activity in the past in arranging for telephone service from the Trade Extension Excursion trains which have been periodically sent out by the Chamber of Commerce.

Proposed Reduction in Cable Rates by Western Union Telegraph Company.

Col. R. C. Clowry, president of the Western Union Telegraph Company, on November 11 announced that negotiations looking toward the adoption of a modification and reduction in cable rates were begun last June with the English transatlantic cable companies associated with the Western Union Telegraph Company, and with the English post-office authorities when Mr. Theo. N. Vail was in Europe. An agreement was practically reached with the English cable companies, but negotiations with the British postoffice authorities were temporarily held up, owing to the rules of the International Telegraph Convention. After Mr. Vail's return from Europe, Mr. E. J. Hall, chairman of the executive committee of the Western Union Company, went abroad to renew negotiations.

A cablegram from London, November 11, reports an interview with Mr. Hall, in which that gentleman said that the Western Union Telegraph Company early in the present year originated the system of the Night Letter in the United States which has proved to be very popular and a great commercial success. Having in mind the desirability of adopting for its cable service something of this nature, it some months ago took up the matter with the Post Office Department, in London, and there have been a number of conferences in relation to some form of special service covering deferred messages in plain language at a substantial reduction from the rates that prevailed for ordinary commercial business. To work out a suitable plan and safeguard it in such a way that only those who are entitled to be benefited shall have its advantages, involves many difficulties in detail and any plan must necessarily be acceptable to the Governments which furnish the connecting land lines through which the service is conducted. It is also necessary that it should be on lines within the conditions imposed by the International Telegraph Convention. The Western Union Telegraph Company, speaking for itself alone, is willing to carry deferred messages in plain language at a reduction of one-half from the existing commercial rates and it is desirous of putting such a service into effect whenever a plan acceptable to all concerned has been agreed upon.

Another cablegram from London states that a conference between the postal officials and representatives of cable companies relative to the plans for a concession in the tolls on deferred private messages was held at the postoffice in London, November 11. The discussion thus far has been of a preliminary character, and the Government officials have enjoined strict secrecy on all those concerned. It is expected that the local companies will agree to the plan, but in any case some time must elapse before it can be put into effect, as the consent of all foreign administrations involved must be obtained.

Telegraph and Telephone Age, 253 Broadway, New York, is headquarters for all electrical books.

Second International Conference of Telephone and Telegraph Engineers.

The second international conference of telephone and telegraph engineers which was held in Paris from September 4 to 10, was well attended, nearly one hundred delegates from twenty European nations being present as well as Mr. J. J. Carty, chief engineer of the American Telephone and Telegraph Company, and Mr. C. E. Scribner, chief engineer of the Western Electric Company, New York. M. Millerand, minister of public works, posts and telegraphs of France, called the conference to order, and after the preliminaries of opening the conference relinquished the chair to M. Eustanie, director of telephones in Paris, who presided over the succeeding sessions. The following subjects were discussed:

1. Manual versus automatic systems of telephone working.
2. (a) Simplification of telephone circuits; (b) selection of frequency and secondary potential (for purposes of theoretical investigation) with a view to facilitating the approach of the telephone current to the sine wave-form; (c) the circumstances of conditioning the adaptability of telephone apparatus to the lines, induction coils, microphone resistance, etc.
3. Precautions to be taken for the avoidance of mutual disturbance in the case of power circuits running in close proximity to telegraph and telephone lines.
4. Telephony between places at great distances from each other. Construction of cables for long-distance use, relays, combination of aerial lines with cables.
5. Wooden poles—new process for impregnation and preservation.
6. Telegraph systems for heavy traffic. Multiple type-printing telegraphs and the Mercadier system.

Thirty-eight papers were received dealing with these questions. Five of these dealt with "Manual Versus Automatic Telephone Service," and this question was considered at some length, Mr. J. J. Carty contributing on this subject an interesting discussion of telephone conditions in the United States. An exhibition, which was arranged by the French Government, was also given of several automatic telephone systems. The next conference will be held in 1913. A standing committee consisting of one member from each country represented will have charge of the arrangements and the selection of the place for the third conference.

Mr. F. J. Howell, of Corning, N. Y., an old-time telegrapher, but who for many years past has been identified with other commercial pursuits, in ordering a continuance of his paper writes: "Glad to see the improvement in the Age, particularly in the scientific description of all kinds of telegraph, telephone and wireless instruments."



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The Railroad.

Mr. H. O. Rugh, president of the Sandwich Electric Company, Sandwich, Ill., was in New York recently on business.

The telephone is soon to be substituted for the telegraph in dispatching trains on the section of the Queen & Crescent Route between Danville, Ky., and Oakdale, Tenn., a distance of 137 miles.

A meeting of the Eastern Division of the Association of Railway Telegraph Superintendents will be held November 16 in the Board Room of the new Pennsylvania Railroad terminal in New York. Officers of the division will be elected and other business transacted.

Mr. J. A. C. Kelman has been appointed chief operator in the Winnipeg, Man., office of the Grand Trunk Pacific Railway. He is well and favorably known in railway telegraph circles and has been in the service of the Grand Trunk Pacific Railway for the past three years.

The telephone method of dispatching trains has lately been adopted on the Shasta Division of the Southern Pacific Railroad, where telephone circuits have been installed over 291 miles of line.

The method is being used over a 206-mile section of the main line between Ashland, Ore., and Red Bluff, Cal., and a branch of 95 miles from Weed, Cal., to Klamath Falls, Ore. The dispatcher is located at Dunsmuir, Cal., which is 98 miles from Red Bluff, the southern terminal of the circuit. There are twenty-five stations on the entire circuit, twelve being located between Dunsmuir and Red Bluff, nine between Dunsmuir and Ashland and four between Weed and Klamath Falls.

The circuit is metallic throughout and is composed of especially drawn 300-lb. copper wire. During sixteen hours out of twenty-four it is cut into two sections and during the third "trick" the entire circuit is operated by one dispatcher. Passenger and freight trains on the Southern Pacific are equipped with portable telephone sets, enabling train men to get in touch with the dispatcher from any point along the road.

Mr. Fayette R. Rockwell, recently appointed general superintendent of the Colorado lines of the Denver & Rio Grande Railway, at Pueblo, Col., started his business career as a telegraph messenger and afterwards became an operator and train dispatcher. He is a railroad man by training and is forty-six years of age.

Mr. M. C. Roach, superintendent of the New York division of the Lehigh Valley Railroad at Jersey City, N. J., began work as an operator on the Pittsburg, Cincinnati, Chicago & St. Louis Railroad, and afterward held a similar position on the Erie Railroad. Later he became train dispatcher on the Erie. He is 40 years of age.

Mr. Thomas J. Foley, assistant general manager of the Illinois Central Railroad, Yazoo and Mississippi Valley Railroad and Indianapolis Southern Railroad, was formerly a telegrapher. He is a na-

tive of Ohio and began his telegraphic career on the Pennsylvania Railroad.

Mr. S. G. Strickland, the newly appointed general superintendent of the Chicago & Northwestern Railway, was formerly a telegrapher, having worked on the Canadian Pacific Railway in Canada and on several roads in the United States. He was born in 1859.

Mr. Willis E. Morse, general superintendent of the Chicago & Northwestern Railway, has been appointed assistant general manager with headquarters at Chicago. Mr. Morse began his business career as a telegraph operator on the Chicago & Northwestern Railway. He is forty-six years of age.

Mr. James M. Kurn, recently appointed general superintendent of the Atchison, Topeka & Santa Fe Railroad at La Junta, Col., was a telegrapher during the early stages of his business career, but his experience has been confined chiefly to the States of Colorado and New Mexico. He was born in Michigan forty years ago.

Trade Note.

Mr. J. C. Murray, sales engineer of the Kellogg Switchboard and Supply Company, has returned from a South American trip and will immediately take up his work in the telephone field in this country.

Western Electric Expansion.

The Executive Committee of the Western Electric Company, Chicago, has voted to expend \$1,000,000 in enlargements to the Hawthorne plant and the vote has been approved by the board of directors. The extensions will be in the nature of telephone and cable shops.

Extending Telephone Train Dispatching.

Within the ten days ending with the first week of November, the United States Electric Company of New York and Chicago has received orders for telephone train dispatching equipment from a number of railroads. Among them are, the Delaware, Lackawanna & Western, two circuits with fifty-eight selectors; Evansville, Terre Haute & Southern, one circuit, twenty-nine stations; Baltimore & Ohio, one circuit, nineteen stations; Atlantic Coast Line, one circuit, nineteen stations, and Chesapeake & Ohio, three circuits, fifty-five stations. In addition to the regular Gill Selector equipment the United States Electric Company is furnishing on these orders telephone and auxiliary apparatus. Orders received in the latter part of October include equipment for the Great Northern, the Northern Pacific and the Dunkirk, Allegheny Valley & Pittsburg. For the Louisville & Nashville this company has just completed the installation of two circuits covering fifteen dispatching stations and thirteen message stations, and the official report from the company is that both systems are working to their great satisfaction.

The Turner Monument Fund.

The sending of the first train order by telegraph, which took place at Turner, N. Y., by Charles Minot, general superintendent of the Erie Railroad in the autumn of 1851, may not have been attended by noisy demonstrations or pyrotechnic display, but in the light of later experience it was an event of large importance to the railroad, so large indeed that it has been wisely decided to commemorate the historical event in granite and bronze so that future generations may be impressed with its importance. The two societies co-operating in this laudable work—the Association of Railway Telegraph Superintendents and the Old Time Telegraphers' and Historical Association—deserve the grateful thanks of every one connected with the telegraph and the railroad for the inauguration of this worthy movement, and the committee charged with the work of financing and execution of the project should be aided in their work by liberal contributions from those who have pride in their profession, whether it be commercial telegraphy or railway telegraphy.

About \$3,000 will be required to erect a suitable monument at Turner, N. Y., and contributions are beginning to come in. They will be duly acknowledged in these columns.

The following named gentlemen constitute the committee in charge of the Monument Fund: E. P. Griffith, Superintendent Telegraph Erie Railroad, Jersey City, N. J., Chairman; Charles Selden, Superintendent Telegraph Baltimore & Ohio Railroad, Baltimore, Md.; E. A. Chenery, Superintendent Telegraph Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, Electrical Engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, President Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, Secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund.

The amounts received to date are as follows: E. P. Griffith, Jersey City, \$15.00; R. H. Corson, Jersey City, \$5.00; Luis Jackson, New York, \$1.00; George W. Hickey, Brooklyn, \$1.00; O. C. Camp, Tarentum, \$2.00; V. J. Harahan, New York, \$5.00; Mortimer Du Perou, Washington, \$2.00; Charles A. Bigler, Philadelphia, \$1.00; J. J. Ghegan, New York, \$10.00; Thomas A. Edison, Orange, \$50.00; E. Winter, Montgomery, \$1.00; F. F. Fitzpatrick, New York, \$10.00; H. P. Dwight, Toronto, \$1.00; G. W. Kertly, New York, \$2.00; D. A. Mahoney, New York, \$1.00; H. B. Perham, St. Louis, \$5.00; J. H. Faulk, Hackensack, \$1.00; J. B. Korndorfer, Brooklyn, \$2.00; G. T. Stade, St. Paul, \$5.00; Old Time Telegraphers' and Historical Association, \$15.00; R. C. Clowry, New York, \$25.00; M. M. Kirkman, Chicago, \$1.00; R. F. Eldridge, St. Paul, \$1.00; G. P. Blomeyer, Zalma, \$1.00; J. H. Shearer, Elmira, \$1.00; E. W. McKenna, Chicago, \$10.00; Walter Vail, Deposit, \$1.00; C. B. Mears, New

York, \$5.00; T. E. Moreland, Pittsburg, \$1.00; G. M. Dodge, Valparaiso, \$2.00; S. C. Mason, Lockport, \$2.50; H. D. Pheatt, Milwaukee, \$1.00; J. A. Edson, Kansas City, \$5.00; F. B. Hubbard, Centralia, \$5.00; F. J. Jones, Warren, \$1.00; J. Annand, Portland, \$5.00; H. R. Williams, Seattle, \$5.00; W. C. Hirschert, Salamanca, \$1.00; H. Sommers, Salt Lake City, \$1.00; W. G. Collins, Seattle, \$5.00; Wm. De La Motte, Sandy Hook, \$1.00; J. W. Fletcher, Custom House, \$1.00; P. J. McManus, New Haven, \$1.00; A. B. Taylor, New York, \$2.00; W. C. Humstone, Brooklyn, \$10.00; Louis Lee, Pittsburg, \$1.00; J. B. Richards, Tacoma, \$1.00; M. Magiff, St. Albans, \$5.00; J. G. Liven-good, New York, \$1.00; H. Otis Pond, Fayetteville, \$0.25; W. C. Walstrum, Roanoke, \$2.00; T. W. Galleher, Baltimore, \$1.00; G. C. Jones, St. Albans, \$5.00; R. J. Needham, Duxbury, \$1.00; J. Burke, Cleveland, \$5.00; J. Monahan, Elmira, \$5.00; G. B. Owen, New York, \$5.00; H. D. Estabrook, New York, \$5.00; M. H. Hall, Monroe, \$1.00; J. B. Yohe, Pittsburg, \$1.00; Charles G. Smith, New York, \$2.00; T. Lynch, Pittsburg, \$1.00; J. B. Hammatt, Peoria, \$2.00; J. B. Tree, Richmond, \$3.00; F. A. Clark, New York, \$1.00; R. W. Pope, New York, \$1.00; G. L. Potter, Baltimore, \$5.00; F. P. Eyman, Chicago, \$2.00; P. W. Drew, Chicago, \$1.00; D. O. Dunkle, Cleveland, \$5.00; J. M. Turner, Augusta, \$5.00; E. E. Sellev, Brooklyn, \$2.50; Wm. Marshall, New York, \$5.00; J. M. Warner, Chicago, \$3.00; W. H. Hornbeck, Passaic, \$2.00; L. D. Ward, New York, \$1.00; W. R. Collins, New York, \$2.50; W. H. Sawyer, Pasadena, Cal., \$2.00; R. S. Parsons, Jersey City, \$5.00; Total, \$319.75.

A movement has been started among the fellow operators of R. L. Sawyer, the telegrapher who met his death in the explosion which wrecked the building of the *Los Angeles Times*, to raise a purse to be presented to his widow. Mr. Sawyer was a native of Fiskdale, Mass., and formerly worked for the Postal Telegraph-Cable Company at Springfield, Mass., and Albany, N. Y., and as Associated Press operator at Torrington, Conn. Several years ago his health failed and he went to the Pacific Coast. He had been regularly employed by the Western Union Telegraph Company for some time past as operator at the office of the *Los Angeles Times*, General Superintendent, C. H. Gaunt of that company at San Francisco, has directed that all possible assistance be rendered to the widow and children of the unfortunate operator.

Much experimental work in wireless telegraphy has been accomplished during the past year in the Signal Corps laboratory in Washington, D. C. The laboratory was organized primarily to assist in the development and design of new equipment and the laboratory equipment has been added to with the view of preparing for research work along the lines of wireless communication.

Municipal Electricians.

Texarkana, Ark., is installing a new fire alarm system.

The fire alarm system of Toledo, Ohio, is under the supervision of Mr. J. T. Greene.

Oakland, Cal., has a fire alarm system with 170 boxes of the non-interfering spring actuated type.

Patent No. 973,627 has been granted to Frank Castle, of Auckland, New Zealand, for an electrical fire alarm system.

Patent No. 972,840 has been granted to J. E. Fogal, A. M. Crichton and A. C. Mowry, of Quincy, Ill., for a fire alarm system.

The City of Roanoke, Va., installed the Gamewell fire alarm system in 1892, with thirty boxes. Now it has sixty-one boxes and the system is modern throughout.

The Fire Commission at Los Angeles, Cal., has decided to move the central office of the fire alarm and police telegraph systems from the City Hall on account of the fire hazard in the present building which is not fireproof and practically without fire protection.

The biennial meeting of the Electrical Committee of the Underwriters National Electric Association will be held in New York, March, 1911. The day and place of the meeting will be announced later. The secretary of the Association is Mr. C. M. Goddard, 141 Milk Street, Boston, Mass.

Work on the new fire alarm system for Manhattan borough, New York City, on which Fire Commissioner Waldo plans to spend between \$1,750,000 and \$2,000,000, has been started, and within a few weeks the first of the new alarm boxes will be installed on the East Side. Two thousand alarm boxes will be installed in Manhattan alone. The entire service will be rehabilitated.

The *Philadelphia Record*, of Sunday, October 30, printed an interesting article describing the Camden, N. J., Electrical Bureau, of which Mr. John W. Kelly, Jr., is the head. The article is well illustrated, a portrait of Mr. Kelly being included. The Camden Electrical Bureau is modern in all respects and it is claimed that fire alarm and police signal officials in larger cities could get new and valuable ideas from Camden as to what an efficient system should be. Mr. Kelly is one of the most active members of the International Association of Municipal Electricians and has apparently profited by the exchange of ideas with his fellow members to the advantage of the Camden fire alarm and police signal department. The City of Camden may well feel proud of what has been accomplished by its up-to-date and progressive chief of the Electrical Bureau.

"Electricity" is the name of a three-act comedy now playing in a New York theatre. The plot is a combination of a millionaire's daughter, a suitor disguised as an electrician and socialistic doctrine.

Obituary.

William J. Bodman, aged fifty-two years, a well known telegrapher, died at Buffalo, N. Y., on November 5.

Joseph Weber, a former telegrapher, aged forty-three years, died at Brooklyn, N. Y., on October 28. Mr. Weber was the inventor of an electrical piano-playing device.

Mr. A. E. Chantler, well known in the Northwest as a telegraph operator and editor, and for years connected with Washington's Twin City papers, was found dead on his ranch outside Tacoma recently.

Myron D. Jones, aged sixty-four years, chief train dispatcher and train master for the Lake Shore & Michigan Southern Railroad at Toledo, Ohio, died on October 25, at Columbus, Ohio, where he had been located in other business for several years past.

Mr. H. H. Morrison, aged 60 years, manager of the Western Union Telegraph office at Concord, N. H., died recently after a long illness. He entered the telegraph service as messenger in 1869 and was appointed manager of the Western Union Telegraph Company in Concord in March, 1874, and held the position at the time of his death. He was a prominent Mason.

William A. Sheldon, aged seventy-one years, died on November 5 at New York. Mr. Sheldon was at one time a prominent member of the profession at 195 Broadway, New York. He was for many years past identified with the financial department of the City of New York. He was a member of the United States Military Telegraph Corps. The history of Mr. Sheldon's military career was printed in our issue of August 1, 1908.

Mr. James W. Pitfield, formerly district superintendent of the Intercolonial Railway, died at St. John, N. B., October 31. Mr. Pitfield had been afflicted with locomotor ataxia for about twenty years, and for the past nine years he was confined to his bed. He was an operator at New Orleans and other Southern points during the Civil War and was afterward general superintendent of construction of lines on the overland route in California for the Western Union Telegraph Company. Later he occupied many other important positions in the telegraph service.

Mr. Benjamin Nachmann, president of the International Cable Directory Company, New York, publisher of the Western Union Telegraphic Code, died at his home in Yonkers, N. Y., on November 2. Mr. Nachmann was born in London, England, April 8, 1855, and came to this country when a young man. He was the compiler of the Western Union Telegraphic Code and established the International Cable Directory Company for the publication and promotion of the same. He was well known to telegraph people of New York and throughout the country and was a member of various telegraph organizations. He leaves a wife and three children.

Reorganization of Private Telegraph Interests in Colorado.

The Mountain Telegraph Company, which operated over 1,300 miles of telegraph line in Colorado jointly in the interests of the Victor-American Fuel Company and the Colorado Fuel and Iron Company has been reorganized and is to be conducted hereafter independently of the two concerns named. It has retained for its use about 350 miles of wire along the Colorado and Southern Railroad and about 350 miles along the Denver & Rio Grande Railroad, reaching this company's various properties. Mr. J. K. Waltz has been appointed superintendent to succeed Mr. E. E. McClintock, who became district superintendent for the Western Union Telegraph Company at Denver, October 1, as noted in our issue of October 16.

Mr. Waltz was born at Terre Haute, Ind., in 1876, and entered the telegraph service at Indianapolis in 1892. He has been manager of the Western Union Telegraph Company, and for ten years was manager of private wire systems. For five years prior to his present appointment he was agent for the Victor-American Fuel Company, which is one of the largest coal producing concerns in the country.

The Colorado and Wyoming Telegraph Company has been organized to take over the properties of the Colorado Fuel and Iron Company in Colorado. It will operate about 1,000 miles of wire, extending from southern Colorado to the northern part of Wyoming and to the various mining properties of the fuel and iron company. Mr. Royal E. Fisher has been appointed superintendent. Mr. Fisher was born at Morrison, Ill., July 7, 1875. In July, 1894, he entered the telegraph service at Blue Springs, Neb., and held positions as operator, cashier, revising clerk and agent at various points on the Burlington system until 1902, when he was transferred to the Lincoln, Neb., relay office. From August 1, 1905, to October 15, 1907, he was manager of the Minnequa office of the Mountain Telegraph Company, and from the latter date until February 1, 1909, was general wire chief of lines west of the Missouri river on the Chicago, Burlington & Quincy Railroad. Between February 1, 1909, and October 1, 1910, he filled the position of manager of the Mountain Telegraph Company at Denver, Col., being promoted to his present position on the latter date.

General Eckert's Will.

The will of the late General Thomas T. Eckert, former president of the Western Union Telegraph Company, was filed in the Surrogate's office in New York, October 31. Practically the entire estate passes to the two sons of the deceased, Mr. Thomas T. Eckert, Jr., and Mr. James Clendenin Eckert. The value of the estate is about \$3,000,000. Thomas T. Eckert, Jr., receives the country place at Elberon, known as Heart's Content, together with other property at Elberon, the testator's coal lands in Schuyl-

kill County, Pa., all of the estate of Mrs. Eckert, which was left to her husband at her death, and the residue of the estate after other legacies have been subtracted. It is said to have been the wish of Mrs. Eckert that her property be left to Thomas T. Eckert, Jr., on the death of General Eckert.

James Clendenin Eckert receives \$50,000 absolutely and a life interest in \$100,000, which is to be divided among his children at his death. Five thousand dollars is left to the testator's brother, Mr. William H. Eckert, and the same amount is left to each of two nieces, Mary P. Taft, of Cincinnati, and Alice Baumgartner Hamlin.

Carlton Terrace, a cottage at Elberon, is left to Joanna M. Eckert, daughter of James Clendenin Eckert.

The executors are: Mr. R. G. Page, Mr. Thomas T. Eckert, Jr., and Mr. James Clendenin Eckert.

Mr. James Clendenin Eckert, son of the late General Thos. T. Eckert, has taken steps to have his father's will set aside on the ground that a fair distribution of the property had not been made. It is also charged that General Eckert was of unsound mind when he made the will of August 30, 1910.

Historian Plum's Tribute to General Eckert.

Mr. W. R. Plum, of Lombard, Ill., historian of the Society of the United States Military Telegraph Corps, pays an eloquent tribute to the memory of the late General Thos. T. Eckert, as follows:

"Even a splendid constitution carefully conserved under favorable conditions must give way to years.

"Ripe in point of time, full of honors, with a history that will make itself felt in the coming ages—for no successful man is dead at burial, much less those who have controlled great events—the passing of our great chief into the beyond, to that greatest reunion of comrades, cannot but bring sadness to those left behind.

"We cannot honor him again, but we will revere his memory; after all, deserved reverence for those who have gone before is a higher tribute than bouquets and monuments.

"I would rather that others write my name on their memory tablets than have it engraved in granite or bronze. We have thus written that of Thomas Thompson Eckert."

General Eckert was one of the four honorary members of the Society of the United States Military Telegraph Corps.

Brig.-Gen'l. James Allen, chief signal officer of the United States Army, in his annual report to the Secretary of War, deplors the confusion which he states exists everywhere in the transmission of Government wireless messages, notwithstanding the claims made by commercial wireless telegraph companies that they have efficient interference preventers. He urges that measures be taken at once to secure Government control of wireless telegraphy, both in peace and war.

Radio-Telegraphy.

A wireless telegraph station is to be established at Colombo, Ceylon.

Mr. Samuel S. Bogart, vice-president of the United Wireless Telegraph Company, of New York, has resigned.

It is stated that Mr. William Dubilier, of Seattle, Wash., has succeeded in conversing a distance of forty miles, between Seattle and Tacoma, by the use of a wireless telephone of his invention.

Seventy-five feet of the steel tower of the American Radio-Wireless Company in Washington, D. C., broke off during the recent sleet storm and crashed through the roof of an adjoining building.

The installation of wireless telegraph apparatus on the steamers of the Osaka Shosen (Japanese) line, has been decided upon as a result of the Tetsurei Maru disaster. Stations will be established at different points along the Korean coast.

The Brazilian Government has erected a wireless telegraph station at Amaralina, near the entrance of the harbor at Bahia. The new station is equipped with the Telefunken system and has a guaranteed range of 400 miles, although its actual range is greater.

A new automobile car, manned by six operators and equipped with a wireless outfit having a telescopic mast, is about to be supplied to certain regiments of the German Army. The radius of the wireless outfit is 100 miles, both for transmitting and receiving.

A reduction of telegraph charges by 20 per cent. was effected in China in 1909. The program of the Board of Communications for the nine years preceding the establishment of constitutional Government (1908-16) includes for each year the improvement and extension of the telephone system throughout the country, and for 1911, preparations for installing wireless telegraphy along the coast.

The British Consul at Kiangchow reports that the wireless installation there is so frequently out of action that it is of very little use either for typhoon warnings or commercial purposes. The typhoon warnings telegraphed from Hong Kong or Haiphong invariably arrive some days after the typhoon has passed, according to *Lloyd's Register of British and Foreign Shipping*. There are now 702 vessels fitted with wireless telegraph outfits.

The trans-Atlantic Marconi wireless station at Glace Bay, N. S., recently opened, covers 150 acres of ground. The fan-shaped aerial wires are 6,000 feet long and about 1,000 feet wide, and are supported by thirty masts, each 250 feet high. The instruments have a transmitting radius of 3,000 miles, although in communicating with the Clifden, Ireland, station the electro-magnetic waves have only 1,700 miles to travel.

The Italian Government has appropriated the sum of 433,000 lire for the erection of six new radio-telegraph stations in Italy's African Colony of Benadir. Within the past few years wireless telegraph

stations have been established at five points on the Italian Benadir coast and on the islands of Zanzibar and Pemba. The first five stations are owned and controlled by the Italian Government; the latter by the Zanzibar authorities. Additional stations are now being discussed for the mainland at Mombasa, in British East Africa, and in German East Africa. In the latter colony there are telephone land lines in connection with the railways, and there are also several heliograph stations which are open to the general public.

For many reasons the adoption of wireless telegraphy on board the large steam trawlers which are employed in trawling operations in and near our home waters, says a London contemporary, is a development which would lead to a considerable expansion of the wireless telegraph industry and would probably help towards solving the problem presented by the damage done to submarine telegraph cables by these vessels. Wireless telegraphy has been adopted on some of the German trawlers and is giving satisfactory results. The Germans find, however, that wireless operators are not obtainable to accompany the trawlers and put up with the rather rough time which they would meet with on those vessels. It will be necessary for the Government to come to the assistance of the fishing industry if wireless telegraphy is to be adopted in the manner suggested. From the social point of view it is generally regarded as a most desirable innovation, as it would keep the shore in touch with the ships and vice versa, and so tend to brighten the life of the workers at sea by keeping them in touch with their domestic circles.

The Bureau of Steam Engineering of the United States Navy has issued a wireless telegraph directory of the world. There are listed 1,520 bona fide stations. This total includes shore stations and ships, but does not take into consideration the war ships of foreign governments. The directory first lists the wireless telegraph shore stations throughout the entire world, according to country, giving call letters, wave length, range and character of station. There are about 700 of these shore stations scattered about the globe. Of this number 88 are on the Atlantic and Gulf Coasts of the United States, 3 in the interior, 48 on the Great Lakes, 51 on the Pacific Coast, and 16 in Alaska.

A separate list shows the 47 shore stations of the United States Navy and another the 344 ships of the Navy. The stations of the United States Army are listed separately, showing 30 land stations and 16 stations aboard vessels of that service.

In the list of merchant vessels, such as steamships, tugs, yachts, etc., 821 stations are listed. The vessels' call letters and owners and the apparatus' wave length, power and range in miles are noted. These vessels are scattered over the entire world.

As an index the final list contains the call letters of every station, arranged alphabetically. From this operators can distinguish the name of ship or station calling.

Mr. W. E. Neely, who for the past ten years has been with the Western Union at Nashville and Memphis, Tenn., is now located at Dallas, Tex., for the same company.

Mr. Edwin F. Howell, secretary of the Serial Building Loan and Savings Institution, New York, the well known old-time telegrapher, who has been absent on a vacation, has returned to his office.

Mr. Thad M. Schnell, the well-known old-time and military telegrapher of Des Moines, Ia., was in Binghamton and Elmira, N. Y., and Susquehanna, Pa., visiting friends recently. Mr. Schnell was manager of the telegraph office at Susquehanna in 1867, and it was his first visit to that city since that time.

The announcement of bankruptcy proceedings against a telegrapher is not an unusual occurrence, but a Columbus, O., operator seems to have established a record in this line which is not likely to be often beaten. The petition which has been filed by this operator states that his liabilities are over \$40,000 with no assets.

Among sound and reliable insurance organizations the Telegraphers' Mutual Benefit Association of 195 Broadway, New York, occupies a foremost place. Organized in 1867, it has paid to beneficiaries of deceased members \$1,500,000. Reserve Fund, \$317,000, the largest Reserve in proportion to liabilities that is held by any similar Association. All persons engaged in Telegraph or Telephone service between the ages of 18 and 45 are eligible for membership, no restrictions after admission as to change of occupation or residence. The lowest possible cost consistent with security offered. Write for blanks and further information.

All Makes of Transmitters.

The phenomenal success of the Night Lettergram in the telegraph business makes it imperative for operators to study new methods of transmission, and to learn to use a typewriter, if they hope to be placed on an equal footing with their more fortunate companions, who have mastered these machines.

We are General Agents for the Famous Duplex, which gives you a choice of two movements. Price, \$12.00.

The Martin Vibroplex can also be furnished to those desiring this make of transmitter. Price \$9.00.

The Mecograph is also carried in stock ready to fill orders at a moment's notice. Price \$8.00.

Lowest Prices on Typewriters in the United States.

You can buy brand new, up-to-the-minute typewriters and sending machines of all makes on little monthly payments—not a cent more than you would pay if you rented a new machine.

A booklet describing all the features sent free on request.

Money Back If Not Satisfied.
J. E. ALBRIGHT
253 Broadway, New York.

The annual entertainment and reception of the New York Telegraphers' Aid Society, for the benefit of the Relief Fund, will be held at the Lexington Avenue Opera House and Terrace Garden, 58th Street, near Third Avenue, on the evening of November 30. Mr. J. C. Watts, of the Western Union Telegraph office, 195 Broadway, is chairman of the Entertainment Committee.

Wanted.

A Telegraph and Telephone Inspector for one of the Central American Republics. Must be a telegraph operator and unmarried. The salary is \$110 per month for the first year, and after that, if services are satisfactory, \$125 per month and actual traveling expenses. The applicant must be experienced in construction, maintenance, etc., pertaining to the telephone lines. The right man will be eligible for promotion within a year, to a more important division with increase of salary. Address "Inspector" care Telegraph and Telephone Age, 253 Broadway, New York.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, is steadily increasing the amount of its annual business. It has in past years accomplished much in the direction of providing a safe depository for the earnings of telegraphers, and has aided over one thousand in the purchase of homes, which are paid for in monthly installments. It pays five per cent. on deposits.

Martin's latest Vibroplex's \$9.00. Typewriter bargains, all makes. JAMES B. HAVICE, General Agent, 253 Broadway, New York.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEY-BOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

Rubber Telegraph Key Knobs.

No operator who has had to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. They render the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Leg Pattern \$2.50
Legless Pattern 4.00
P.O.B. Columbia, Pa.

THE LEFLEY KEY

The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. Money Order.

S. B. LEFLEY,
Columbia, Pa. R.F.D. No. 1.



Telegraph and Telephone Age

No. 23.

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Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY.—VII.

A Study of Telegraph Apparatus.

BY WILLIS H. JONES.

SPRINGJACKS AND CORD TERMINALS.

A switchboard springjack is about the most substantial-looking part of all the paraphernalia found in a telegraph office, yet it possesses its individual weak points in common with the rest of the equipment, as will be explained later. There is no apparatus absolutely perfect. A glance at Fig. 1 will show that the springjack proper consists of three parts, the upper and the under lip, and a strong spring to hold the two in a closed position. The lower lip is simply a solid plate of brass, while the upper or movable lip consists of a long S-shaped bar, one end of which is hinged by means of a pivot to another brass plate terminal. The weak spots in this device are the spring and the pivot. The spring sometimes stretches and does not hold the lips tightly together. But this defect is easily remedied. The most formidable defect appears when the springjack becomes old. The pin becomes rusty

and frequently causes temporary "openings" in the loop circuits connected therewith, which usually close mysteriously the moment the wedge of a test instrument is inserted. This defect is one of the most annoying sources of loop trouble we have to contend with, as the said pin, so far as the eye can

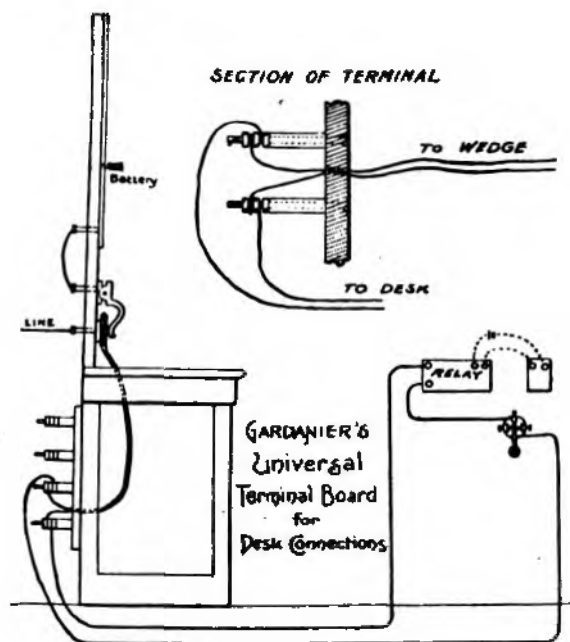


FIG. 1.—SECTION OF TERMINAL BOARD.

detect, is apparently faultless. It is only after a number of these openings occur successively that one is warranted in ordering the jack removed entirely and thoroughly overhauled, as many other things contribute to cause similar openings. Nevertheless, the frequent inspection of these pins is a point probably too often overlooked, and also too little appreciated when explanations are due. No one who has ever had charge of a loop switchboard, however, has any false idea on this point. It is evident that springjacks may be used for many different purposes. A number of them arranged in the manner shown in Fig. 1 and placed side by side would constitute a main line wire switchboard. If arranged as shown in Fig. 2, we have what is called a loopswitch.

In Fig. 1 we see the complete connections of one main wire. The external line-wire is connected to the lower lip and the upper lip connects with the vertical brass bar immediately above it by means of a short length of wire. In some offices the line is connected with the upper lip, but that is merely a matter of choice; either method will answer the purpose. The object of the long vertical brass bar is to provide a means of connecting the battery, or

a circuit with the wire permanently connected in the jack below it. All instruments or other apparatus that are to be inserted in the main line wire are connected by means of a wedge inserted in the springjack, as shown in the illustrations. This wedge always constitutes the terminals of the conductors of the house circuit which leads to the relay, sounder or other apparatus with which it happens to be con-

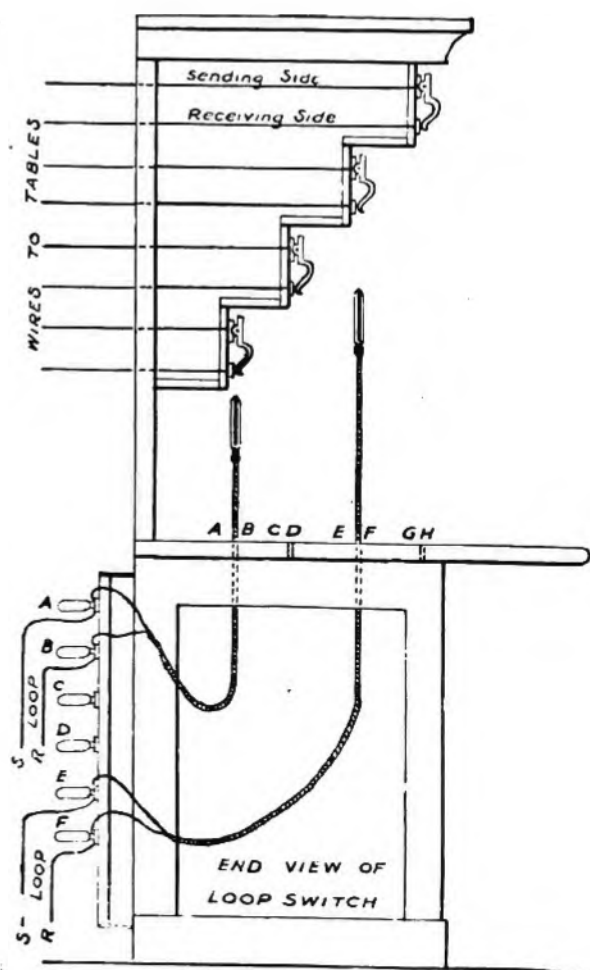


FIG. 2.—LOOP SWITCH.

nected. The connection is usually effected by a flexible cord, the other end of which in turn is connected with the sub-switchboard behind the main wire switch, as shown in the diagrams. Fig. 1 shows the Gardanier type of terminal switchboard used almost universally by the Western Union Telegraph Company. The cord itself is a permanent connection, but the terminal pins make it possible to extend the house connections to any location desired, or substitute one class of apparatus for another at will. The detached cut in the upper part of Fig. 1 shows how easily such alterations may be made.

In a loop switchboard, shown in Fig. 2, the terminal board is somewhat differently constructed, while the arrangement and connections of the springjacks are likewise dissimilar. In this board the two

lips of each springjack represent the terminals of a house circuit, which brings the local circuits of multiplex apparatus or some other circuit which may include still different apparatus, to this central point of the office, as shown in the upper jack of Fig. 1. Branch offices and various other local circuits are brought to this board through the terminal beneath the shelf and end in flexible cords and wedges, as shown. Connections, therefore, are made with house apparatus by simply inserting the wedge of an external circuit in the springjack circuit leading to any multiplex or other house apparatus.

The lamp resistance, when required for the purpose of regulating the current flowing in branch office duplex loops, is inserted in the sockets to which the terminals of the loops are connected. Each of these sockets is numbered and has a correspondent number for the hole in the shelf through which the flexible cord connected thereto comes up. Each row of lamp sockets also has a companion row of holes. By this means the lamp for any loop can readily be traced and located.

(To be Continued)

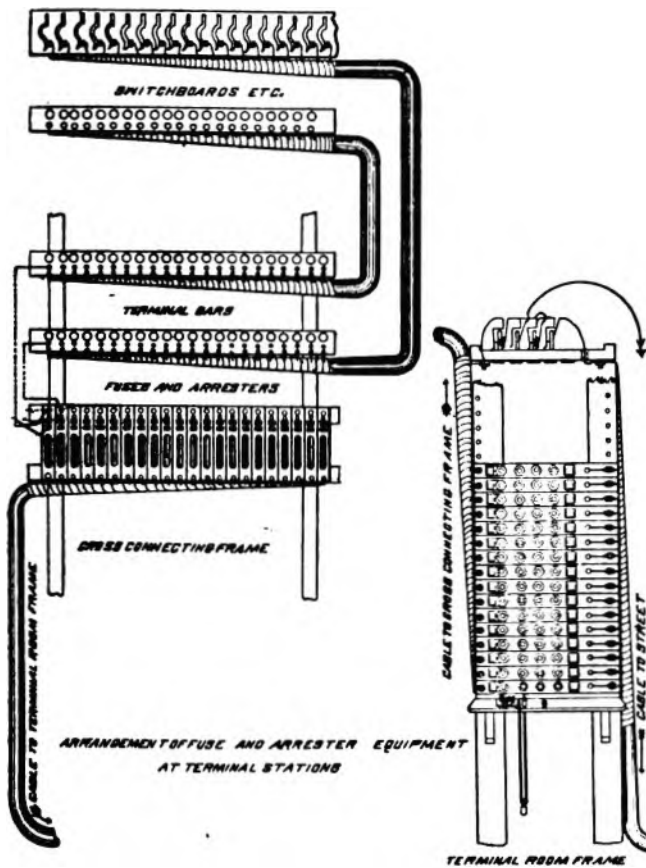
Terminal Office Wiring.

The engineers of the Postal Telegraph-Cable Company for some years have given special attention to the subject of office and switchboard wiring, and have developed systems that eliminate the objections of the older methods. In the old way wires were led to the switchboard through troughs or trenches, through which they were laid without particular order or system. The result was a tangled mass of wires, which rendered it practically impossible to readily find any particular one in case of necessity. Under the modern method all wires are cabled, and around the switchboard the cords are very largely eliminated. The work has been developed on the unit system, which permits of unlimited expansion without interference with existing equipment.

The accompanying diagrams show the Postal Telegraph Company's standard method of wiring terminal offices. A frame, shown at the right of Fig. 1, is located in the terminal room in the basement. All underground and other cables from outside the building are brought to this frame, and each conductor is connected to a terminal jack bar, this bar having looping, grounding and patching jacks in it for test purposes. From this frame cables are led to another frame, known as cross-connecting frame A, shown at the left of Fig. 1, which is usually located behind the switchboard in the operating room. Upon this frame, or between it and the terminal-room frame, the fuse blocks are carried. All main-line switchboard panels are also permanently cabled to cross-connecting frame A, and all changes in the assignments of line conductors are likewise made upon this frame.

Another cross-connecting frame, known as frame B, is located at the rear of the switchboard, or at any

other convenient place, and to this frame all operating and repeater tables, switchboard shelf connec-

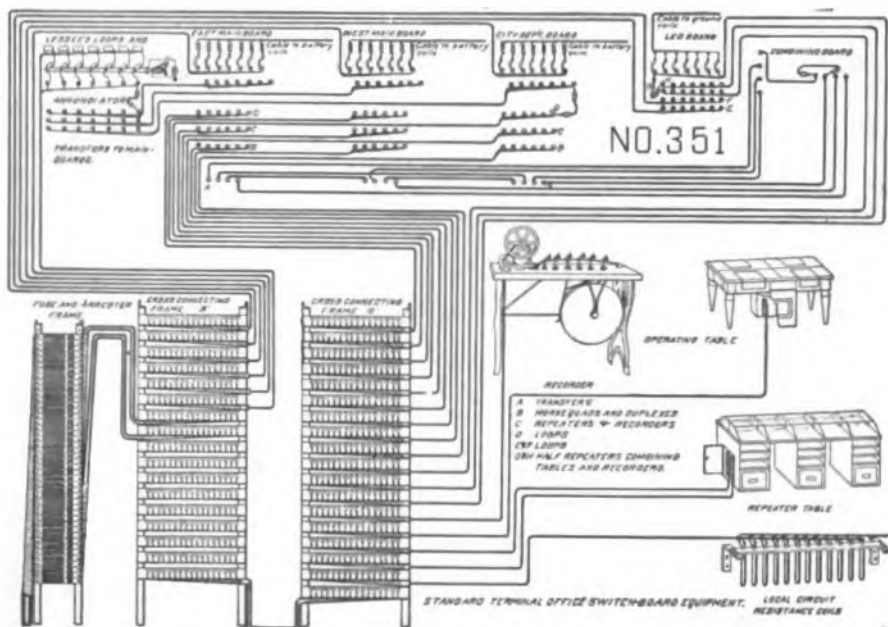


The battery leads for the switchboards are connected to banks of resistance coils, and these coils are cabled to the switchboard discs.

The jacks in the frame in the terminal room serve both for cable terminals and for temporary cross-connecting work by cords when cables are in trouble. They also furnish a means for quick tests of cable trouble, and may be used as a temporary switchboard in case the main switchboards of operating rooms should be destroyed by fire or disabled in any other manner. In the latest equipment fire-proof table cabinets located at the ends of operating and repeater tables carry the resistance coils used in connection with local and multiplex sets.

All frames are of angle iron, including switchboard frames, and all switchboard connections, cross-connecting frame, and terminal frame connections are mounted upon either porcelain or slate. No wood or other inflammable material is used except for switchboard shelves. The wire used upon the cross-connecting frames is provided with flame-proof braid and is especially made from the Postal Company's specifications. All resistance coils are of fireproof materials mounted upon slate. In one of the most recent installations the repeater tables are made entirely of angle and sheet iron, with asbestos-wood tops, and the instruments, with the exception of sounders, are mounted upon slate bases. These include condensers, rheostats, relays and transmitters.

The main line instruments have undergone a change in design and construction, and are notable for their solid and serviceable appearance. The trunnions are provided with agate bearings to reduce the friction, and there is no lost motion in any of the working parts. In the latest installation of



tions, etc., are cabled, and the cross-connection of these cables is done at this point. (See Fig. 2.)

switchboards no cords are used, except for irregular assignments and for test purposes.

Recent Telegraph and Telephone Patents.

Nos. 974,866 and 974,955. Automatic Telephone System, to A. H. Dyson, Chicago, Ill.

No. 975,105. Semi-Automatic Telephone System, to C. R. Austin, Longbeach, Cal.

No. 975,338. Telephone System, to A. H. Dyson, Chicago, Ill. This system is of the automatic and semi-automatic type.

No. 975,345. Telephone Disinfector, to B. F. Gardner, Chicago, Ill. The inventor of this device uses the disruptive discharge of an induction coil whose terminals are in the mouthpiece of the transmitter.

No. 975,504. Telephone System, to C. C. Bradbury, Chicago, Ill.

No. 976,608. Switch for Automatic Telephone Systems, to A. H. Dyson, Chicago, Ill.

No. 975,756. Multiplex Telegraph Apparatus, to S. D. Field, Stockbridge, Mass.

No. 975,933. Telephone Repeater, to S. L. Campbell, Prairie City, Ore.

No. 976,092. Reversible Galvanic Battery, to W. Morrison, Des Moines, Ia.

No. 976,123. Selective Ringing Means for Telephone Systems, to E. E. Clement, Washington, D. C.

The following patents have expired:

No. 507,983. Automatic Signal for Trunk Lines of Telephone Exchanges. Issued to Oro A. Bell, Brooklyn, N. Y.

No. 508,054. Multiple Switchboard System for Telephone Exchanges. Issued to Charles E. Scribner, Chicago, Ill.

No. 508,069. Polarity Switch for Secondary Battery Systems. Issued to Allen H. Whiting, New York.

No. 508,255. Telephone Circuit. Issued to John S. Stone, Boston, Mass.

No. 508,551. Battery Element. Issued to William Mills, Elizabeth, N. J.

No. 508,563. Combined Messenger Call and Telephone. Issued to George E. Christie, Paterson, N. J.

No. 508,829. Telephone Transmitter. Issued to Eloy Moriega, Mexico, Mex.

Nos. 11,386, 11,387 and 11,388. Multiple Switchboard. Issued to Milo G. Kellogg, Chicago, Ill.

No. 509,061. Speaking Attachment for Telephones. Issued to W. Weber and G. Weber, Philadelphia, Pa.

No. 509,066. Telegraphy. Issued to Julien P. Wooten, Bainbridge, Ga.

No. 509,186. Telephone Exchange Apparatus. Issued to Charles E. Scribner, Chicago, Ill.

No. 509,216. Fire Alarm Telegraph Repeater. Issued to Thos. F. Gaynor, Louisville, Ky.

No. 509,219. Non-Interference Signal Box Mechanism for Fire Alarm Telegraphs. Issued to Thos. F. Gaynor, Louisville, Ky.

No. 509,290. Signal Telegraph. Issued to C. V. Boughton, Buffalo, N. Y.

Personal.

Mr. Stephen D. Field, the well-known electrical engineer of Stockbridge, Mass., was a recent New York visitor.

Mr. E. B. Saylor, of Pittsburg, was a recent New York visitor and called on many of his friends while in the city.

Mr. Thomas T. Eckert, Jr., son of the late General Thomas T. Eckert, former president of the Western Union Telegraph Company, was married November 22 to Miss Minnie Egan, of New York.

Mr. Thomas Commerford Martin, secretary of the National Electric Light Association, New York, has issued in pamphlet form his address at the unveiling of the memorial tablet at Forestdale, Vt., to commemorate the invention of the electric motor by Thomas Davenport.

Mr. Charles H. Boynton, formerly general superintendent of the Associated Press, New York, has formed a new stock exchange partnership under the name of C. H. Boynton & Company. Mr. Boynton has many friends in the electrical field and handles electrical securities. He is the son of Mr. Charles A. Boynton, who has been for many years general superintendent of the Associated Press at Washington, D. C.

In the previous issue we mentioned the fact that Mr. Francis W. Jones, formerly and for many years electrical engineer of the Postal Telegraph-Cable Company, New York, had gone to West Palm Beach, Fla., for the winter. We inadvertently failed to mention the fact that Mrs. Jones accompanied her husband. Mr. and Mrs. Jones are well known to the electrical profession, and their numerous friends are pleased to learn that the health of Mr. Jones has greatly improved since his retirement from active commercial life about three years ago.

Postal Telegraph-Cable Company.**EXECUTIVE OFFICES.**

Mr. E. J. Nally, vice-president and general manager of this company, has prepared an article entitled "Progress," which appears in the current issue of the *Postal Telegraph*. The article is as follows:

"Now that we are approaching the beginning of a new year, and are able to look back over nearly the whole of this year's work, we find that we have made very marked progress. We have more lines, and they are in better condition; we have more offices, and they are better equipped; we have more employees, and they are better paid; we are doing a larger business than ever before,—all this in the face of a very active competition on the part of the old company; hence, we have every reason to feel encouraged at the outlook for next year.

"This company was never in better shape in every way than now. We are financially strong,

our plant is the best, and our organization is compact and efficient.

"It is true that a few of our valued men have gone over to the opposition. We are sorry to lose them, but the success of no large enterprise is dependent upon the continued service of any one man or group of men, any more than the progress of the world at large is dependent upon the activities of any one man or group of men. Where there is organization there are capable under-studies, always ready and able to take up the work and carry it along. The number of changes and promotions of late, and the promptness with which they were made, and the general satisfaction which they have given, have obviously strengthened the service and given hope and encouragement throughout the ranks. It has been noted, and commented upon, that in every instance promotions were made and positions filled from Postal ranks, according to seniority and according to the fitness of the persons selected; in no case was it necessary to gather in recruits from any other telegraph company, any telephone company, any electric company, or any railroad company. This in accordance with the Postal policy—to give preference to our own people, and thus inculcate and foster the Postal spirit.

"Wise and conservative financial policies, up-to-date equipment and progressive, business-getting methods, the best possible service, and earnest co-operation on the part of all employes, from the president down to the messenger boy, must result in the continued success of the Postal Company in the future, as it has in the past."

Mr. Edward J. Nally, vice-president and general manager of the company announces that certain important changes will be made in district lines as a result of changes and promotions in the west and southwest, effective January 1, 1911, as follows:

Western Division: First District, Mr. H. G. McGill, superintendent, Chicago, will comprise the lines and offices in what is known as Greater Chicago.

Second District, Mr. E. W. Collins, superintendent, Cleveland, Ohio, will comprise the lines and offices in Ohio (except Toledo) and in West Virginia, as at present.

Third District, Mr. S. H. Mudge, superintendent, now in St. Louis, will later be transferred to Chicago, and will have the lines and offices in Illinois and Missouri, except Chicago, Kansas City and St. Joseph.

Fourth District, Mr. Albert L. Lafferty, superintendent, headquarters Chicago, will comprise the lines and offices in Michigan, and Toledo, Ohio.

Fifth District, Mr. A. B. Richards, superintendent, now in Kansas City, will later be transferred to Chicago, and will have the lines and offices in the States of Kansas and Nebraska, and also the offices in Kansas City and St. Joseph, Mo., and Council Bluffs, Ia.

Sixth District, Mr. W. P. S. Hawk, superintendent, Chicago, will comprise the lines and offices in the State of Indiana.

Seventh District, Mr. W. C. Black, superintendent,

headquarters Denver, will comprise the lines and offices in the States of Colorado, Wyoming, New Mexico, Eastern Arizona, also Ogden and Salt Lake City, Utah, and El Paso, Tex.

Eighth District. This new district has been created, which will comprise the lines and offices in Wisconsin, Northern Michigan, Iowa, South Dakota and Minnesota. Mr. John F. Looney, now electrical engineer of the Western Division, has been appointed superintendent of the new district, and will have his headquarters in Chicago. Mr. Looney will be succeeded as electrical engineer of the Western Division by Mr. Harry C. Shaw, now electrical engineer of the Pacific Division.

Pacific Division: Mr. H. C. Shaw will be succeeded as electrical engineer of the Pacific Division by Mr. Vail V. Stevenson, now manager of the Los Angeles office, with headquarters in San Francisco.

Southern Division: Mr. Jesse Hargrave, superintendent Third District, has been advanced to the position of division superintendent of the Southern Division, with headquarters in Atlanta, Ga.

Mr. G. W. Ribble, superintendent First District, Richmond, Va., has been advanced to the superintendency of the Second District, with headquarters in Atlanta, Ga., vice Mr. G. E. Paine, promoted. His district will comprise the States of Georgia and Florida.

Mr. Charles H. Ashburn, manager of the Norfolk, Va., office, has been promoted to the superintendency of the First District, with headquarters in Atlanta, vice Mr. G. W. Ribble. His district will comprise the lines and offices in the States of Virginia, North Carolina and South Carolina.

Mr. Wm. C. Daviett, chief clerk in general superintendent Usher's office, has been promoted to the superintendency of the Fourth District, with headquarters in Atlanta, vice Mr. C. B. Arrington, promoted. His district will comprise the lines and offices in the States of Kentucky and Tennessee.

Mr. C. B. Arrington has been promoted to the superintendency of the Third District, with headquarters at Atlanta, vice Mr. J. Hargrave, promoted. His district will comprise the lines and offices in the States of Alabama, Louisiana and Mississippi.

Mr. Howard A. Lanier, chief operator at Norfolk, Va., has been made manager of the Norfolk office, vice Mr. C. H. Ashburn.

Mr. J. R. Gilroy, chief operator at Toledo, Ohio, has been made manager of the Toledo office, vice Mr. A. L. Lafferty. Mr. C. B. Holley, night chief operator, has been made chief operator, vice Mr. Gilroy.

Mr. Edward J. Nally, vice-president and general manager of the company, was in Chicago last week on business incident to the appointment of Mr. Guy E. Paine as general superintendent at that point.

Mr. T. W. Carroll, general superintendent of the Western Division, Chicago, Ill., and Mr. J. P. Edwards, electrician of the Southern Division, Atlanta, Ga., have resigned.

Mr. Albert L. Lafferty, manager of the Toledo, Ohio, office, has been appointed superintendent,

Fourth District, Western Division, with headquarters at Chicago, vice Mr. H. J. Kinnucan, resigned.

On November 17 the company completed the construction of three wires between Salt Lake City and San Francisco. Congratulatory telegrams were exchanged between Mr. C. B. Turpin, manager at Salt Lake City, and Mr. J. B. Coggins, manager at San Francisco. Two of the wires are of copper, 435 lbs. to the mile. They are transposed for telephone service. They follow the Southern Pacific route, and the construction of the line is of the very best.

Mr. Chas. M. Baker, Chicago, has been appointed division general superintendent of plant of the western division, effective January 1, 1911.

Mr. A. W. Richerter, clerk in Superintendent Kimmey's office, New York, has been transferred to Boston as chief clerk in the superintendent's office.

Among recent executive visitors were: Mr. H. A. Tuttle, president and general manager North American Telegraph Company, Minneapolis, Minn.; Superintendents, C. E. Bagley, Philadelphia; H. Scrivens, Pittsburg; H. D. Reynolds, Buffalo, and acting superintendent, C. A. Richardson; Wm. Ryan, district foreman, and P. J. Farrell, quadruplex chief, Boston; F. B. Travis, manager, and G. M. Foote, assistant manager, Washington; V. J. Albert, manager, Baltimore; A. W. Rinehart, manager, Pittsburg; A. E. Zintl, assistant manager, and John Gorsuch, district foreman, Philadelphia; R. A. Barton, manager, Lancaster, Pa.; C. C. King, chief operator, and N. C. Pangburn, foreman, Albany; L. Bangert, district foreman, Buffalo.

PROMOTIONS IN THE NEW YORK MAIN OFFICE.

Mr. J. J. Whalen, assistant manager, has been appointed manager to succeed Mr. F. F. Norton, promoted.

Mr. D. F. Mallen, night manager, has been appointed assistant manager to succeed Mr. Whalen.

Mr. C. J. McCarthy, assistant night manager, has been appointed night manager to succeed Mr. D. F. Mallen, and Mr. E. A. Coney succeeds Mr. McCarthy as assistant night manager. Mr. S. C. Dodd, assistant night wire chief, has been advanced to the position of senior night wire chief, vice Mr. E. A. Coney, and Mr. J. H. Twyford succeeds Mr. Coney as senior night wire chief.

Mr. J. P. Williams, assistant all night chief, has been appointed all night chief in place of Mr. Twyford; Mr. T. P. Smith succeeds Mr. Williams as assistant night chief, and Mr. T. F. Kehoe has been appointed assistant day wire chief on the south and west to succeed Mr. Smith.

Mr. Harry R. Monahan, draftsman in the office of the electrical engineer, has resigned.

Mr. J. J. Fredericks, assistant day wire chief, has been appointed general traffic chief to succeed Mr. J. B. Rex, resigned.

Mr. A. E. Keighley, of the Dayton, Ohio, office, has been appointed assistant to manager F. J. Cunningham, at Richmond, Ind. Since Mr. Cunningham assumed charge of this office last August the business has materially increased as a result of his splendid management.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, was, at a special meeting of the directors on November 23 elected president of this company to succeed Colonel Robert C. Clowry, resigned. Colonel Clowry remains a director and was elected a member of the executive committee. The directors also elected Newcomb Carlton vice-president of the company. Mr. Carlton was a vice-president of the Westinghouse Electric and Manufacturing Company, and in 1905 he went to London as the managing director of the British Westinghouse Electric and Manufacturing Company. He was born at Elizabeth, N. J., forty-two years ago.

A conference of the general superintendents and division commercial superintendents from five of the six divisions was held in New York recently to exchange ideas and suggestions for the benefit of the service. The discussion covered matters of importance, which naturally arise in connection with a rapidly expanding business. Those present were: Mr. J. C. Nelson, general superintendent, and Mr. S. E. Leonard, division commercial superintendent, Denver; Mr. T. P. Cook, general superintendent, and Mr. M. T. Cook, division commercial superintendent, Chicago; Mr. L. McKisick, general superintendent, and Mr. J. C. Smith, division commercial superintendent, Dallas, Tex.; Mr. B. F. Dillon, general superintendent, and Mr. J. M. Stephens, division commercial superintendent, Atlanta, Ga.; Mr. A. G. Saylor, general superintendent; Mr. E. M. Mulford, division commercial superintendent and Mr. S. M. Williams, special agent, New York.

The conference was also attended by Mr. Belvidere Brooks, general manager; Mr. W. H. Baker and other officials of the company.

A conference of district commercial and district traffic superintendents of the eastern division was held in New York November 22 and 23, at which were present the following: District Commercial Superintendents, J. F. Nathan, New York; E. P. Griffith, Jersey City; N. E. Church, Pittsburg; W. A. Sawyer, Philadelphia; C. F. Ames, Boston; C. W. McKee, St. John, N. B.; J. W. Reed, New Haven, Conn. The following district commercial managers were present: A. E. Reynolds, Albany, N. Y.; O. A. Connor, Buffalo, N. Y.; G. R. Daniels, Scranton, Pa., and W. H. Spry, Newark, N. J. The following district traffic superintendents were also present: Herbert Smith, New York; T. A. McCammon, New York; W. J. Dodge, Pittsburg; J. M. Creamer, Philadelphia; L. D. Wilbourn, Boston;

D. C. Dawson, St. John, N. B.; T. E. Russell, New Haven, Conn. District traffic managers present were: Richard O'Brien, Scranton, Pa.; T. J. Meade, Albany, N. Y.; E. F. Griffith, New York; G. F. Smith, New York; A. J. Heldman, New York; J. W. McMahon and others. Others present were: E. T. Burrill, general traffic chief; W. A. McAllister, general traffic chief; W. A. Houghtaling, traffic supervisor, and F. D. Giles, special agent, all of New York.

Mr. T. W. Carroll, general superintendent of the Postal Telegraph-Cable Company, Chicago, Ill., has been appointed assistant to the general manager, with headquarters in New York.

Mr. H. C. Worthen, of the office of traffic engineer, New York, has been appointed general superintendent, Southern Division with headquarters at Atlanta, Ga., to succeed Mr. B. F. Dillon, deceased.

Mr. H. J. Kinnucan, superintendent of the Postal Telegraph-Cable Company at Detroit, Mich., has resigned to accept the position of division general agent of this company with headquarters in the same city.

Mr. J. P. Edwards, division electrical engineer of the Postal Telegraph-Cable Company, Atlanta, Ga., has accepted a position in the office of the engineer of equipment, New York.

Mr. W. A. Stallings has been appointed manager at Natchez, Miss., to succeed Mr. G. H. Bobbitt.

Mr. W. R. Hollis, of Superior, Wis., has been appointed manager of the Fargo, N. D., office.

Captain Theodore A. Royan has been appointed commander of this company's cable steamer, "Robert C. Clowry."

Mr. Alonzo M. Pearson, manager of the Cambridge, Mass., office, has been appointed special agent, with headquarters at Boston.

Mr. H. B. Simonds, chief bookkeeper in the Boston office, has succeeded Mr. A. M. Pearson as manager of the Cambridge, Mass., office.

Mr. J. B. Rex, formerly general traffic chief of the Postal Telegraph-Cable Company, New York, has accepted a similar position in the Boston office of this company.

Mr. T. E. Russell has been appointed district traffic superintendent of the seventh district, Eastern division, with headquarters in New Haven, Conn.

Mr. Joseph Slater, for many years connected with the superintendent's office in Philadelphia, has been appointed chief clerk to Mr. R. J. Meigs, district plant superintendent.

Mr. George Boothby, of the Associated Press, Albany, N. Y., has accepted a position at Philadelphia as special solicitor, and is attached to the office of superintendent W. A. Sawyer.

Mr. H. F. Dodge, division commercial superintendent at San Francisco, was a New York visitor

last week, as was also Mr. H. J. Kinnucan, of Detroit, Mich., general supervisor.

Mr. E. C. Davis, formerly of Dallas, Tex., and Kansas City, Mo., but for some months past at Los Angeles, Cal., has been promoted to be wire chief of that office.

Mr. W. J. Francis has been appointed manager of the Montgomery, Ala., office, to succeed Mr. C. A. Fonville, resigned. Mr. Francis was formerly with the Western Union, at Richmond, Va.

Mr. Harry R. Monahan, formerly draftsman in the office of the electrical engineer of the Postal Telegraph-Cable Company, New York, has accepted a similar position in the office of engineer of equipment.

Mr. R. E. Scoriah, manager of the Muncie, Ind., office, has been advanced to a similar position at Terre Haute, Ind., to succeed Mr. A. C. Cronkhite, promoted to be district commercial superintendent at Indianapolis, Ind.

Additional space for the executive offices being required, an entire floor has been rented in the New York Law School Building, on Fulton Street. The offices of M. C. Allen, division superintendent of plant, and W. J. Higgins, district superintendent of plant, will be located in this new structure.

The following appointments have been made in the Pacific Division:

Mr. J. L. Ord, division line supervisor, with headquarters at San Francisco, Cal.

FIRST DISTRICT, SAN FRANCISCO, CAL.

Mr. G. S. Tulloch, district plant superintendent.

Mr. A. W. Douglas, district equipment supervisor.

Mr. M. L. Quinn, district line supervisor.

SECOND DISTRICT, SEATTLE, WASH.

Mr. E. L. Ritter, district plant superintendent.

Mr. E. R. Fisher, district equipment supervisor.

Mr. W. R. Wolgamot, district line supervisor.

THIRD DISTRICT, LOS ANGELES, CAL.

Mr. L. Messner, district plant superintendent.

Mr. G. E. Palmer, district equipment supervisor.

Mr. T. P. Smith, district line supervisor.

Retirement of Col. Clowry, as President.

The retirement of Col. R. C. Clowry from the presidency of the Western Union Telegraph Company, and the appointment as his successor of Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, was announced November 23. Col. Clowry retires with the best wishes of all his former subordinates. He has been in harness for over fifty years, and his retirement was for the purpose of seeking a much-needed rest. Mr. Vail, his successor, was an operator in his early career, and, although his affiliations in latter years have been with telephone interests, he is thoroughly familiar with the telegraph. He is yet in the prime of life, and will make an efficient head of the great combined organization which he now represents.

The following correspondence bearing on the change will be read with interest.

The Western Union Telegraph Company.
New York, Nov. 16, 1910.

My Dear Mr. Vail:

I enclose herewith my resignation as President of the Western Union Telegraph Company, to take effect at the meeting of the Board of Directors on the 23rd instant, and shall be obliged if you will submit it to the Board on that date.

I have been continuously in the telegraph service for more than fifty years, occupying all positions from the lowest to the highest, and shall be glad to turn the work over to another.

I thank you most sincerely for your friendly and kindly consideration during our intercourse of the last year, and wish you success and happiness in your future career.

Very truly,

(Signed) R. C. Clowry.

Theo. N. Vail, Esq.,
President American Telephone & Telegraph Co., New York.

President's Office.

American Telephone & Telegraph Co.,
New York, Nov. 17, 1910.

Dear Col. Clowry:

I have yours of the 16th in which you announce your intention to resign the Presidency of the Western Union Telegraph Co.

While I am in hearty sympathy with your desire, yet I do most sincerely regret that the Company is to lose the services of one who has been so closely identified with and contributed so much to the growth and prestige of the great company.

I am sure that in your retirement you will carry with you the best wishes and good will of all who have been associated with you, not only in the telegraph, but in the telephone business.

Most sincerely,

(Signed) Theo. N. Vail.

The Western Union Telegraph Company.

New York, November 23, 1910.

To the Board of Directors,
Western Union Telegraph Company,
New York.

Gentlemen:

I hereby tender my resignation as President of your Company, to take effect to-day.

Having been continuously engaged in the telegraph business for more than fifty years, I feel that I am entitled to retire from the service and take a much needed rest.

Thanking you heartily for your confidence and co-operation in the past, I am,

Very respectfully yours,

(Signed) Robert C. Clowry.

To the Officers and Employees of The Western Union Telegraph Company.

After a continuous service of more than fifty

years in the telegraph business, I have to-day retired from the Presidency of The Western Union Telegraph Company, in order that I may hereafter enjoy a much-needed rest. The greatest regret I have, however, in so retiring, is that I shall miss the close and friendly business relations with my associates of so many years with whom it has been a pleasure and an honor to serve, and whose devotion to the interests of this great company has been unsurpassed. I am sure that your loyalty to my most worthy successor, Mr. Theo. N. Vail, will be as thorough and complete as it has been to me. I tender you all my best wishes for your good health and happiness.

(Signed) Robert C. Clowry.

New York, November 23, 1910.

Canadian Notes.

About 550 concrete poles are being erected in Toronto, Ont., by the Hydroelectric department for use in street lighting.

The Grand Trunk Pacific Telegraph Company now has in operation a continuous line of telegraph extending from West Fort William, Ont., via Winnipeg and Edmonton, to Edson, Alberta, a total distance of 1,400 miles. Twenty-three new offices have been opened between Fort William and Winnipeg. Construction work is now proceeding from Edson, Alberta, west, through the Yellowhead Pass to Tête Jaune Cache, which point it is expected to reach by December 31. From Prince Rupert eastward the line is constructed to "M. P. 100," and material is already distributed to continue the line to Aldermere, 245 miles east of Prince Rupert. During the season 1910, telegraph lines have been constructed on the following branches: Yorkton Branch, Melville, Sask., to Canora, Sask., 55 miles; Prince Albert Branch, Young, Sask., to a point 30 miles north; Regina Branch, Melville, Sask., to Balcarres, Sask., 31 miles; Calgary Branch, Tofield, Alta., to Red Deer, Alta., 87 miles. Mr. A. B. Smith, Winnipeg, Man., is manager of telegraphs, and this work is being done under his supervision.

The application of the various telegraph companies of Canada for the approval of their message forms was before the railway commission recently. During the discussion a question arose as to the liability of a company for a time schedule in transmitting a message. Up to the present time the telegraph companies have been liable for the cost only of an ordinary message in the event of a mistake being made, and of fifty times the amount in the case of a repeated message. It was suggested by the board that a maximum penalty of \$500 be fixed. The advisability of making the penalty \$200 for an unrepeat and \$400 for a repeated message was suggested. The board reserved decision.

In the Republic of Panama there are 32 telegraph offices, and during 1909 two short extensions to the telegraph system were completed.

Why Some Operators Are Unable to "Adjust."

BY J. I. MOSIER, CALAIS, ME.

We read a great deal about the operation and care of multiplex telegraph apparatus, but very little about the Morse simple circuit and relay, probably because the instruments are considered so simple that every operator should know all about them. The number of operators working simple Morse circuits must be far in excess of those working multiplex, and as there are certain conditions affecting the simple circuit and relay that are not understood by a majority of the operators, it would be well to point these out, especially since work of the most important character, *i. e.*—that affecting the movement of trains—is done on these circuits.

One quite general belief is "If I can adjust for you, why can't you adjust for me?" Many operators believe that the other operator does not know how to adjust properly. Although this is often the case, it is also due to abnormal conditions affecting the circuit which few operators understand, the principal one of which is the excess of battery power at one end of the line over that at the other end. The greater this difference the more difficult it is for the operator nearer the end of the wire with the stronger energy to adjust for the operator nearer the weaker end during wet weather, or when there is a leakage from any cause, the limit being reached, when the battery is all at one end of the line.

In the illustration we have, say, a simple telegraph circuit, twenty-four and one-half miles in length with battery at one end only, and with three stations, the apparatus consisting of 150-ohm relays. Let it be assumed that this circuit consists of iron wire having a resistance of 20 ohms per mile, and that there is a leak at *X*, one mile from *C*, having a resistance of 200 ohms, and caused by contact with a telephone, guy, or fence wire.

First consider the resistance from ground at *A* to the point *X*.

Ground connection,	30 ohms.
Battery, 50 cells, 2 ohms each,	100 "
23½ miles wire, 20 ohms per mile,	470 "
2 relays, each 150 ohms,	300 "

Total resistance, ground *A* to *X*, 900 ohms.

As the resistance of each path from *X* is 200 ohms (one path consisting of the 200-ohm leak, and the other, one mile of wire, one relay, and ground connection), the joint resistance from *X* to ground will be,

100 "

Total resistance of circuit, 1000 ohms.

When all of the keys are closed the battery will produce a current of $50/1000 = 1/20$ ampere, or $1/20 \times 1000 = 50$ milliamperes. At *X* this current divides into two equal parts, since the two paths are of equal resistance, 25 milliamperes going through the leak, and 25 milliamperes through the relay at *C*. This is ample current to operate the relay so that the operator at *C* will have no diffi-

culty in reading the signals sent by the operators at *A* or *B*.

Now what happens when the operator at *C* signals? When his key is closed 50 milliamperes of current flow through relays at *A* and *B*. When his key is open, the resistance of the circuit is made up as follows:

Ground connection at <i>A</i> ,	30 ohms.
Battery,	100 "
23½ miles wire,	470 "
Two relays (<i>A</i> and <i>B</i>),	300 "
Leak,	200 "

Total, 1100 ohms.

The current flowing in this circuit will be $50/1100 = 1/22$ ampere, or $1/22 \times 1000 = 45\ 5/11$ milliamperes.

Then with the key at *C* closed, 50 milliamperes flow through relays *A* and *B*, while with the key

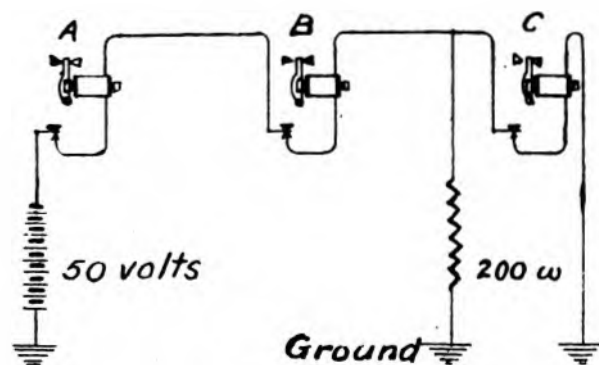


DIAGRAM OF A CIRCUIT WITH BATTERY AT ONE END.

at *C* open, $45\ 5/11$ milliamperes flow through *A* and *B*, leaving a working margin of only $4\ 6/11$ milliamperes. It would be impossible under these conditions for the relays at *A* and *B* to be adjusted.

The same holds good in a lesser degree, when there is a higher voltage at one end of the line than at the other.

Although this explains one of the reasons why some relays can be more easily adjusted than others, there is no justification for other offices being thrown out of adjustment by either a decrease in current or a slight leak on the line. In either case the cause is invariably due to the armature having too much play. Such a condition necessitates a comparatively weak retractile spring, otherwise, the armature falling back so far from the magnets will not be attracted with sufficient force to move promptly to the front stop when the circuit is closed.

Now if the current is decreased by any of the various causes, all relay magnets in the circuit will be proportionately weakened, and the armature lever of the relay in question will remain against its back stop, the weakened magnets not exerting force enough upon the armature at such a distance.

Again, if there is a slight leak from the line to the ground at any point, the armature lever of this relay will remain against its front stop, even when a key

is opened beyond the leak, the weak spring being unable to overcome the magnetic pull caused by the short circuit resulting by reason of the leak. A good general rule to follow is to give the armature not more than $1/32$ inch play. This adjustment will prove satisfactory for practically all conditions.

Although the magnets and spring have to be adjusted to meet existing conditions, there is a medium in their adjustment for normal conditions to give the relay the greatest efficiency. The magnets should not be placed so near the armature that the increased self-induction will cause the relay to act sluggishly, or sticky. The spring should be stiff enough to pull the armature back promptly even if there be a slight leak on the line. For "high" adjustment during wet weather, it is better to pull the magnets well back, than to make the spring too stiff, as a weak spring is more sensitive than a stiff one.

With one or two exceptions the above applies to box relays and main line sounders, as well as the common relay. In wet weather, the magnets of box relays cannot be pulled back as far as those of the common relay, because the magnetic pull has to overcome not only the spring, but also the inertia of the heavy lever.

Generally speaking apparatus designed to be used without a sounder cannot be so well adjusted for a small working margin, owing to the weight of the lever.

Meeting of Eastern Division of Association of Railway Telegraph Superintendents.

A largely attended meeting of the Eastern Division of the Association of Railway Telegraph Superintendents was held November 16 and 17 in the board room of the new Pennsylvania Railroad Terminal, in New York. The discussion of the subject of telephone train dispatching and inspection of lines occupied a considerable portion of the time. On the subject of insulators, Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway, Montreal, related his experiences with glass and porcelain insulators. Those of glass were subject to frequent breakage, especially when fixed on iron pins, while those of porcelain were much more durable. He had tried three makes of porcelain insulators, two American and one German. The German product had given the best satisfaction. Compared with glass insulators, they cost about 50 per cent. more.

Mr. E. P. Griffith, superintendent of telegraph, Erie Railroad, Jersey City, N. J., and chairman of the Turner Monument Fund, gave an account of the work of the committee in securing subscriptions toward the fund of \$3,000 for the erection of a monument at Turner, N. Y., to commemorate the sending of the first telegraph train order. He also displayed a blue print of the proposed monument. The action of the committee thus far received the approval of those present.

Mr. Charles Selden, superintendent of telegraph,

Baltimore & Ohio Railroad, Baltimore, was re-elected chairman of the Eastern Division for another year. The following-named gentlemen were present at the meeting: Mr. Charles Selden and Mr. B. F. Thompson, Baltimore & Ohio Railroad, Baltimore, Md.; Mr. E. P. Griffith, Erie Railroad, Jersey City, N. J.; Mr. W. C. Walstrum, Norfolk & Western Railroad, Roanoke, Va.; Mr. W. P. Cline, Atlantic Coast Line, Wilmington, N. C.; Mr. L. B. Foley, Lackawanna Railroad, New York; Mr. A. B. Taylor, New York Central Lines, New York; Mr. J. T. Nolan, Washington Terminal, Washington, D. C.; Mr. W. H. Potter, Southern Railway, Washington, D. C.; Mr. W. J. Camp, Canadian Pacific Railway, Montreal, Que.; Mr. S. A. D. Forristall, Boston & Maine Railroad, Boston, Mass.; Mr. N. E. Smith, New York, New Haven & Hartford Railroad, New Haven, Conn.; Mr. W. F. Williams, Seaboard Air Line, Portsmouth, Va.; Mr. L. S. Wells, Long Island Railroad, New York; Mr. J. F. Caskey, Lehigh Valley Railroad, South Bethlehem, Pa.; Mr. W. F. Taylor and Mr. J. M. Dietz, Pennsylvania Railroad, Altoona, Pa., and Mr. C. L. Lathrop, Pittsburg, Shawmut & Northern Railroad, Angelica, N. Y.

At the conclusion of the meeting on November 16 the party inspected the magnificent terminal of the Pennsylvania Railroad, and later were entertained at luncheon at the Waldorf-Astoria Hotel by the Western Electric Company.

On November 17 Mr. Belvidere Brooks, general manager of the Western Union Telegraph Company, entertained the superintendents at a dinner at the Lawyers' Club, New York. Among those present, besides Mr. Brooks and the railroad superintendents, were Mr. H. B. Thayer, president; Mr. H. Halligan, general manager, and Mr. A. L. Salt, of the Western Electric Company; Mr. W. H. Baker, Mr. F. A. Pickernell, and all of the visiting general superintendents, and the division commercial superintendents of the Western Union Telegraph Company.

New York Electrical Society.

The New York Electrical Society will hold several interesting meetings during the present season. Among the topics to be considered are the following: "Electricity at the Panama Canal," by Mr. David B. Rushmore; "Wave Motion by Electricity and Other Energy," by Dr. Charles P. Steinmetz. A visit will be made to the laboratory of Mr. Thomas A. Edison at Llewellyn Park, West Orange, N. J., on which occasion it is stated that Mr. Edison will give a talk on "The Edison Storage Battery and Its Applications." Besides an inspection of the laboratory there will be an exhibition of moving pictures.

Mr. J. B. Prudhomme, manager of the Postal Telegraph-Cable Company, at Texarkana, Tex., writes in sending his subscription for another year, "Better late than never."

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December 1, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

The Telegraphers' Mutual Benefit Association.

The report of President Brooks of the Telegraphers' Mutual Benefit Association indicates that the association's affairs are in a very satisfactory condition. Notwithstanding the high death rate the reserve fund has been increased very substantially and there is every reason to believe that this progress and growth in stability will continue. But in order that it may be still more increased the individual members should take an active part in the association's work by aiding in enlarging the membership. An element of added strength is the proposal to create an advisory board consisting of members in different sections of the country to act with the Executive Committee. This was an important action and the advantages that the association will derive from it cannot be overestimated. In addition it was ordered that all past presidents be created ex-officio members of the committee. The wide experience and the accurate knowl-

edge of the Association's affairs possessed by its past presidents individually will, under the new order, be co-ordinated and rendered available for the benefit of the association.

President Brooks called attention to the importance of members having their certificates of membership made payable to some person or persons as beneficiaries. In the event of the death of the beneficiary named in the certificate before that of the policy holder a new beneficiary should be named. This will prevent delay in settling claims, and avoid the necessity of the estate being placed in the hands of an administrator which is a tedious and expensive method of settlement. The report advises that earnest efforts be made to interest telephone employees and acquaint them with the advantages of membership in the association. There is certainly a wide field here for effective work now that the telegraph and telephone interests are so closely allied. It would certainly be a great advantage to have the telephone interests represented on the official board, as President Brooks recommends. That alone would tend to secure the active interest of eligible telephone men, and such representation, supplemented by earnest and wide field work, should be very effective in building up the strength of the association. The success of this task however depends largely upon the individual members. The officers and agents of the association cannot do all the work; they need help from the members. The members themselves can accomplish much if they will only give the matter a little consideration and time. It is a work of humanity that all the members should participate in most heartily.

Government Ownership of Public Utilities.

The question of government ownership of public utilities has lost its old-time vigor, but some thought is yet being bestowed upon it in many localities generally unfavorable to the theory. This agitation, like all other agitations, may be likened to a swinging pendulum. After it starts it gathers momentum until it reaches a certain point in its progress, then its momentum decreases and it returns to the point where all forces are in equilibrium. So it is with all innovations. Sober thought throws light upon all human problems, and it is beginning to dawn upon some State and municipal officials that the effect of government ownership of railroads, telegraphs, telephones, etc., would wipe out a very large tax revenue derived from these private interests for the support of State administration. With these taxes gone who would come to the relief of the States' needs? The taxpayer of course. This would be an expensive lesson in government ownership and the taxpayer will probably have something to say about the matter if the question should ever be put to a test. He will think twice before taxing himself to support interests that are not neces-

sarily a benefit to all the people, and which should remain in private ownership and be taxed directly. Government ownership of these public utilities would therefore mean, in effect, the taxation of the many for the benefit of the few. The taxpayer is beginning to realize the truth about this matter and while the realities of the situation are becoming more widely known it is necessary to be on constant guard and ready to meet and elucidate the government ownership fallacy whenever it is revived.

As is well known, Kansas is the breeding ground of ideas of a populistic nature, and the following comment on this subject from the *Leavenworth Post* seems like a thunderbolt from a clear sky:

"Government ownership of the railroads would be a nice thing, wouldn't it? In Leavenworth county the railroads and telegraph companies pay almost one-fifth of all the taxes. Under government ownership they wouldn't have to and they wouldn't have to pay \$500 for every \$25 cow they killed either."

The Child Labor Question Applied to the Messenger Service.

As an example of how the child labor law is being enforced to the detriment of the ambitious boy desirous of assisting his family while working his way through school, an official of one of the telegraph companies has received letters from the manager of an office in a state where the laws forbid a boy under sixteen years of age from working unless he has permission from an official of the school department, which shows that during last summer's school vacation a boy aged fifteen years and six months applied for work as a messenger. In the absence of the school official, authorized to issue the certificate, permission was not obtainable. The mother assured the manager of the telegraph office that the boy was nearly sixteen years of age and needed what money he could earn. The manager gave him employment between the hours of 8 a. m. and 5 p. m. An inspector discovered the boy at work and had the manager arrested and fined for employing him. Later the proper official of the school department returned and issued permission for the boy to work until the commencement of school, at which time he was compelled to relinquish his employment and return to school. Under such laws and those certain philanthropists are seeking to write upon the statue books, it will no longer be possible for the youth of this country to be self helpful. He may run the streets as a vagrant but he must not perform honorable labor.

If such laws are to be enforced a public office should be kept open in each town and city where parents may take their boys and obtain permission for them to seek employment. Ill-considered legislation seeking to prevent boys from earning an honest livelihood will tend to discourage ambition and encourage idleness.

Old Time and Military Telegraphers.

Col. William B. Wilson, of Philadelphia, president of the Old Time Telegraphers' and Historical Association, has announced the executive committee for the management of the affairs of the association for the ensuing year as follows: Wm. J. Lloyd, Chicago, Ill.; G. A. Cellar, Pittsburgh, Pa.; H. D. Reynolds, Buffalo, N. Y.; John C. Barclay, New York; G. W. Deetz, Atlantic City, N. J.; F. W. Griffin, Philadelphia; J. A. McNichol, Philadelphia; A. S. Weir, Philadelphia, and John Wintrup, Philadelphia.

The next reunion of the Old Time Telegraphers' and Historical Association and of the Society of the United States Military Telegraph Corps, of which Col. Wilson is also president, will be held at Atlantic City, N. J., next September on a date yet to be chosen. Mr. David Homer Bates, 658 Broadway, New York, is secretary of the Society of the United States Military Telegraph Corps, and Mr. F. J. Scherrer, 195 Broadway, New York, is secretary of the Old Time Telegraphers' and Historical Association.

Secretary Scherrer is now busily engaged in putting the finishing touches on the printed proceedings of the Chicago reunion last September, and this valuable addition to the literature of the association will soon be ready for distribution.

Mr. Deetz, the Atlantic City resident of the Executive Committee, is manager of the Western Union Telegraph Company at that point and will be assisted by Mr. A. C. Farrand, superintendent of the Electrical Bureau of that city.

Division Reorganization of Postal Telegraph-Cable Company.

The Postal Telegraph-Cable Company has decided upon a radical move in connection with its division organization. Instead of scattering its superintendents throughout the country, they will, in due time, be located at the division headquarters, where they will form a cabinet, as it were, for the general superintendent. The new plan has many advantages over the old one. It will do away with the writing of many letters covering a multitude of subjects that can best be disposed of orally, in conference, and will enable superintendents to readily confer with one another upon all matters pertaining to their respective districts.

It is not intended that superintendents who are located at points distantly remote from headquarters shall be brought in, nor is it expected that the changes will be made at once. It will be done gradually, and so as to cause the least inconvenience to the interests of the men and the company. It will be noted that in the different promotions and changes announced in this issue, that wherever a new superintendent has been appointed, his headquarters will be the headquarters of his general superintendent.

Copies of electrical books covering the electrical industry may be purchased at the office of Telegraph and Telephone Age, 253 Broadway, N. Y.

Telephone Service in America.

We published in our issue of November 1 a portion of the address of Mr. John J. Carty, chief engineer of the American Telephone and Telegraph Company, delivered at the International Conference of European Telephone and Telegraph Administrations, held in Paris last September. Mr. Carty compared the manual switchboard and the automatic switchboard and pointed out the limitations of the latter in large plants. He also told of the plans of his company to care for telephone growth for the next twenty years. The concluding portion of Mr. Carty's address related to the experimental demonstration now in progress at New York of a semi-automatic telephone system. On this subject Mr. Carty said:

Having stripped our question of its verbal disguise, we see that the two systems [manual and automatic] are not so antagonistic as would at first appear. They both stand upon this common ground: Each recognizes the importance of manual operations guided by human intelligence; each recognizes the importance of automatic machinery; each system employs both agencies; each system is semi-automatic.

We are now prepared to formulate the question anew. We see that it becomes a problem of dividing the total operations to be performed, in such a manner that labor guided by human intelligence shall be employed where it is most effective, and that automatic machinery shall be employed where it is most effective. Properly stated, therefore, our question is "What is the best type of semi-automatic switchboard?"

The so-called automatic system, as I have shown, is found unsuitable for the demands of a comprehensive system. The so-called manual system has been tested by the most severe demands of a system composed of 5,000,000 telephones, and it has been found to answer every substantial requirement. By its means we are to-day giving an excellent service and our studies of the future requirements show that if nothing better is attainable, we can, with the manual system, supply in a satisfactory manner all the demands of the public.

But it would not do for us to rest content with this. We must at all times strive for improvements. These are the traditions of the American Telephone and Telegraph Company, added to which are the specific orders from President Vail frequently reiterated, that we must constantly seek for improvements so that we may at all times when it is reasonable and practicable, place at the disposal of the public that system which solid experience has demonstrated to be the best.

Pursuant to this policy we have spent hundreds of thousands of dollars in experiments and investigations pertaining to this subject.

We have, after many years of work, developed and are now installing at New York for an experimental demonstration, a system which is avowedly semi-automatic and not disguised under another

name. The advocates of this system contend that it is a mistake to place, as is done in the so-called automatic systems, complicated automatic machinery at each sub-station. (A sub-station is any telephone set at the subscriber's premises which may be connected to the central office.) They favor the use of a sub-station instrument identical with that employed in the so-called manual, and they assert that this instrument is really much more automatic than the instrument employed in the so-called automatic system itself.

We must admit that there is much force in this statement, for an analysis of the operation of the two instruments shows that the manual operations required at the automatic station are several times more numerous than at the manual station. In fact all of the manual operations required at the manual station are also required at the automatic station. To these must be added at the automatic station a number of other manual acts, depending upon the character of the call to be sent.

It is further asserted that the apparatus at the automatic sub-station is complicated to a high degree, whereas at the manual station it consists of simple elements, and that in consequence of this, with the vast multiplication of stations which must take place in a successful telephone system, the automatic system would be placed at a great disadvantage.

In this semi-automatic system about which I am now talking, a counterpart of the automatic apparatus which is required at each subscriber's station in the automatic system, is placed at the central office. Thus one of these pieces of apparatus is required for each "A" operator's position instead of one for each sub-station on the subscriber's premises. This greatly reduces the number of complications, and one of them being required for each operator's position only, much more money is available to be expended upon its construction. Hence it can be made with great precision and so as to give much more reliable working. Furthermore, these pieces of apparatus being at the central office, they are under the constant care of expert maintenance employees, who can instantly substitute a spare apparatus for one which should become defective.

It is contended on behalf of this semi-automatic system that the "A" operator's position (the "A" operator is the one who answers the subscriber in the first instance), is a point at which human intelligence is needed, because of the numerous exigencies of the service. I have carefully looked into this statement, and I am much impressed with the force of the reasons given in support of it. While the position of the "A" operator seems to be one where human intelligence is required, it is not so at the position of the "B" operator (the "B" operator is the one who receives the trunk call from an "A" operator at another office). When the work of this "B" operator is analysed it will be found theoretically that it can all be done by machinery and that the work to be performed does not require human intelligence. Consequently, in this semi-automatic system, all of the "B" operators are eliminated and

machines substituted. This very greatly reduces the total number of operators required, and if the machinery can be made to work satisfactorily, it is believed that greater precision of working will be attained. This expectation is based upon statistics which show that a large part of the errors made at the central office take place between the "A" operator and the "B" operator.

As the pieces of automatic apparatus needed in the semi-automatic system at the "A" operators' positions in the central office are relatively small in number, it does not seriously increase the total expense to design and construct them with the greatest care and with the best workmanship, so that the utmost degree of precision may be obtained in their working. On account of the enormous number of such pieces of apparatus which would be required if they were distributed at the subscribers' premises, one for each telephone station as is required in the automatic system, the same high degree of design and workmanship cannot be applied, because the costs would be multiplied exceedingly. Hence in respect to these vital parts of the two systems, the automatic system must always stand at a disadvantage.

The result of this has been to produce for the semi-automatic system an apparatus operated by a keyboard similar to that used on the typewriter. Working with such a keyboard, it has been experimentally demonstrated that the "A" operator can handle a very much greater number of calls than she could in the so-called manual system. This fact greatly reduces even the number of "A" operators.

The advocates of this system contend that they have made the best division of labor, the best distribution of automatic machinery, and that they can attain a higher degree of efficiency and much lower annual costs than are attainable with either the so-called manual system or the so-called automatic system.

Engaged upon this study and upon these experiments we have had a corps of capable engineers and experimentalists working for years, and I feel warranted in attaching great weight to their favorable expectations.

Soon after my return to America, I hope to be present at the opening of the semi-automatic switchboard, and until we have obtained the results of this working, there is not much more that I can profitably say upon the details of the subject.

In conclusion, the situation as I view it, is as follows: The so-called automatic system is not, in fact, automatic, it is only partly so. It has been fairly and exhaustively studied and found to be unsuitable for the comprehensive demands of our present service, and more and more unsuitable when considered with respect to the demands of the future.

The so-called manual system has successfully withstood the severe demands of a system comprehending 5,000,000 telephones, and all of our careful studies with respect to future growth have shown that if nothing better were obtainable, it would furnish to us a means whereby we could supply an ex-

cellent universal service to all the people of the United States.

As I have already stated, a third system, frankly called a semi-automatic system, is about to be practically tried. If the expectations regarding it are realized, it will be a system more efficient and more economical than either the so-called manual or the so-called automatic.

Before leaving this subject, I wish to speak briefly upon one point. It has been said by some that we have not generally adopted the so-called automatic system, because we have been deterred by the large expenditure of money which would be required.

I shall promptly show you that there is no truth in this. The history of the telephone in America has been that of rapid change from one system to another, as soon as improvements have been demonstrated. Pursuant to this policy, the plant at New York has been constructed and reconstructed three times. A similar story is to be told of the rest of the country. Our company has been so conservatively financed and our administration has been so keen to adopt new improvements, that ample depreciation funds have been accumulated so that just as soon as it is demonstrated that a better switchboard system is available, we are prepared to begin its installation and proceed with the utmost practicable speed to make the change. All of this could be done without the slightest disturbance in our financial arrangements.

While there rests upon us the responsibility of adopting as soon as it is practicable and reasonable to do so that which is best, there is a corresponding and most serious obligation of not throwing away what has been demonstrated to be a thoroughly efficient system, without having it conclusively demonstrated that there is something better. I do not see anything in the present state of affairs which need give any company or any administration any concern with respect to the possibilities of a sudden change, for even if it were demonstrated that a better system were now available, it would be impossible, taking into account the manufacturing and engineering resources of all the world, to make the change except in a gradual manner. We have already had so much experience with such changes that we know how they must take place. They are accomplished by a process of gradual evolution and not by sudden revolution.

In every administration there are from time to time switchboards which have been worked for the full period of their life. These must be replaced in any event, and when such cases arise, the new type of switchboard is installed. This does not involve the abandonment of apparatus having further usefulness. There are also constantly arising cases where new installations must be made. These can be installed on the new plan. Obviously, this does not require that any existing apparatus be thrown away. The manufacturers and the administration staffs would find themselves so fully occupied with this work that they would not for some years be able, even if it were desirable,

to disturb those central offices in which the switchboards have many more years of life. It will be found that by the time the old switchboards have been replaced and the new ones installed, those switchboards which have had to be removed in advance of the expiration of their life would be few and in those cases the work would not be anticipated by a great many years. Even where a switchboard is removed before its life has expired, this need only be done when it is found best, all things considered, to replace it by a new one rather than to continue it in service. There is nothing in this situation which demands a headlong rush, so without wasting any time, we should proceed with deliberate care. We, who are charged with the great responsibility of rendering such an important service to the public, cannot be justly criticised if we refuse to be carried away by the enthusiasm of manufacturers and inventors and thus to be led into a wholesale and probably disastrous experimentation upon the public.

In America we have pursued this subject for many years with the utmost diligence. An important practical demonstration is about to be made. We cannot foretell the answer, but we must accept it whatever it may be.

I have told some of the things we have done. It has been our constant aim to keep an open mind and to be free from bias. We are seeking only the truth, and from that we have nothing to fear.

Convention of the Bell Telephone Contract and Commercial Men.

The convention of the contract and commercial men of the Associated Bell Telephone Companies, held at Montreal, September 20 to 23, which was briefly noted in our issue of October 1, was an important one as to the number and variety of papers. The first day of the convention was devoted to the consideration of the subject of organization. Papers were presented by I. P. Sylvan, of the American Telephone and Telegraph Company on "Proper Scope of the Commercial Department," by C. H. Weber, division manager of the Chesapeake and Potomac Telephone Company on "Interdepartmental Relations," and by M. C. Rorty, division manager of the Central District and Printing Telegraph Company on "The Functions of the Commercial Engineer." Selling methods occupied the attention of the delegates on the second day. J. F. Greenwalt, publicity agent of the Colorado Telephone Company, discussed "Publicity Methods and Advertising Telephone Service." George C. Brooks, general contract agent of the Central Union Telephone Company, presented a paper on "Directory Advertising." A. Von Schlegel, general contract agent of the Michigan State Telephone Company, read a paper on "Methods of Selling Local Exchange Service." F. C. Monroe, commercial engineer of the New England Telephone and Telegraph Company, discussed "Methods of Promoting Toll

Service." J. H. Crosman, Jr., division manager of the Bell Telephone Company of Pennsylvania, presented a paper on "Standard Units for Determining Selling Efficiency." On the morning of the third day rural development was discussed and papers dealing with this subject were read by C. E. Hall, assistant general commercial superintendent of the Iowa and Nebraska Telephone Companies, and L. N. Whitney, division superintendent of the Central Union Telephone Company. In the afternoon S. M. Williams, special agent of the Western Union Telegraph Company, New York, read a paper on "Supplementary Relations of Telephone and Telegraph." J. R. A. Hobson, general commercial superintendent of the Southern Bell Telephone and Telegraph Company, discussed "Relations Between the Western Electric Company and Operating Telephone Companies."

The fourth and concluding day was given over to the consideration of collections. A. E. Berry, division manager of the Bell Telephone Company of Pennsylvania, discussed "General Collecting Methods," and James H. Barry, division commercial superintendent of the New England Telephone and Telegraph Company, read a paper on "Standards of Efficiency in Collection Work."

After the business of the convention had been concluded the delegates were given a dinner, at the Windsor Hotel, by the American Telephone and Telegraph Company, the arrangements for which were made by Mr. H. S. Brooks, of New York, general commercial superintendent of that company.

Supply of Telegraph Poles for England.

Up to comparatively recent years the main supply of telegraph poles for the British postoffice was drawn from Norway and Sweden, but latterly, owing to the supply from these countries falling short of requirements, recourse has had to be made to Riga, Russia, and the neighboring district, and, as a matter of fact, at the present time Russia is the principal source of supply. Home-grown larch poles are also used to some extent, especially where very long lengths—from seventy to eighty feet—are required. Sufficient data have not been obtained regarding the lasting properties of larch poles in England to warrant a very extensive use of this class of timber. The Department sometimes has recourse to pitch pine for square "terminal" poles. These are purchased locally, the timber being imported from the Eastern states of North America.

The total output of copper sulphate in the United Kingdom during 1909 was 63,000 long tons, valued at \$7,402,000. Of this quantity 26,000 tons were produced in chemical works, 36,000 tons from copper and brass factories, and about 1,000 tons in a number of other industries.

Telegraph and Telephone Age is headquarters for electrical books.

The History of Telephone Train Dispatching.*

BY G. K. HEYER, NEW YORK.

The year 1851 marked the first systematic attempt to telegraph orders from a central point to trainmen and conductors. From that time until within the last few years, to one familiar with railway operation, the thought of train dispatching carried with it the thought of telegraphy.

Very soon after the telephone had come to be generally used as a means of carrying on communication between distant points, some thirty years ago, the question was raised with regard to whether or not this new and improved method could be drafted into service for directing train movements. The controlling minds of the railroads who had expressed themselves by means of the Morse key had come to consider the telegraph as much a part of the regular operation of the system as to believe it synonymous with quick, safe and efficient operation. They were disposed to let well enough alone and could not feel themselves free to advocate the use of a system which, to them, was comparatively new and untried.

Another argument against the use of the telephone was the feeling among operators that the passing of the telegraph would seriously affect their positions. This fear, however, has not been borne out by subsequent events, and the railroads have shown every disposition to retain the operators in their old positions. On serious thought, this could only be expected, as the welfare of the railroads makes necessary the employment of men who know the railroad business and in few cases, if any, have operators lost their positions due to the use of the telephone, except as the result of some act of their own.

While there were those who believed that the telephone would be satisfactory in double and multi-track operation, there was much skepticism with regard to its use on single-track roads. This fear has, however, been proven to be groundless by the results obtained in actual practice, and when carefully considered, it will be found that any means which would allow the dispatcher to more clearly express himself and thus relieve the traffic problems on double-track roads would lend themselves with added benefits to the solving of the more complex operation on single-track systems. The fact that the use of the telephone had long been advocated did not prove anything and the level-headed railroad men were justly demanding absolute proof. This proof was forthcoming as soon as the first few installations of telephone and selector equipment had been given a practical trial.

The New York Central lines were the first to install equipment of this nature and in October, 1907, a section of the main line between Albany

and Fonda, a distance of 44 miles, with 16 way stations, was completed.

The installation on the New York Central was closely followed by a number of installations on the Chicago, Burlington & Quincy Railroad, in December, 1907, when the main line between Aurora and Mendota, Ill., a distance of 46 miles, was equipped with 11 stations. After this, a section from Aurora to Galesburg, Ill., a distance of 125 miles, with 16 stations, was equipped, and another section between Aurora and Clyde, the end of the Chicago terminals, a distance of 28 miles, with 15 stations. These circuits all covered double-track where reversed movements were made.

Within a short time after the completion of these sections, and convinced from the results obtained that single-track operation presented no problems which could not be solved by the use of the telephone, the Chicago, Burlington & Quincy Railroad, equipped a single-track section of road between Aurora and Savanna, Ill., a distance of 106 miles, with 23 way stations. These installations on the New York Central and the Burlington produced the proof for which many had been waiting, and these roads can justly be called the pioneers in telephone train dispatching.

The extent to which the telephone has been adopted by railroads is shown by the following list of roads, each having telephone circuits covering over 1,000 miles. These figures include in most cases equipment installed and under construction both on train and message circuits: Atchison, Topeka & Santa Fe, 6,083 miles; Lake Shore & Michigan Southern, 2,000; Pennsylvania Railroad (east of Pittsburg), 1,407; New York Central lines (including the Boston and Albany), 1,255; Big Four, 2,500; Illinois Central, 2,100; Canadian Pacific, 1,694; Great Northern, 2,000. (will eventually have 6,000); Chicago, Milwaukee & St. Paul System, 1,300; Louisville & Nashville, 1,261.

In addition to the above named roads, there are 47 which have one or more telephone train dispatching circuits in operation, the total number of roads being 57 and the mileage covered approximately 35,000.

The Lackawanna is the only railroad that has installed telephone and selector equipment over practically its entire system. This road, out of a total of 957 miles, has equipped 933, on which there are 271 stations. There are several other railroads, however, which will be fully equipped when plans already worked out are carried to completion. In fact, it is only a matter of a few years when the telephone will probably entirely replace the telegraph for the dispatching of trains as well as for the transaction of all local, commercial, message and routine business. This is proven by the fact that already a number of telephone circuits are owned jointly by the Western Union Telegraph Company and the railroads for the transaction of this class of business.

*Extract from an Address before the Engineers' Society, of Harrisburg, Pa., October 10.

Balancing Quadruplexes and Duplexes.

A correspondent in a western city writes us in substance as follows:

In the article by Mr. Edgar C. Dodge on the subject of balancing quadruplexes and duplexes, published in your issue of November 1, that gentleman makes the statement that magnetic balances are never maintained for more than a few minutes at a time, and that an operator will throw out his magnetic balance if it will improve the working of the circuit.

The rule has been to never do this except in extreme cases, as it simply means that another office is out of balance, and that as soon as he lines up you will be called in again to rearrange your balance because you biased your instrument. His recommendation of doing away with the ground in balancing is not advisable. At best his balance would be a guess.

With a view to ascertaining current practice in regard to balancing, we referred our correspondent's letter to Mr. Minor M. Davis, electrical engineer of the Postal Telegraph-Cable Company, New York, inviting him to make a statement on the subject. Mr. Davis says:

"It is certainly possible to get a pretty good balance in the manner Mr. Dodge describes, but I have never seen anyone get a perfect balance in that way.

"In the *Telegraph Age* of October 1, 1898, Mr. Willis Jones describes an excellent way to balance, and in the *Telegraph Age* of May 1, 1899, Mr. B. P. Hancock describes another method.

"In my judgment the quickest and surest way to get a good balance is to have the distant station ground until you centre your polar relay armature. This places the armature in the best position to indicate the effect of slight changes in the rheostat and condensers. You can find the centre in a very few seconds and then get an approximate balance upon the polar relay in the usual way. Even a wire of unknown resistance can be approximately balanced very quickly in this manner. Having secured an approximate balance it is very good practice to have the distant station cut in and dot on the neutral side. With the long end closed and the home keys quiet, the neutral relay should be turned down as low as it will go, and still clearly produce the dots from the distant station. The home battery should then be reversed. If this makes the dots from the distant station heavier or lighter, the rheostat should be changed until the reversal of the full home battery does not affect the incoming dots.

"After securing a resistance balance the static balance should be taken while the distant station has the short end to line. With the distant keys quiet, the neutral relay should be turned very low, and the condensers and condenser resistances then adjusted until reversals of the home battery, no matter how rapid, do not affect the neutral relay. It is vitally important to get a perfect static balance. Experience in balancing will soon teach an observant person to readily detect whether an unbalance is caused by the rheostat or by the condensers.

"I believe the above method will give the best obtainable balance under all weather conditions. It can be very quickly taken by anyone skilled in the art. It is a great advantage, however, to be able to balance without calling upon the distant station to ground and, upon the whole, I agree with Mr. Dodge that chief operators should learn to balance without doing so. They can readily learn, and the only risk is the possibility that the polar relay will not be at its very best adjustment. A very good procedure is to get an approximate balance by feeling the movement of the polar relay armature (see Mr. Dodge's article in *Telegraph and Telephone Age*, November 1, 1910) and then refine it by the methods described above. Another good way is to notice the effect of your own reversals upon the neutral relay, while the distant station has the short end to line and his keys quiet.

"Polar duplexes may be balanced without grounding by getting the distant station to write or dot and by carefully adjusting the relay so that it will be sensitive to slight disturbances. For instance, if the relay is adjusted to make the incoming signals very light while the home key is open, the signals will become lighter or heavier when the home key is closed, unless the balance is good. Having adjusted the relay to the position giving very light signals a balance can be secured by changing the rheostat and condensers until the signals are not affected by movements of the key. It is probable, however, that most repeater chiefs use the method described by Mr. Dodge. It is common practice to hold a pencil against the armature of the polar relay and thus feel the effect of reversing the home battery when the distant key is quiet. The pencil is soothing to the nerves when local current pressures are high or when the relay is a direct point repeater.

"The writer thinks it pays to equip duplexes with galvanometers or neutral relays to facilitate balancing. Certainly all chief operators should learn to balance without requiring the distant station to ground, and the article by Mr. Dodge ought to do good.

"While discussing the subject of balancing quadruplexes and duplexes I may take the opportunity to call attention to the great utility of a small wooden rod for use in listening to the signals. Relays and transmitters often appear to be doing their work properly when in reality they are not. If one end of a wooden rod is placed against the metal work of the marking contact of a repeating relay or transmitter and the other end of the rod is placed against the ear a much more accurate knowledge of the action of the points can be obtained than can be obtained in any other way. The use of wooden rods for this purpose was at one time very general, but during the past year or two a good many repeater chiefs seem to have discarded them. The rods seem to me to be of very great value, particularly in handling direct point repeaters."

The Military Telegrapher in the Civil War.

PART I.

One of the prominent military telegraphers during the civil war was Major Charles O. Whitney, who, after the cessation of hostilities, settled in Alabama, where he was honored by being elected to the State Legislature and to other positions of importance by his fellow-citizens. Major Whitney died at Blue Springs, Tenn., August 27, 1875, at the age of 42 years. His nephew, J. B. Hamatt, an old member of the telegraphic profession, now a resident of Peoria, Ill., has furnished us with some information concerning his uncle's career, which stamps Major Whitney as a man of unusual ability and energy for one of his age, and one who had a faculty of making friends with employers and employes alike. His life was a checkered one. Born in Brattleboro, Vt., January 31, 1834, his father died when he was an infant. He made one voyage at sea, and when yet a mere lad learned telegraphy. He was married in Deposit, N. Y., when twenty-two years of age, and served as an operator a year in Brooklyn, N. Y., and another year in Jersey City. He then spent some time in the south, whence he went to Michigan



MAJOR CHAS. O. WHITNEY.

City, Ind., in 1857, and remained there a year, following his profession. He next went to Minnesota, in 1858, where he engaged in agriculture and land speculation. In 1861 he removed to Clinton, Ia., where he was engaged as operator and superintendent of construction, until 1863, when he joined the army and went south. He was at once detailed as chief operator and superintendent of telegraph at the headquarters of the Seventeenth Army Corps, commanded by General Dodge. In this capacity he accompanied Sherman's army to Atlanta, rendering a very efficient telegraph service. After the close of hostilities he settled at Scottsboro, Ala., where he engaged in the merchandise business. He was chosen a member of the Alabama Constitutional Convention in 1867, and elected to the State Senate upon the adoption of the Constitution, which office he held four years. In 1869 he built a line of tele-

graph on the Alabama & Chattanooga Railroad, 300 miles in length; a line on the Brunswick & Albany Railroad, 200 miles long, and several small branch lines. He was superintendent of the first-named line, with headquarters at Chattanooga, Tenn., at the time of his death. Mr. Whitney's two sons became telegraph operators; one of them, Arthur Whitney, was operator, train dispatcher, and finally superintendent of the old Memphis & Little Rock Railroad, with headquarters at Memphis, Tenn., dying at that place several years ago. The other brother, Charles Whitney, was a railroad operator at Ogden, Utah, for the Central Pacific Railroad Company, and held other telegraph positions. He is now located at Bisbee, Ariz. The widow for some years past has resided with her daughter, Mrs. Lillie Whitney Scruggs, at 1298 Vinton Place, Memphis, Tenn. She has reached the ripe age of 72 years.

About the time of Major Whitney's passing away negotiations were under consideration looking to his taking hold of railroad and telegraph work in the Pacific Northwest, which, if he had lived, would have brought him into prominence on what has since become the Southern Pacific system. Thus it is we sometimes miss our highest aims because of premature taking away. Beginning as a poor orphan, he made his own way through life, serving his country on the battlefield in time of war and living an honorable life in time of peace. His record is one which all may emulate with benefit.

The Late Thomas T. Eckert.

In the list of honorary pall bearers at the funeral of the late General Thomas T. Eckert, published in our issue of November 1, the name of Mr. Richard O'Brien, of Scranton, Pa., was inadvertently omitted. Mr. O'Brien was one of General Eckert's chief operators in the field during the Civil War and they afterwards became warm friends. It was quite natural therefore that Mr. O'Brien should have been selected as one of the pall bearers to pay this last tribute of respect to the memory of his former chief. The other pall bearers were Mr. Andrew Carnegie, Mr. R. M. Galloway, General Thomas H. Hubbard, Dr. John B. McMahon, Col. Albert B. Chandler, Mr. David Homer Bates, Mr. Charles A. Tinker, Mr. James Merrihew, Mr. P. J. Casey, Mr. William S. Hawk and Mr. Thos. H. Poole.

One of the earliest methods of transmitting intelligence to a distant point was the semaphore. In 1795 the British Admiralty introduced a semaphore system on all the highest points of land from London to Dover, Deal and Portsmouth. By its use a message could, under favorable circumstances, be transmitted to any of the places named and a reply received in London in seven and one-half minutes.

Professor Korn's photo-telegraphic machine, which sends a photograph by wire, was exhibited at the recent Electrical Show at Madison Square Garden, New York.

Concrete Poles.

In a paper read by Mr. A. E. Dobbs at a recent meeting of the Texas Independent Telephone Association, at Dallas, Tex., the author gives some interesting and valuable information regarding concrete poles.

Cement at the present time, he says, is quite cheap, and concrete is proof against decay, fire, heat, water, woodpeckers, insects, fungus growths, cribbing horses, sign tackers, or even runaway automobiles. It is, when reinforced, lightning proof and to a great extent fool proof, for boys will soon tire of trying to climb concrete poles. When, in addition to all this, we consider that concrete poles are straight and slightly and will be better twenty years from now than when first set, they would seem to be cheap even though the first cost is four times as much as wooden poles.

Cement poles can be moulded any shape desired, round, square, octagonal, triangular or hexagonal; all of the same size and shape; can be made any length, and when set in position are all in perfect alignment. They will also carry much greater weights than wooden poles, will bend further than a wooden pole without breaking and have elasticity enough to yield considerably to sudden strains without losing shape, while their resistance to strain is nearly twice that of cedar poles. Thus a thirty-foot pole will yield about two feet at the top and spring back into place when the strain is removed.

A well-constructed pole line should not be subjected to any but vertical stresses, as all terminal and heavy side strains should be taken up by anchors and guys properly placed. In the resistance to downward strains, concrete poles cannot be excelled even by white oak. Anchor strains, however, should be taken care of by special appliances.

Concrete is composed fundamentally of Portland cement, which is used as a binder for other and harder materials, such as sand, rock or slag, and is used in varying proportions according to the kind and size of the other ingredients. Sand is added to the mixtures in order to create the greater hardness and save in the amount of cement used. Broken stone or gravel is also employed for the same purpose, while in reinforced structures steel rods are added in order to give greater tensile strength and elasticity. Where gravel or broken stone is used, sand is also employed to fill in the spaces and make a solid body.

Formulas for the composition of concrete vary in the proportion of their ingredients, but one general formula covers them all, namely: The proportions of sand, chat and cement should be such that all spaces shall be filled and every particle of sand or stone shall be well covered with a cement coating. When this is strictly adhered to the structure is as strong as it can be made, for, regarding the cement as a binder only, every particle of sand and stone covered with even a thin coating of cement adheres strongly to its neighbor

and you can get no more by increasing the proportion of cement. Thus, in a case where sand only is used, a proportion of one part cement and four parts sand makes the strongest possible mixture. Where chat is obtainable the following formula used by one company making concrete poles has been found thoroughly reliable: 1 sack cement (100 lbs.), 2 wheelbarrows chat, 3 wheelbarrows sand. This makes one sack of cement extend to about six times its original bulk.

Unless the handling of cement is well understood it is better to employ some thoroughly competent cement man, for in every case where good cement mixtures have proven unsatisfactory it can be traced to ignorance of its qualities or improper manipulation. There are two methods of applying water to cement which produces what are commonly called "wet" or "dry" mixtures and the methods of treatment are not exactly the same. In the wet method enough water is added to make a mixture about the consistency of mortar. There should not be too much water as in that case the cement will float to the top while the sand and chat settle to the bottom, which will result in weak spots in the finished product. The sand, chat and cement should be thoroughly mixed while dry either by being turned several times with shovels or in a mixing machine. When well mixed, water should be added and the mixture placed in the mold or form as rapidly as possible, as cement begins to crystallize or set within ten minutes, and once it begins to set it cannot be used and the batch will have to be thrown away. Once in the mold it should not be disturbed until it has hardened. The so-called dry mixture contains just enough water, sprinkled on, to hold it together; it does not require such swift handling as the wet mortar, but at the same time it should not lay around long. The difference between wet and dry may be summarized as follows:

1. The wet mixture crystallizes more quickly and makes a harder concrete. The dry mixture sets more slowly and hardens only after several hours.
2. Wet concrete should be left for at least an hour before the form is disturbed. The dry mixture molds may be taken apart immediately.
3. The wet form is quite well cured within two or three days. The dry product should be left for at least thirty days.

Cement concrete hardens continually for quite a long time and is much harder at the end of one year than it is even after thirty days' curing. Whether wet or dry mixtures are used, however, they should not be exposed to the sun while curing and should be kept damp. Cement sets best under water and a dry mixture must be wet pretty thoroughly before it will harden at all.

Concrete columns will stand an immense downward pressure, but under the stresses of expansion and contraction there is a tendency to crack. In order to overcome this tendency and permit of greater elasticity iron rods should be placed

through them at regular intervals. Concrete will cling to plain, clean iron as firmly as to the sand and chat composing the mixture. It will also cling to wood in the same manner, provided the wood has been well dampened, but wood shrinks in drying and its holding power cannot be relied upon. With iron, however, the case is different and as iron and cement have the same coefficient of expansion, there is never any deterioration of its holding power. The best size of rod to use in pole construction is about one-fourth inch chamfered plain steel without any galvanizing or paint upon it, as the concrete will not adhere so well to zinc which forms the coating of galvanized wire. These rods should be drawn tightly from end to end and tied together with wire at intervals of four or five feet in order to strengthen their holding power as well as prevent spreading while the concrete is being poured. Four of these rods are enough for any pole up to twenty-five feet in length, and their number increased in the larger sizes up to say ten in a forty-five foot pole, but the extra rods need not be extended all the way to the top, but spliced onto the other at from one-half to two-thirds of the way up from the bottom. The rods at the bottom end may be bent around the bottom of the pole—thus grounding them—while those at the top may be cut off and the top of the pole afterwards rounded off with a trowelful of cement mortar. As each quarter inch rod has a breaking strain of approximately 4,000 pounds, it will be seen that when buried in concrete that adheres firmly, four rods will constitute a pretty strong column, especially when they are all bound together by wire. Cement adheres to iron only when the iron has been wetted, which is necessary in dry mixtures.

In making forms for pole construction rather heavy planking is required if wood is used. This plank should be planed smooth with no rough spots or splintered projections. It should be filled with oil and when set up should be well greased on the inside to prevent the cement from adhering to the sides. When desired holes for the arm bolts as well as the through bolts for braces can be formed by placing a straight five-eighth inch rod where required. Should it be necessary to insert steps, holes can be bored in the side of the form and round bolts inserted the desired distance. When the form is taken down these bolts must be withdrawn, but steps can be put in when the concrete has set, with a little thin cement mortar which will harden and hold them in place. When steps are not used poles must be climbed with a ladder or a sling.

Concrete poles cannot be treated in all respects like wooden poles. Being heavier than wood, weighing about 100 pounds to the cubic foot, they can not be piled on an ordinary wagon nor set up with pikes. The poles must, therefore, be set by means of a swinging gin pole preferably one that can be attached to a wagon that will both load the poles and swing them into the hole, guide ropes being largely relied upon to straighten

the pole up when it is once in the hole. Arms may be put on by two methods: Either by a through bolt from the front of the arm to the back of the pole backed by two-inch washers, or by two bolts through the front of the arm to an iron strap back of the pole, the bolts passing outside the pole altogether. When properly tightened these bolts will hold the arm in position and make, in many cases, braces unnecessary. Guy wires must not be wrapped round the pole as has been common practice as they will crush the corners and tend to break the concrete unless a shield of one-eighth-inch sheet iron, is placed underneath.

The cost of poles that are not required to give service for more than thirty or forty years that can be manufactured at reasonable cost, using fifty-six cents a cubic foot as a basis to estimate upon square poles, is as follows:

Length	Top Inches	Butt Inches	No. of Rods	Cu. Ft.	Wt., Lbs.	Cost Set up
18	4	7	4	3.2	320	\$1.79
20	4	7	4	4.2	420	2.35
22	4	7	4	4.7	470	2.63
24	4	7	4	5.0	500	2.80
30	4	8	6	6.3	630	3.53
36	4	9	6	10.56	1056	5.91
40	5	10	7	15.62	1562	8.75
50	6	12	8	28.1	2810	15.73

In addition to these figures, hauling and the cost of forms must be taken into account.

Control of Weather by Electricity.

In a lecture before the British Institute of Electrical Engineers in London, November 12, Mr. S. Z. de Ferranti, the well-known English electrical engineer, declared that in the future the weather will be controlled by electricity, and that the sun will shine or rain will fall as needed. This is to be accomplished by encircling England's coast with an electrical defense which will force the clouds to descend into the sea in the form of vapor instead of drifting over the country and obscuring the sun. He predicted that before many years electricity will be produced at one-sixteenth the average cost of producing it now.

At the close of last year there were 1,437 miles of telegraph and telephone line, with 4,311 miles of wire, in the Federated Malay States. Of this, 2,380 miles were telephone wires. The cost of maintenance was \$64,953, and \$45,879 was spent on construction, including \$922 on police wires. The total expenditure on telephone construction was \$35,147. During the year 263,435 telegrams were transmitted, and 267,144 were received for delivery. The revenue derived from this source was \$66,443, an increase of \$10,848 over the corresponding figure of 1908. The value of telegrams sent free for government departments was \$46,100. The revenue from telephones was \$45,596, or \$11,387 more than the receipts in 1908.

Report of British Postmaster-General.

The following extracts from the fifty-sixth annual report of the British Postmaster-General will be of interest to our readers:

TELEGRAPHY.

During the year ended March 31, 1910, 86,884,000 telegrams passed over the Post Office wires, compared with 84,825,000 in the previous year, an increase of 2.4 per cent. The total value of the telegrams was £2,769,053, compared with £2,709,507 in the previous year. During the year 214 additional post offices have been opened for telegraph business. Guarantees have been given for 144 of these, in 80 cases by public bodies and in 64 by private persons. There are now 11,291 post offices in the United Kingdom at which telegraph business is carried on, as well as 2,419 telegraph offices at railway stations and other public places.

Improved forms of telegraph apparatus are still receiving careful attention. Modern keyboard perforators have greatly enhanced the utility of the Wheatstone system, and the use of printing telegraph apparatus also is receiving special attention. A satisfactory trial has been made of undulator apparatus on the Bristol-Cork circuit, with a view to avoiding the use of repeaters on the submarine cable. Additional pneumatic tube services have been introduced between the Central Telegraph Office and several London offices which were previously served by wire, and also at Hull and Aberdeen between the head office and certain branch offices. This will permit a saving of staff and a reduction in the number of wires. The practice of delivering telegrams by telephone, which will, when the public has become fully accustomed to it, be found expeditious and convenient, is also being extended.

The main underground telegraph line to the west has been completed, and the wires between London and the landing places of the important cables starting from the west of England have now been diverted to the underground route. The northern underground line has been completed to Edinburgh; a section of underground work from Aylesbury to Coventry has been laid, completing the second London-Birmingham underground cable; additional pipes and cables have been laid between Manchester and Warrington, Manchester and Ashton, and Manchester and Stockport; and pipes have been laid between Leeds and Stockton, Chatham and Canterbury, and Berkeley and the city boundary of Gloucester. During the present financial year it is hoped to lay pipes from Gloucester to Worcester, from Leeds to Hull, and from Canterbury to St. Margaret's Bay and Abbot's Cliff, the landing-places of Continental cables, and cables from Berkeley to Worcester and from Stockton to Leeds. The cable from Stockton to Leeds will complete the line from Warrington to Newcastle; and the pipe work from Gloucester to Worcester and the cable from Berkeley to Worcester will complete the underground connection between Bristol and Birmingham. There will then be a triangle of underground lines, with

the angles at London, Birmingham and Bristol, the underground lines to the southeast, the north and the southwest being extensions from these three towns. Alternative routes via two sides of the triangle instead of the third side may be of great value in time of breakdown.

The number of foreign telegrams sent to and from the United Kingdom during the year (exclusive of certain telegrams dealt with entirely by cable companies) was 10,259,000, an increase of about 838,000 as compared with the preceding year. As part of the practical trials of fast-speed apparatus mentioned in last year's report, quadruplex working with the Laudot type of instrument has been introduced experimentally on two of the Anglo-Netherland wires, and as a result of the success of this experiment it is proposed to make the arrangement permanent after the completion of certain rearrangements now in progress at the Central Telegraph Office, by which the space allotted to the Continental wires will be increased.

WIRELESS TELEGRAPHY.

During the year 1909-10 the Post Office acquired from the Marconi Company and Lloyd's their coast stations in the United Kingdom open for commercial communication with ships. The sums paid to the company and to Lloyd's were £15,000 and £2,400 respectively. The former amount covered, in addition to the stations in actual operation, certain plant at other stations, the working of which was suspended, together with the right to use, free of royalty, the existing Marconi patents and any future patents or improvements, for a term of fourteen years, for communication for all purposes between stations in the United Kingdom and ships, and between stations on the mainland of Great Britain and Ireland, on the one hand, and outlying islands on the other hand, or between any two outlying islands; and (except for the transmission of public telegrams) between any two stations on the mainland, and on board Post Office cable ships. The stations are open under the International Radio-telegraphic Convention (as they were before their acquisition) for communication with all ships, equipped with any system of wireless telegraphy, and the Post Office is free to use or to experiment with any system of wireless telegraphy at its discretion. The Marconi Company retains its license for its long-distance stations at Poldhu and Clifden, which are primarily intended for communication with America. In connection with the purchase of the short-distance stations by the Post Office, the Marconi Company and Lloyd's arranged to cancel an agreement between themselves which was made in 1901, and which had been found difficult to work, and so had tended to impede the development of wireless telegraphy. The negotiations and arrangements were conducted throughout with the knowledge of and in consultation with the Lords Commissioners of the Admiralty, who, like the Postmaster-General, considered that the stations should be in the hands of the Government and should be worked as part and

parcel of the general telegraphic system of the country.

My predecessor laid stress on the importance of allowing no private monopoly in wireless telegraphy to grow up, and expressed the hope that the new arrangements would result in an even more rapid extension of the use of this important invention than had taken place in the past. This hope seems likely to be fully realized. It is hoped that before long there will be a ring of thoroughly equipped stations round the coast of the United Kingdom. The system, when thus completed, is likely to prove of the greatest possible value to shipowners, as well as as to passengers by sea, and I think that shipowners will be well advised to proceed as rapidly as possible with the equipment of their vessels.

The number of radio-telegrams dealt with during the year at the stations which are now in the hands of the Post Office were as follows: Outward radio-telegrams to ships, 3,266, as compared with 1,817 in 1908-9; inward radio-telegrams from ships, 27,727, as compared with 22,732 in 1908-9. Apart from the Post Office stations, there are one or two stations carrying on a more or less restricted traffic with ships, especially packets owned by certain railway companies.

During the year 1909-10, sixty licenses covering seventy-nine installations have been granted for stations in the United Kingdom under the Wireless Telegraphy Acts. These (with one exception) were for experimental purposes. The total number of licenses for land stations in existence on March 31 last was as follows: Commercial, six licenses, eight stations; private business (including lightships), five licenses, eleven stations; experimental, 164 licenses, 242 stations; minor cases (experimental) in which permission has been given by letter, ninety-three licenses. Up to March 31 last, licenses had been granted to shipowners covering 130 ships. The majority of these are Atlantic liners, but a considerable number of other vessels, notably railway companies' packets and vessels trading to South America and to the East, have now been equipped.

TELEPHONES.

The total number of telephone trunk line exchanges open at March 31 last was 643, compared with 598 at March 31, 1909. The capital expenditure at the same dates was £5,596,756 and £4,682,796 respectively; the number of conversations over inland trunk lines, 26,566,318 and 23,502,024 respectively; the gross revenue from inland calls £662,845 and £573,883 respectively; and the receipts from Continental calls £24,135, and £22,125 respectively. During the year 127 post office telephone exchanges were opened in the provinces—100 in England and Wales, sixteen in Scotland and eleven in Ireland. Of these, sixty-two were opened under guarantee terms under which the State bears two-thirds of any loss on the expenses of working. The total number of lines directly connected with the Post Office provincial telephone exchanges on March 31, 1910, was 23,635, compared with 22,354

on March 31, 1909, and the number of exchange telephones rented increased from 30,937 to 33,330.

The number of telephones connected to the municipal systems at Hull and Portsmouth on March 31 last was 2,931 and 2,514 respectively, whilst 1,848 telephone stations were installed on the Guernsey State system. The number of telephones connected in the Metropolitan area with the Post Office system on March 31 was 64,200, a net increase during the year of 9,075; whilst the number of call offices increased from 682 to 766. The mileage of underground pipes in this area was 2,492 and the length of underground wires 479,899 miles.

Accounts for the year ended March 31, 1910, of the income and expenditure relating to the trunk system, the London service and the provincial exchange system are given in an appendix to the report. The income from the trunk line system was £660,399, and the expenditure £569,219, the balance available for depreciation or repayment of capital being £91,180. The expenditure on the London exchange system was £353,363 and the income £525,389, the corresponding figures for the provincial exchange system being £263,288 and £205,389, a deficiency of £57,899 being shown. The amount of royalty received during the year from the National Telephone Company was £317,807, and from other licenses £2,783.

The following estimated figures show the extent to which the telephone is being used for sending messages for onward transmission as telegrams and express letters: Telegrams, 4,926,000, an increase at 1908-9 of 9.98 per cent.; express letters, 163,400, increase 9.23 per cent. The number of messages sent to the Post Office by telephone for onward transmission as ordinary letters decreased from 4,400 in 1908-9 to 3,200 in 1909-10. The telegrams delivered during the year to addresses by telephone numbered 2,154,000.

MILEAGE OF WIRE.

The total mileage of Post Office wires, including spare wires, is now as follows: Public telegraphs, 310,039; telephones, 601,980; private and leased wires, 258,106; total, 1,170,125 miles. This length is apportioned as follows: Aerial, 428,570 miles; underground, 731,514 miles; submarine, 10,041 miles.

Reference is made in the report to telegraphists' cramp. The nature of the disease, the report says, is obscure, and there is a divergence of expert opinion about it. The Postmaster-General mentions that he has appointed a committee, under the chairmanship of Sir John N. Barran, Bart., M. P., and including Mr. R. H. Davis, of the Postal Telegraph Clerks' Association, Dr. J. Sinclair, the second medical officer to the Post Office, and Dr. H. Theodore Thompson, assistant physician to the London Hospital, to inquire into the prevalence and causes of the malady, and to report what means may be adopted for its prevention.

Telegraph and Telephone Age is the leading publication in its field. Subscription price, \$2.00 per year.

Annual Meeting of the Telegraphers' Mutual Benefit Association.

The forty-fourth annual meeting of the Telegraphers' Mutual Benefit Association was held in the Western Union Building, 195 Broadway, New York, Nov. 16, President Belvidere Brooks being in the chair. The attendance was the largest and most widely represented ever held during the Association's long and useful existence, and much interest was manifested in the plans for the future development of the Association work. After the Committee on Credentials, consisting of Mr. F. D. Bernike, Chicago; Mr. J. E. Gollen, Bradford, Pa.; and Mr. A. Watkins, Richmond, Va., had reported, Mr. Brooks directed that the secretary read the president's report. The report in part is as follows:

The record of the business of your Association during its forty-third year just closed, as presented in the reports of the Secretary and Treasurer about to be laid before you, will show in detail that notwithstanding that the amount paid for death claims was the largest in the history of the Association, it has been able to promptly meet all claims and to increase the Reserve Fund by more than \$10,000, and that the Association is in a healthy and prosperous condition. Seventy-eight claims in the Full Grade and thirteen in the Half Grade were paid during the year, making the total amount paid to beneficiaries of deceased members since organization \$1,567,207.

Several instances having occurred in which the payment of claims was delayed owing to failure of the deceased members to have necessary change made in their certificates on account of death of beneficiary of record, termination of trust of minor children, etc., I desire to call attention of the membership to the necessity of having certificates payable to the person or persons they wish to benefit, and to the preservation of certificate as being essential to the prompt payment of claims.

Under the By-Laws, when the beneficiary of record predeceases the member, the amount of the claim reverts to the estate of the member and can only be paid to the duly appointed administrator. The necessary proceedings involved are often very tedious and expensive, and can be avoided by return of the certificate during the lifetime of the member to the Secretary's office, for substitution of another beneficiary.

I would also suggest to such members as have named their "Estate" as beneficiary, the advisability of naming some person as trustee, and thus save the delay and expense referred to.

While the benefits of the Association can be availed of by all persons engaged in telephone as well as telegraph service, employees of the first named do not appear to have taken advantage of the protection provided under our plan, to any great extent.

This may in some measure have been due to the fact, that the personnel of your officers has been confined to the one service, and I would therefore recommend to this meeting for consideration that steps be taken to provide for representation of the telephone interests on your official board.

The many telegraph service changes during the past year which necessarily entailed numerous changes among the Agents is reflected in the comparatively small number of applications received. I wish to again repeat, that the Agents should not be expected nor required to do all the work of maintaining the membership, and that it should be a matter of personal interest as well as the duty of every member to be active and earnest in bringing to the notice of their eligible acquaintances the history and objects of the Association, and in securing their applications for membership.

The reports of the secretary, the treasurer and the auditing committee were also read, all of which were ordered printed.

The secretary's report shows that the total membership is 4,603 in the full grade, and 789 in the half grade.

The sum of \$10,000 was carried to the reserve fund, which now amounts to \$327,778.23. The assets of the Association were shown to be of an amount exceeding a reserve of six and one-half per cent. on the total amount of insurance carried by the Association.

The receipts for interest during the past year on investments of the reserve fund and current deposits amount to \$16,443.42. The income derived from interest is equivalent to three assessments on the entire membership.

After the election of officers and, inspired by the declination of Mr. W. C. Humstone in favor of Mr. W. H. Baker as member of the executive committee, Secretary M. J. O'Leary recounted the services of the presidents of the Association, the late Hon. J. D. Reid to 1881, Mr. Clarence Cary 1881 to 1883, Mr. A. R. Brewer 1883 to 1887, Mr. J. Merrihew 1887 to 1897, Mr. W. C. Humstone 1897 to 1902, in which year the present executive, Mr. B. Brooks, was elected to, and has since continued in office. He then went on to say that there are now four living ex-presidents who have at all times given generous aid and wise counsel to the Association, and that the official ties which bound these gentlemen so closely to the Association should not be severed, but continued, perpetuated and preserved. He therefore moved the adoption of a resolution, which was unanimously carried, that all ex-presidents of the Association be made ex-officio members of the executive committee. As Messrs. Brewer and Merrihew are still serving the Association as treasurer and a member of the executive committee respectively, Messrs. C. Cary and W. C. Humstone were named as ex-officio members of the committee.

Mr. S. S. Garwood, commenting on the part of the president's report relating to representation of telephone interests on the board, proposed a resolution, which was adopted, that the executive committee be empowered to create an advisory board, whose duties shall be to co-operate with the executive committee for the extension of the Association work in their respective territories.

The following were elected officers for the ensuing year: President, Belvidere Brooks, New York; first vice-president, Charles P. Bruch, New York; second vice-president, S. S. Garwood, Philadelphia; secretary, M. J. O'Leary, New York; treasurer, A. R. Brewer, New York. The members of the executive committee consist of President Brooks, W. H. Baker, A. R. Brewer, James Merrihew, Charles P. Bruch, T. A. McCammon, G. H. Fearons, E. J. Nally and M. J. O'Leary, all of New York; W. J. Lloyd, of Chicago; auditing committee, H. D. Reynolds, chairman, Buffalo; W. J. Dealy and Thomas E. Fleming, New York.

A discussion took place, during which all present were urged to do their utmost during the coming year to increase the membership among those in the telegraph and telephone fields who are eligible.

The following-named gentlemen were present:
New York.—B. Brooks, E. J. Nally, C. P. Bruch, W. H. Baker, C. C. Adams, J. B. Van Every, E. B. Pillsbury, W. C. Humstone, Wm. Holmes, A. R. Brewer, T. Brennan, J. F. Nathan, R. J. Doyle, M. M. Davis, A. G. Saylor, P. J. Tierney, J. A. Berry, T. J. Cusack, W. J. Dealy, W. J. Morrison, E. M. Mulford, L. Dresdner, R. J. Murphy, W. J. Austin, F. E. Hutchinson, George Roehm, J. Costelloe, F. E. Coyle, J. B. Taltavall, T. E. Fleming, M. J. O'Leary, H. T. Marks, W. L. Ives, W. O. Snyder, E. Y. Gallaher. *Boston*.—P. J. Farrell, S. A. D. Forristall. *Buffalo*.—H. D. Reynolds. *Hartford*.—S. B. Curtis. *Richmond*.—Ashby Watkins. *Philadelphia*.—C. E. Bagley, S. S. Garwood, W. P. Phelps. *Wilmington*.—W. P. Cline. *Chicago*.—T. P. Cook, M. T. Cook, F. D. Bermke. *Bradford, Pa.*—J. E. Golden. *Atlanta, Ga.*—J. M. Stephens, B. F. Dillon. *Roanoke, Va.*—W. C. Walstrum. *Washington*.—G. M. Foote, N. R. Young, F. B. Travis. *Woodshole, Mass.*—H. G. Haddon. *Pittsburg*.—H. Scrivens. *Dallas, Tex.*—J. C. Smith, L. McKisick. *Denver*.—S. E. Leonard, J. C. Nelson.

Magnetic Club Fall Dinner.

The regular fall dinner of the Magnetic Club was held at the St. Denis Hotel, New York, on the evening of November 16, and it was one of the most enjoyable affairs ever held by that organization. It was called an aeronautic dinner, by reason of the fact that Mr. Clifford B. Harmon, the well-known American amateur aviator, was the principal guest of the club. The visiting delegates to the annual meeting of the Telegraphers' Mutual Benefit Association, which was held during the afternoon, were also guests, and these, together with the regular members and friends, taxed the accommodations of the large banquet hall. In keeping with the character of the meeting, colored rubber toy balloons were brought into requisition to aid in giving a real aeronautic tone to the feast. Bunches of balloons were anchored to the tables, and single balloons were floating around against the ceiling. At one end of the room a model biplane hung from the ceiling, the propeller being driven by a small electric motor. By way of diversion, many of those present amused themselves by applying lighted matches to the balloons, which exploded with a loud report.

The dinner was an excellent one, and when it was finished Mr. Marston R. Cockey, first vice president of the club, in the absence of Mr. Charles P. Bruch, president, who has been confined to his home for several weeks by illness, appropriately introduced Mr. Harmon the speaker of the evening.

Mr. Harmon, in an easy conversational manner, told of his experiences in ballooning and with aeroplanes. In closing his remarks he referred to the

United States Aeronautical Reserve, and suggested that telegraphers interest themselves in aviation, as it offered great opportunities for the utilization of wireless telegraphy.

After Mr. Harmon's remarks, a programme of entertainment was thoroughly enjoyed, and the meeting was concluded by the singing of "Auld Lang Syne." The committee of arrangements deserve great credit for the splendid manner in which they handled the details of the dinner. Following is a list of those present:

Albany, N. Y.—N. C. Pangburn, C. C. King. *Baltimore, Md.*—V. J. Albert, C. Selden, B. F. Thompson. *Boston, Mass.*—C. A. Richardson, Wm. Ryan, P. J. Farrell. *Bradford, Pa.*—J. E. Golden. *Buffalo, N. Y.*—H. D. Reynolds, L. H. Bangert. *Chicago, Ill.*—T. P. Cook, M. T. Cook, F. Bermke. *Dallas, Tex.*—L. McKisick, J. C. Smith. *Denver, Col.*—J. C. Nelson. *Lancaster, Pa.*—R. A. Barton. *Minneapolis, Minn.*—H. A. Tuttle. *New York*.—C. C. Adams, W. J. Austin, J. J. Alcock, J. F. Bowd, F. E. Brumley, J. R. Beard, E. S. Butterfield, E. B. Bruch, W. P. Bowman, W. H. Baker, B. Brooks, W. I. Capen, T. L. Cuyler, Jr., M. R. Cockey, R. N. Cleverdon, W. S. Cleverdon, F. R. Cleverdon, J. F. Cleverdon, J. J. Cardona, T. J. Cusack, F. E. Coyle, Col. A. B. Chandler, J. Davidson, W. Deegan, B. M. Downs, J. Doran, T. J. Donovan, P. W. DeBaum, W. J. Dealy, M. M. Davis, J. S. Ellis, John Ellis, R. S. Eldridge, A. P. Eckert, W. Finley, J. H. Flood, T. E. Fleming, W. D. Francis, G. W. Fleming, L. B. Foley, E. Y. Gallaher, R. Gould, B. H. Gage, J. J. Ghegan, F. H. Hollenbeck, T. E. Heffren, F. E. d'Humy, Thos. J. Howlett, J. Henry Harper, J. Hennessey, W. R. Holligan, C. J. Hubbard, J. H. Hess, W. S. Hallett, P. A. Hickey, W. E. Harkness, Clifford B. Harmon, Dr. L. R. Hallock, E. Kimmey, H. Kitt, F. J. Kernan, A. Kavanaugh, Felix Kernan, C. F. Leonard, L. Lemon, C. A. Lane, R. J. Marrin, J. J. McCormick, D. J. McQuade, H. G. Madden, R. H. Miller, W. H. Matthews, J. McNeil, T. P. McGowan, E. F. Maher, Wm. Marshall, F. E. McKiernan, D. F. Mallen, A. T. Miller, F. M. McClintic, J. J. McDermott, J. Merrihew, J. Manning, H. T. Marks, R. J. Murphy, J. McCauley, F. F. Norton, E. J. Nally, S. E. Ostrom, J. B. Olson, J. P. O'Donohue, M. J. O'Leary, E. B. Pillsbury, Fred'k Pearce, A. E. Price, C. R. Pratt, C. F. Pearce, E. O. Purcell, W. F. Regan, E. Reynolds, E. J. Rankin, C. Shirley, J. F. Shugrue, F. A. Scheffler, W. Scrivens, J. O. Stevens, J. F. Skirrow, W. Scarborough, A. G. Saylor, T. Singleton, E. P. Tully, J. B. Taltavall, C. A. Tinker, T. R. Taltavall, Col. N. B. Thurston, J. B. Van Every, A. G. Williams, F. N. Whitney, H. Wiese, S. F. Ward, J. J. Whalen, H. Zweifel. *Philadelphia*.—A. E. Zintl, E. Snow, C. E. Bagley, S. S. Garwood, J. R. Gorsuch. *Pittsburg, Pa.*—H. Scrivens, A. W. Rinehart. *Roanoke, Va.*—W. C. Walstrum. *Richmond, Va.*—A. Watkins. *Washington, D. C.*—G. M. Foote, F. B. Travis, N. R. Young. *Wilmington, N. C.*—W. P. Cline. *Woods Hole, Mass.*—H. G. Haddon.

The Turner Monument Fund.

The committee in charge of the Turner Monument Fund is untiring in its endeavors to secure contributions from all those engaged in railway and telegraph work who have the interest of their profession at heart. The object of this movement, as was fully explained in our previous issues, is to secure a fund of about \$3,000 for the purpose of erecting at Turner, N. Y., a monument to commemorate the sending of the first telegraphic train order, which took place at that point in the autumn of 1851. The Association of Railway Telegraph Superintendents and the Old Time Telegraphers' and Historical Association are co-operating in the movement, and the subscriptions coming in are gratifying and encouraging to those having the matter in charge. It is earnestly desired that all those connected with the telegraph and the railway shall contribute towards the success of this worthy cause. The list of contributors published in the previous issue and that given in this issue show that interest in the work is growing, but there should be no delay in forwarding remittances by those who have decided to contribute. There is no limit placed on the size of contributions. The movement is national, not local, and all contributions will be duly acknowledged in the columns of *Telegraph and Telephone Age*.

All of the railway telegraph superintendents in attendance at the recent meeting in New York of the Eastern Division of the Association of Railway Telegraph Superintendents obtained a good supply of circular letters to distribute among the employes of their respective systems, with a view to obtaining a large number of small subscriptions and thus popularize the movement. Everyone should support this worthy undertaking and contribute \$1 or more, and it is hoped that interest in the project will become general, so that the plans of the committee will be carried to early success.

Mr. F. D. Underwood, president of the Erie Railroad, has manifested a personal interest in the matter, and has contributed \$25, besides promising to render any assistance needed to attain the end in view.

Mr. J. D. Purtell, chief dispatcher of the Erie Railroad, at Dunmore, Pa., in remitting a collective subscription says: "We are all glad to be able to contribute our mite toward the fund. Expect that we will be able to secure more contributions, which will be forwarded to you as fast as they are received."

The following named gentlemen constitute the committee in charge of the Monument Fund: E. P. Griffith, Superintendent Telegraph Erie Railroad, Jersey City, N. J.; Chairman; Charles Selden, Superintendent Telegraph Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, *Telegraph & Telephone Age*, New York; E. A. Chenery, Superintendent Telegraph Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, Electrical Engineer, Canadian Pacific Railway, Montreal, Canada; Col. W.

B. Wilson, President Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, Secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York, who has been elected treasurer of the fund.

The contributions received up to date are as follows:

Previously acknowledged: \$319.75. United States Electric Co., New York, \$10.00; W. B. Williams, Wheeling, W. Va., \$5.00; W. E. Vanarsdall, Philadelphia, Pa., \$1.00; F. J. Loesch, Chicago, Ill., \$5.00; J. H. Taylor, Minot, N. D., \$10.00; J. McRobie, New York, \$2.00; C. A. Tripp, Redlands, Cal., \$5.00; E. T. Campbell, Chicago, Ill., \$5.00; I. H. Lewis, Salt Lake City, Utah, \$2.00; E. A. Chenery, St. Louis, Mo., \$3.00; T. M. Emerson, Wilmington, N. C., \$15.00; A. A. Allen, St. Louis, Mo., \$5.00; T. E. Callahan, Whitefish Bay, Wis., \$1.00; H. H. Matlock, Springfield, Ill., \$1.00; W. J. Camp, Montreal, Can., \$5.00; B. F. Thompson, Baltimore, Md., \$1.00; J. B. Bertholf, Monroe, N. Y., \$1.00; John Purtell, Dunmore, Pa., \$1.00; D. P. McCoy, Scranton, Pa., \$0.50; G. B. Madigan, Wimmers, Pa., \$0.50; G. R. Vining, Moosie, Pa., \$0.50; J. A. Wallace, Avoca, Pa., \$0.50; W. J. Sheehan, Scranton, Pa., \$0.50; L. E. Farley, Scranton, Pa., \$0.50; E. T. M. Carr, Long Branch, N. J., \$1.00; J. P. Costello, Binghamton, N. Y., \$2.00; L. S. Austin, Clifton, N. J., \$5.00; P. C. Friend, Morehouse, Mo., \$1.00; W. T. Boyd, Jersey City, N. J., \$2.00; L. J. Burkhardt, Lyons, Kan., \$0.50; W. H. Webb, Lyons, Kan., \$0.50; C. S. Greer, Columbus, Ohio, \$1.00; H. C. Holabird, Chicago, Ill., \$5.00; W. F. Taylor, Altoona, Pa., \$1.00; F. D. Underwood, New York, \$25.00; Lewis Dresdner, New York, \$1.00; J. C. Princell, Bismarck, N. D., \$0.50; R. S. Best, Bismarck, N. D., \$0.50; C. W. Welch, Bismarck, N. D., \$0.50; S. W. Derrick, Bismarck, N. D., \$0.50; E. J. Knecht, New Orleans, La., \$1.00; H. F. Farmer, New Orleans, La., \$1.00; Dispatchers' Office, Osawatimie, Kan., \$1.75; G. W. Brownson, Kansas City, Mo., \$1.00; T. H. Hahn, Chicago, Ill., \$1.00; J. B. Taltavall, New York, \$2.50; T. R. Taltavall, New York, \$2.50. Total, \$457.50.

Radio-Telegraphy.

The Marconi Wireless Telegraph Company is erecting a wireless station on the Magdalen Islands, in Quebec, for the purpose of securing constant communication with Charlottetown and other ports of the maritime provinces. The new station will render an important service to shipping in reporting ice conditions in the Straits of Belle Isle. Communication by cable between the mainland and the Magdalen group of islands is frequently interrupted.

Standard time will be announced by wireless telegraph daily at 11 o'clock from the Eiffel Tower, Paris, for the benefit of ships at sea within range of that station.

The students at the school of engineering at the

Pennsylvania State College are installing a wireless-telegraph station designed for communication with stations at Washington, New York, Philadelphia, Boston and elsewhere. Among the uses to be made of the apparatus will be the reporting of football games played by the college team in other cities where suitable wireless-telegraph equipments have been installed.

It is announced that the Government of New Zealand has decided to erect a wireless station at the southernmost point of that country, with a range of 2,500 miles, and it is thought possible, therefore, that Capt. Scott may remain within call of this station throughout his long winter in the Antarctic.

Patent No. 974,838 has been granted to E. H. Smythe, Chicago, Ill., for a receiving apparatus for electromagnetic waves.

Mr. William Marconi on November 13 exchanged wireless communications between the station at Coltano, Italy, and the stations at Clifden, Ireland, and Glace Bay, N. S. Mr. John Bottomley, vice-president and general manager of the Marconi Wireless Telegraph Company of America, New York, states that the chief purpose of the Coltano station is to establish close communication between Italy and the Argentine Republic. At the same time it brings Italy into wireless communication with England, America and other parts of the world.

On November 21 post office inspectors and city detectives raided the offices of the Continental Wireless Telephone and Telegraph Company, at 56 Pine Street, New York, and arrested Mr. Charles L. Vaughan, treasurer of the concern, on the charge of using the mails to defraud. The company is a holding concern, and is said to control the stock of several other wireless telegraph and telephone companies, more or less well known. Mr. Walter W. Massie, president and general manager of the Marine Transmission Company, which operates the Massie wireless system, informs us, however, that his company was not connected with the Continental Wireless Telegraph Company, as was reported. The specific charge against Vaughan is that he "devised a scheme or artifice to defraud by falsely representing" that the Continental Company was organized to operate, develop and control various wireless concerns in this country, and of having made statements concerning the earning capacity of these concerns which were considered false.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XXV.

What are the chief advantages derived from the use of a storage battery in a telegraph equipment?

What is the difference in construction between a storage battery and a primary battery?

What is the difference in their chemical and electrical actions?

Who was the inventor of the storage battery, and how was the original cell constructed?

What is the exciting liquid in the ordinary storage battery?

How is a storage battery charged?

Does the storage battery store electricity as such?

In charging a storage cell what happens to the lead plates?

In what way was the original storage battery improved?

What is meant by "forming" a storage battery?

What advantage is gained by coating the lead plates of a storage cell with red lead?

Describe the method of charging a storage cell from loop currents.

In the process of charging how are the poles of a storage cell arranged with reference to the poles of the generator?

What is the voltage of a storage cell?

What is the resistance of the coils of sounders usually employed with storage battery supply?

Why is it necessary to insert additional resistance in a local circuit?

What is the usual current allowance per sounder?

Upon what does the life of a storage cell depend?

At what percentage of its capacity should a storage battery be worked to give the best results?

How are storage cells in intermediate offices charged?

Give a rule for calculating the amount of current required for a local circuit.

How may a storage battery be charged by the electric light current from the office lighting circuit?

How is the charging rate of a storage cell found when it is being charged by an electric light circuit?

How may a cell be charged while it is being discharged?

When a cell is fully charged, how is this fact indicated in the cell itself?

What are the advantages derived from the use of a storage battery in telegraph work.

Why is it preferable to use a motor-generator for charging storage cells, instead of connecting the cells directly to electric light wires?

Give rules for calculating the capacity of a storage battery for the operation of main line circuits.

Wire thieves are active again. The Western Union Telegraph Company recently reported that thieves had cut and stolen some of its wires in the vicinity of Tyler Park, along the Erie Railroad. Thieves also cut and stole some copper wire along the Baltimore & Ohio Railroad in the vicinity of Elizabeth, N. J. They took advantage of a severe storm to carry out their work.

The Telephone.

Mr. Herbert N. Casson delivered a lecture on "The Effect of the Telephone on Modern Industrial and Social Life," before the New York Electrical Society, November 16.

Mr. S. W. Ladd has been appointed receiver for the Interstate Telephone and Telegraph Company of Illinois, one of the largest and most important independent companies in the State.

Telegraph poles take root and sprout in Uganda, Africa. This phenomenon was observed by the Rt. Hon. Winston Churchill and is recorded in his book entitled "My African Journey."

The Pacific Telephone and Telegraph Company opened its new exchange in San Jose, Cal., on November 10, a public reception being held in the afternoon and evening of that day to celebrate the event.

Two new telephone lines are about to be opened for public use between London and Paris, and two others will be opened next spring. These lines will afford a capacity of 400 conversations a day between the two capitals.

An ordinance has been introduced in the Chicago City Council requiring telephone companies to instal meters on all telephones equipped with coin boxes, for the purpose of recording outgoing messages.

Mr. R. L. Lewis, district manager of the Pacific Telephone and Telegraph Company, at San Diego, Cal., has resigned to engage in other business. He has been succeeded by Mr. J. E. Franklin, of Los Angeles.

There are over 23,000 telephone companies in the United States, with upwards of 13,000,000 miles of wire, and some twenty-five commercial telegraph and cable systems, with over 1,600,000 miles of land lines and over 46,000 miles of ocean cables.

The Bureau of the Census, Washington, D. C., has issued its report of the telephone covering the year 1907. The report presents statistics concerning the physical equipment, service, and financial operations of the commercial and mutual telephone systems of the country and the independent rural telephone lines, for the year ending December 31, 1907.

Mr. Val B. Mintun has been appointed manager of the Missouri and Kansas Telephone Company at Kansas City, Mo., to succeed Mr. F. J. Dikes, resigned. Mr. Mintun was born in Kansas City, thirty-six years ago and has been in the employ of the Missouri and Kansas Telephone Company for the past six and a half years. Mr. Mintun is well known in railroad circles and has been a regular attendant at the meetings of the Association of Railway Telegraph Superintendents for many years past.

The Italian Minister of Posts, Telegraphs and Telephones reports that at the end of the fiscal year 1907-1908 there were 49 government city exchanges in the kingdom, 256 public telephone sta-

tions and 36,243 subscribers. The systems owned by private parties had 118 city exchanges, 87 county exchanges, 341 public telephone stations and 14,035 subscribers. Although a large number of the telephone systems in Italy were started under private ownership, the State has followed the policy of buying up the systems in the principal centers.

The only telephone company in Portugal is the Anglo-Portuguese Telephone Company, an English concern both as to its capital and its principal employees. Between 200 and 250 persons are engaged in the service and the company has twenty-three exchanges, Lisbon and Oporto being the principal points. There are about 2,500 subscribers in Lisbon and about 1,100 in Oporto. The Portuguese government controls and operates all the wires which run to or are connected with the forts, etc., and owns exchanges in various places around Lisbon.

Mr. Union N. Bethell, president of the New York Telephone Company, and Mr. John J. Carty, chief engineer of the American Telephone and Telegraph Company, New York, made addresses before the Telephone Society, in the Engineering Societies' Building, New York, on the evening of November 15. There were about 1,100 persons present including all of the visiting Western Union general superintendents, as well as the division commercial superintendents. Mr. Bethell gave a history of the consolidation of the various telephone companies in New York, Pennsylvania and other States, which was practically covered in our issues of September 16 and October 1. Mr. Carty gave a very interesting and instructive talk on the engineering aspects of the telephone business.

The American Telephone and Telegraph Company is making rapid progress in the construction of the underground conduit for long-distance telephone cables between Washington and Boston, by way of New York. The conduit between Washington, D. C., and Wilmington, Del., a distance of ninety-two miles, is nearly completed. The conduit work between Boston and Providence, New Haven and New York, and New York and Wilmington, is completed, and when the Washington-Wilmington section is finished direct underground communication between Washington and New York will be possible. The larger part of the conduit consists of four ducts of creosoted wood, the number of ducts being increased to five or six where the conduit passes through towns. A novel form of manhole has been adopted for this line. It is built up of concrete blocks and slabs. The purpose of this underground line is to preserve telephonic communication between the points named during stormy weather.

There is much for telegraph operators to learn respecting their calling which can be readily obtained by reading *Telegraph and Telephone Age*—\$2 a year.



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The Railroad.

The Erie Railroad is constructing concrete telephone booths at sidings and other places along its lines.

It is stated the Erie Railroad will adopt the telephone system of train despatching on its main and branch lines.

An Edison storage battery car is being practically tested in railroad work on the Orange, N. J., branch of the Erie Railroad. The car was built for a speed of 25 miles an hour, but has attained 30 miles an hour without any apparent strain upon the batteries.

The initial installation of selective train despatching apparatus on the Missouri Pacific Railroad, of which Mr. E. A. Chenery is superintendent of telegraph at St. Louis, was recently completed. The circuit is made up of two No. 9 B. & S. gauge copper wires transposed every half mile on transposition brackets and covers the main line of the Illinois division of the St. Louis, Iron Mountain & Southern Railway, extending between Dupon, Ill., to Illmo, Mo., a distance of 118 miles. The dispatcher's office is located at Chester, Ill., the division headquarters, about midway on the division, and of the twenty-three way stations equipped, ten are north and thirteen are south of that point. The selective equipment consists of the latest type Gill apparatus.

Extension of Telephone Dispatching on the Illinois Central Railroad.

Ninety-nine miles of the Illinois Central Railroad, between Paducah and Central City, Ky., have lately been equipped with telephone circuits for handling train orders. On the new circuit sixteen way station subscriber sets have been installed, in addition to twenty-one regular telephone stations. These sets, which are somewhat similar in appearance to the standard magneto telephone set, are for use in connection with hand sets equipped with plugs and cords. Each subscriber's set is equipped with a jack, to enable connection to be made by means of a hand telephone.

The hand sets are numbered, and one is furnished each freight train conductor, when his train is ready to start out on a run. A receipt is taken from the conductor when the set is delivered, and the set is turned in when the conductor completes his run. To get into communication with the dispatcher the conductor goes into the booth, or station, throws a switch which connects the telephone to the line, and inserts the plug into the jack, thereby placing his receiver across the line. To speak to the dispatcher, it is necessary to press a button on the hand set, which closes the transmitter circuit.

The telegraph has been supplanted by telephones for dispatching trains on more than 2,000 miles of this road.

Telephone Train Dispatching in New England.

The New York, New Haven and Hartford Railroad has in operation telephone circuits

covering 100 miles of its road, from Northampton, Mass., to New Haven, Conn., with branches to Holyoke and New Hartford, Conn. There are twenty-nine telephone stations on this division, which is equipped with test panels, selectors and flexiphones. Sixty-eight stations are in operation on the Boston & Maine Railroad, covering the White Mountain Division and the Concord Division. These circuits extend from Concord to Woodside, ninety-three miles, White River Junction to Concord, seventy miles, and Boston to Fitchburg, fifty miles. The best grade of copper wire is being used, together with telephone arms, selectors, wrecking outfits and portable sets. The Central Vermont Railroad, has ordered telephone equipment to cover its northern division from St. Albans to Windsor, Vt. On this stretch of 150 miles there will be thirty-eight telephone stations, which will be equipped with telephone arms and circular loom cable. The Boston & Albany Railroad has in successful operation telephone equipment covering the whole of its main line and all branches from Boston to Albany. On these four circuits there are 165 stations.

Telegraphy has been added to the curriculum of the Carlisle, Pa., Indian School, and Indians are being taught the art. It is stated that they are apt students. They are patient and seem to grasp the details readily. It is thought that they will be especially useful in filling positions in lonely places in the west, where it is often difficult to keep white men.

Trade Notes.

The Evansville & Terre Haute Railroad Company has purchased equipment for a telephone train dispatching circuit between Evansville and Terre Haute, a distance of 110 miles. Gill main line bell selectors will be used for signaling, the dispatcher being provided with the new Gill silent calling keys. There will be twenty-seven train order offices on the circuit, and each will be equipped with telephones for block and train dispatching service. Telephones are to be installed at blind sidings to facilitate the operation of trains.

The telephone train dispatching equipment of many of the New England railroads was furnished by the Western Electric Company, which has supplied more than 90 per cent. of the railway telephone equipment now in use in this country. Other railroads are using the telephone for this service as far west as the Pacific coast and south as far as Florida and Texas.

Western Electric Business for 1910.

The Western Electric Company's old fiscal year ended with November, but the company's report will probably cover thirteen months in order to make the fiscal year hereafter correspond with the calendar year. October returns, gross, were 40 per cent. larger than those of October, 1909, and the twelve months ending with November will show gross sales of somewhat over \$61,000,000.

Death of B. F. Dillon.

Mr. B. F. Dillon, general superintendent of the Western Union Telegraph Company at Atlanta, Ga., died on November 21 from the effects of a stroke of apoplexy. Mr. Dillon had spent the previous week in New York attending the conference of officials of the company, and seemed to be in the best of health. The news of his death was a great shock to his numerous friends in this city and throughout the service.

Mr. Dillon was born in Screven County, Ga., April 21, 1849, and in 1870 accepted a position as operator for the Western Union Telegraph Company at Kansas City, Mo. He soon returned to the South and worked at Lake City, Fla., and Augusta, Ga., and later became chief operator at Savannah. He afterwards became manager of that office, and in 1887 was appointed superintendent at Jacksonville. In March this year he received the appointment of general superintendent, with headquarters at Atlanta, which position he held at the time of his death. He was a public-spirited man and took active interest in civic affairs in the various places of his residence.

Interment was at Jacksonville and all of the southern division officials were present out of respect to the memory of the deceased.

The Late William H. Cohn.

The death of Mr. William H. Cohn, of Sacramento, Cal., noted in a recent issue, marks the passing of an unusually interesting character. Mr. Cohn was one of the most genial and lovable of men. During the strike of 1883 his wide acquaintance and popularity served the little band of strikers well, and enabled them to not only gain the unanimous moral support and sympathy of the business men and public generally, but to raise over \$700 in subscriptions for the support of the strikers, which was deposited in the safe of the State Treasurer at the Capitol, and drawn as needed.

Mr. Cohn was something of a politician in those days, and through his influence the use of the opera house and the services of the best band in Sacramento were obtained free of cost for the mass meeting in which the Governor and other State officials and the prominent business and professional men of Sacramento took part.

All this is ancient history, but the memory of the events of that month of idleness and of Mr. Cohn, who contributed so much toward the welfare of the boys is one that must ever linger in the minds of those who were associated with him during that time.

Obituary.

A. B. Churchill, a telegraph operator, aged sixty-six years, died on November 5 at Boston, Mass.

Mr. Benj. T. Finch, late director-in-chief of the Indo-European Telegraph Department, died at

his home in Blackheath, England, October 22, at the age of 70 years.

The Cable.

Mr. T. G. Barker, of the executive offices of the Commercial Cable Company, New York, has returned from England, where he spent a vacation of several weeks.

Owing to the difficulty in maintaining the submarine cables connecting the Orkney Islands, at the north of Scotland, with the main land, wireless telegraph stations have been erected on the islands of Sanday and North Ronaldshay.

The cable steamer "Mexican," belonging to the Mexican Telegraph Company, has returned to New York harbor after completing some difficult repairing in the stormy season in the Gulf of Mexico. Mr. Otto Strubel, cable engineer of the company, accomplished some excellent work in connection with the repairing, which was made in record time. All of the trouble was caused by anchors.

A new submarine telegraph cable has been laid between Newbiggin, Northumberland, England, to Arendal, Norway, a distance of 420 miles. The cable was manufactured by Siemens Brothers & Co., London, and was laid by their cable steamer "Faraday."

Municipal Electricians.

Mr. Raymond N. Brace, operator at the police telegraph bureau in Rochester, N. Y., went duck-shooting on Lake Ontario, November 7, and has not been heard from since. It is feared that he was drowned. A new operator will be appointed December 1 to fill the vacancy.

In Shreveport, La., storage battery supplies the current for the operation of the fire alarm system. There are twenty-two miles of copper wire and forty-eight street alarm boxes. The alarm system and all engine houses are equipped with indicators. There is a four-circuit switchboard, with repeaters and indicators.

Wireless fire alarm messages from the steamship Falcon were received recently at various points along the Pacific coast and at San Francisco, and the fire tug Snohomish, of Seattle, Wash., was detailed to assist the vessel, which was on fire at sea.

The fire alarm and police telegraph systems in Chicago are maintained in an efficient condition, according to a recent investigation into the subject. The practice of the Department of Electricity, which has this service in charge, is to maintain about thirty alarm boxes on each circuit so arranged that there is no danger of two boxes on the same circuit being "struck" for the same fire, thus interfering with the alarm. In some cases, however, the number of boxes has been greatly increased, up to as high as seventy on a circuit nearly thirty miles long. It has been recommended that the system should be subdivided thoroughly to keep down the number of boxes on a circuit and the length of circuits.

New Book.

Edison; His Life and Inventions. By Frank Lewis Dyer and Thomas Commerford Martin. New York: Harper & Brothers. Two volumes; 988 pp. Illustrated. Price, \$4.25.

This book is the first complete, authentic and authorized record of the life and work of this great inventor and former telegrapher, and is published with Mr. Edison's consent.

Mr. Edison has for so many years stood before the world as an inventor of extraordinary ability and his name is so intimately associated with many of the greatest electrical inventions of the nineteenth century that there was a universal and insistent desire for a reliable and complete account of his life and work. These volumes were written to meet this demand and the work has been excellently done. Mr. Dyer, one of the authors, is general counsel for the Edison Laboratory and allied interests, and Mr. Martin, co-author, was formerly associated with Mr. Edison and has been for many years one of the most prominent and active workers in the electrical field. By reason of their long acquaintance with Mr. Edison and their wide knowledge of his character and work they were eminently fitted to undertake the task which they have so successfully brought to a conclusion. Mr. Edison himself aided the authors in their labors and supplied them with a great deal of material, which is incorporated in the books. This may be easily recognized by his characteristic and forcible language.

The work is designed to bring the reader face to face with Mr. Edison, and there are thousands of telegraphers and electrical people all over the world who will be glad of this opportunity to know him.

The story of Mr. Edison's life is an intensely interesting one. The portion that will, of course, appeal most strongly to telegraph people will be that relating to his career as a telegraph operator and inventor of telegraph apparatus. The story of his selling the quadruplex is a familiar one, but it is retold with such freshness and vividness that it seems like a new one.

There is no branch of the electrical industry that does not bear Mr. Edison's impress, and this record of his achievements is sure to meet with a hearty reception. The authors have handled their subject in a masterly way and deserve the thanks of the reading public for making it possible for the present and future generations to know of the life and work of this great genius.

Copies of this work can be procured through Telegraph and Telephone Age, 253 Broadway, New York.

It is likely that the telegraph system of Porto Rico will be abandoned next year. The Porto Rican Telephone Company has purchased the telegraph system of the island, and it has been found that the telephone is better suited to meet the requirements of the social and business community than the telegraph.

General Mention.

The Marconi Wireless Telegraph Company of Canada has applied to the railway commission for ratification of its tariff of tolls for messages delivered from a ship in the Gulf of St. Lawrence. The question of jurisdiction was raised and judgment was reserved.

Mr. J. W. Tillinghast, until recently manager of the Western Union Telegraph Company, at Cleveland, Ohio, is in Lorton Valley, Fairfax County, Va., where he is looking over some farming lands, with a view to locating permanently in that section. Mr. Tillinghast will retire from active duties after fifty years in the telegraph service.

Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Co., has been named as a member of the organization committee of the proposed permanent exposition in New York City. The plan is to establish the exhibition on the lines of Earls Court in London, but on a larger scale. The New York Permanent Exposition Company has been organized with a maximum authorized capital of \$50,000,000 to undertake the work.

The annual meeting of the International Congress of Inventors was held at Rochester, N. Y., recently, at which were read several papers on the subject of patents. Mr. Ludwig Gutmann advocated a revision of patent statutes, the institution of a lower patent court and a court of patent appeals. Mr. Keiper, former assistant examiner in the Patent Office, advocated the appointment of infringement examiners. His suggestion was endorsed by the meeting.

We take the following paragraph from the Jerome, Idaho, *North Side News* of a recent date. Mr. Annett mentioned therein is a well-known old-time telegrapher now in business at that place. He was at one time Assistant Superintendent of Telegraph of the Illinois Central Railroad, at Chicago; manager of the Western Union Telegraph office at New Haven, Conn.; manager of the Goldfield, Nev., office, and occupied other important positions in the telegraph service.

"A hundred guests were entertained by Mr. and Mrs. Chas. F. Annett on October 8, at Hale Hall, in honor of their daughter, Miss Annett, who is visiting them from Chicago. Mrs. Armstrong assisted in receiving, and later presided at the punch bowl. The hall was decorated with pumpkins, giant sunflowers and other such trophies of autumn as a new country affords. The evening was spent in dancing to excellent music. Mr. Heiss received first prize in the guessing contest, guessing within one the number of seeds in a pumpkin."

Mr. C. E. Stump, manager of the Dock Street office of the Postal Telegraph-Cable Company, Philadelphia, Pa., writes: "I cannot get along without Telegraph and Telephone Age."

Mr. Bert Asher, operator at Adair, Mont., saw a meteor flash across the sky recently. In falling to earth it set fire to a tree, the glare of the flames revealing its location. The stone, after cooling off, was picked up and taken to Missoula by Mr. Asher.

We have received from Mr. A. J. Hartman, manager of the North American Telegraph Company at Red Wing, Minn., a post card picture of the Postal Telegraph-Cable Company's office at that place, also one of the "73" camp 1910, of the Postal Company's operators and messengers on the banks of the Mississippi river. The camp was located in the heart of the forest.

The Interstate Commerce Commission will give a hearing to telegraph and telephone companies in Washington on December 7 with a view to determining the status of telegraph and telephone companies under the act to regulate commerce. The questions to be discussed are: What telegraph and telephone companies are subject to the act to regulate commerce? May telegraph and telephone companies subject to the act issue franks entitling persons to free interstate service, or may they grant free interstate service, and, if so, to what extent? Are these companies required to file their tariffs or charges under the sixth section of the act?

NEW YORK, WESTERN UNION.

Mr. Martin Durivan, who has had charge of the telegraph equipment at Long Branch during the past season, has returned to this office and has resumed his old position as assistant to Mr. J. B. Hurd, traffic chief.

Mr. Hector St. Jacques, of the Western Division, is spending a vacation in England.

Mr. L. H. Jordan, formerly of this department, is now located at Pittsfield, Mass., as manager.

Mr. George Alexander, of the Newspaper Division, died on November 12 of pneumonia. The remains were taken to his old home in Quebec for interment.

PHILADELPHIA, POSTAL.

Chief Operator E. W. Miller went to Princeton to oversee the handling of the heavy newspaper work during the Yale-Princeton football game November 12.

Manager Albert of Baltimore was a recent visitor while en route to New York.

Traffic Chief M. N. Redding has returned from a gunning trip to his home in Chestertown and was very successful.

Night Chief Operator E. H. Locke has returned to duty after a brief illness.

BALTIMORE, WESTERN UNION.

The following promotions have been made in this office: Mr. Samuel T. Shutt to be manager, vice Mr. J. M. Creamer, promoted to the position of District Traffic Superintendent, with headquarters at Philadelphia; Mr. Eugene S. Anderson, chief operator, vice Mr. L. D. Wilbourn, promoted to be District Traffic Superintendent at Boston; Mr. R.

L. Dryden, southern wire chief, vice Mr. E. S. Anderson; Mr. R. G. Simmons, all night chief, vice Mr. R. L. Dryden, and Mr. J. W. Waller, night traffic chief, vice Mr. R. G. Simmons. Mr. Shutt previous to his promotion was manager of the Light-street branch office. On their departure to take up their new duties Superintendents Creamer and Wilbourn were presented with handsome traveling cases by their office associates.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, has for nearly half a century proclaimed the absolute necessity of life insurance and provided a safe and economical form of protection for the home and family within the means of every telegraph and telephone employee. A certificate of membership affording protection of \$500 or \$1,000, or both, is easily obtainable by every one in good health engaged in telegraph or telephone service, either commercial or railroad, between the ages of 18 and 45, and should be held by all employees not otherwise provided with adequate life protection.

Own Your Home.—The Serial Building Loan and Savings Institution, of 195 Broadway, New York, was organized for the purpose of assisting telegraphers to buy homes and encourage them to save systematically. It is managed by well-known telegraphers and has aided over eleven hundred persons to secure homes during its existence of twenty-five years. Write for particulars.

We are general agents for all makes of sending machines, also typewriters of all makes, new and second hand. Send for catalogue. Address: J. E. Albright, 253 Broadway, New York.

MARTIN VIBROPLEX, heavy base; the best sending key on market; \$9.00. James B. Havice, General Agent, 253 Broadway, N. Y. Agents wanted.

TRANSMITTING MACHINES

I am placing on the market improved **YETMAN TRANSMITTING TYPEWRITERS**, and **KEY-BOARD TRANSMITTERS** without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

Rubber Telegraph Key Knobs.

No operator who has had to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. They render the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Telegraph and Telephone Age

No. 24. NEW YORK, DECEMBER 16, 1910. Twenty-eighth Year.

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SOME POINTS ON ELECTRICITY—VIII.

A Study of Telegraphic Apparatus.

BY WILLIS H. JONES.

SWITCHES.

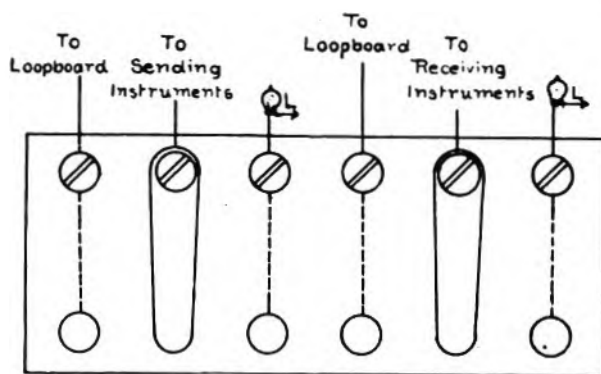
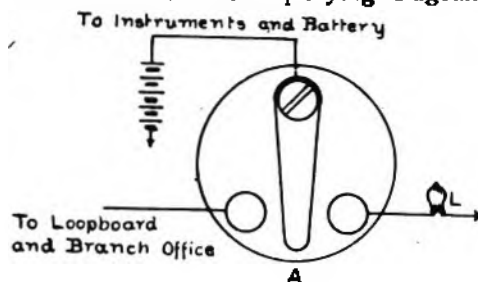
The main line and local battery switches, the operator sees on the desks or tables in front of him are probably the simplest pieces of apparatus included in the equipment of a multiplex circuit, yet there is a "study" even in these.

It is easy enough to understand what they are for, but it is not always as easy to know just where each wire attached to the binding posts leads to.

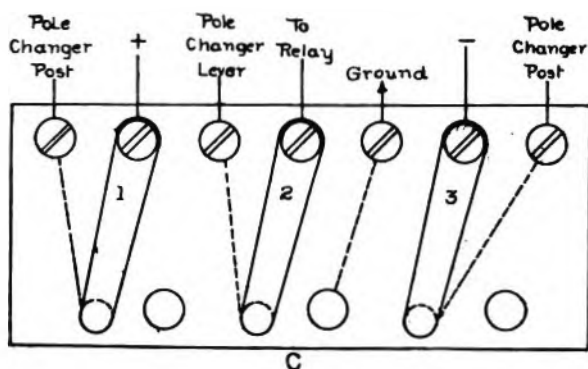
The student should first study their mechanical construction, by tracing the wires underneath the base, and ascertaining the point to which the wire connected to each binding post or disk invariably leads. In all modern telegraph offices these connections are always the same on most switches used for like purposes. Two switches of identical construction, however, may be used for different purposes, yet there will be a uniformity in the connections for each class of service required.

Let us take, for example, an ordinary three-point switch, as it is usually called, such as those the operator uses when cutting in, or off, the branch office loops.

The theoretical connections for such a switch are shown at A in the accompanying diagram and at



Local Circuit Six-point Switch



DIAGRAMS OF SWITCHES, CONNECTIONS, ETC.

a glance gives the operator a correct idea of its purpose. The lever he pushes from one side to the other is always connected to the key and transmitter local connections, or with the receiving apparatus. On multiplex circuits there are of course two of these switches side by side on one base, one for the sending side, and the other for the receiving side. Thus when the lever is turned say to the right and rests on the brass disk on that side, the circuit attached to the lever is extended to the

terminal of the wire attached to that disk, and in like manner to the terminal of the other disk when the lever is turned to the left. On multiplex circuits the left hand disk on the operator's desk leads to the loopswitch and thence to the branch office. The disk on the right leads through the resistance lamp to a "ground."

If each switch was actually constructed with only three points, as the illustration suggests, no layman would fail to understand the connections at once, but the standard double lever and six post pattern possesses six disks and requires four short pieces of wire underneath the base, as shown by the dotted lines in diagram B. This, together with the two extra disks sometimes tends to mislead a novice to believe that possibly there are other external connections than those shown in A., but such is not the case. The middle disk in each double switch is "dead" and is used merely as a rest for the lever when the local battery and connections are desired to be left open.

The two disks on either side are connected with the binding posts by a wire because it is necessary to place the disks at such points on the base that contact may be made between them and the end of the lever.

Diagram C shows the connections of a seven-point main-line battery switch, such as is used for duplex and multiplex circuits.

The levers, as usual, connect with certain parts of the multiplex equipment which at times require shifting. Thus levers 1 and 3 connect with the positive and the negative poles of the batteries, respectively, while lever 2 carries that polarity of current which happens to be delivered via the bar of the polechanger to the relay and line, as indicated in the illustration. The disk at the right of the middle lever is connected to the 600-ohm ground coil, to which disk the lever is turned when the distant station takes a balance.

The connections of the battery and the polechanger binding post may be reversed on levers 1 and 3 without interfering with the operation of the circuit. In fact some offices use one method and others the reverse.

Students should make drawings of the connections of local and mainline battery switches and thus get the connections thoroughly impressed on the mind.

PROPER CARE OF SWITCHES.

Doubtless there are some who do not realize the fact that switches require considerable attention and proper treatment as does any other part of multiplex apparatus. A little spot of ink which has dried and become hard and covers one of the disks the lever rests upon may completely open the circuit. If not, it may at least cause a high resistance at that point and thus reduce the volume of current. If operators who complain of "weak locals" would first examine the brass disks, they would often be able to detect the source of trouble and remedy the fault themselves by means of a penknife.

Another source of trouble is loose binding posts. They will work loose at times, and they should be examined daily.

Sometimes the pressure of the lever upon the disk is not sufficient to make a good contact. When this occurs remove the lever from the base and bend it enough to insure a good contact and then replace it.

Never attempt to pound it down into contact while it remains in place. If you do, you will certainly make matters worse.

Recent Telegraph and Telephone Patents.

No. 976,216. Electrical Relay, to F. Ritchie, Acton, England. The action of the relay is reinforced by a local induced current so that it may be operated by a line current, a primary impulse being produced after the initial impulse which induces a secondary impulse in the same direction as the initial impulse.

No. 976,230. Telephone Receiver, to H. R. Stuart, Newark, N. J.

No. 976,241. Telephone Trunking System, to C. S. Winston, Chicago.

No. 976,208. Selective Party Line Telephone System, to H. J. Roberts, Evanston, Ill.

No. 976,380. Selective Signaling System, to O. M. Leich, Genoa, Ill. A railroad telephone system with a step-by-step signaling mechanism and a slower clock mechanism which overtakes the step-by-step mechanism to change the circuit conditions through the local signal.

No. 976,457. Telephone Mouthpiece, to J. A. Hall, Oakland, Cal.

No. 976,524. Automatic Telephone System, to H. G. Webster, Chicago.

No. 976,537. Telegraph Transmitter, to J. C. Barclay, Montclair, N. J. A rotary member with the projecting studs occupying different paths of rotation and distributed angularly, the studs having plugs screwed into the member, the plugs being stepped and beveled, together with finger keys which operate mechanism to stop the rotary member, the latter controlling circuits.

No. 976,586. Relay Magnet, to J. F. McElroy and J. E. Macomber, Albany, N. Y.

No. 976,791. Storage Battery Electrode, to Thos. A. Edison and J. W. Aylsworth, West Orange, N. J.

No. 976,792. Storage Battery, to Thos. A. Edison, West Orange, N. J.

No. 976,836. Electric Annunciating Apparatus, to H. J. Alther, Boston, Mass.

No. 976,961. Combined Telephone and Service System, to H. G. Webster, Chicago, Ill.

No. 976,962. Wall Set, to A. H. Weiss, Chicago, Ill.

No. 977,008. Telegraph System, to G. E. Hines, New York. The main line is grounded at each end, with closed transformers with secondaries in series with the line and key, controlled primaries and relays with polarized armatures in series with the line restrained against movements due to stray currents,

and an adjustable self-induction device in series with the conductor.

No. 977,067. Central Station Call System for Telephone Lines, to W. E. Butler, David City, Neb.

No. 977,086. Electrical Element, to A. T. K. Estelle, Fliseryd, Sweden.

No. 977,114. Relay, to R. H. Manson, Elyria, Ohio.

No. 977,142. Telephone System, to F. X. Staub, Fort Wayne, Ind.

No. 977,145. Primary Battery Plate, to A. O. Tate, Toronto, Ont.

Personal.

The Franklin Institute of Philadelphia has awarded Elliott Cresson medals to Dr. Edward Weston, of Newark, N. J., for work in electrical discovery and in the advancement of electrical application and to Ernest Rutherford, professor of physics, Owens College, Victoria University, Manchester, England, for his work in the advancement of the knowledge of electrical theory.

Officials of the western division of the Postal Telegraph-Cable Company, on December 3, gave a farewell dinner at the Bismarck Hotel, Chicago, to Mr. T. W. Carroll, former general superintendent, who resigned on November 30, to become assistant to the general manager of the Western Union Telegraph Company in New York. The subordinate officials presented to their retiring chief a diamond ring. There were about twenty-five persons present and Mr. H. G. McGill, district superintendent, presided.

Major J. Orton Kerbey, the well-known old-time and military telegrapher and former United States Consul to Brazil, but for many years past a resident of Washington, D. C., was a recent New York visitor on the invitation of his old friend Mr. Andrew Carnegie. Major Kerbey, David Homer Bates of New York and Theo. E. Moreland of Pittsburgh, are the only living members of the former staff of telegraphers who were associated with Mr. Carnegie in the office at the outer depot, Pittsburgh, previous to the Civil War.

Mr. Theodore N. Vail, president of the Western Union Telegraph Company and of the American Telephone and Telegraph Company, recently entertained at his country home at Lyndonville, Vt., Mrs. J. J. Dickey, wife of the late J. J. Dickey, superintendent Western Union Telegraph Company, of Omaha, Neb.; her daughter, Miss Bertha Dickey, Ralston Scobie and Miss Helen Scobie, nephew and niece of Mrs. Dickey. The party recently returned from a year's stay in Germany, where the young people attended school.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Colonel A. B. Chandler, chairman of the Board of Directors of the Postal Telegraph-Cable Company, was united in marriage to Miss Mildred Vivian, of New York, on December 13. The wedding was a

quiet one, only the immediate relatives being present. The couple are spending their honeymoon on a trip to Washington, D. C., and thence further South.

Among recent executive office visitors were: Mr. S. M. English, president and general manager of the Postal Telegraph-Cable Company of Texas, Dallas, Tex.; Mr. H. Scrivens, superintendent of this company at Pittsburg; Mr. W. H. Regan, manager of the Fall River, Mass., office.

Mr. H. W. Hetzel, chief clerk to superintendent C. E. Bagley of Philadelphia, has been promoted to be travelling auditor of the company with headquarters at New York. Mr. G. A. Deitrich of the Baltimore office succeeds to the position of chief clerk to the superintendent at Philadelphia. Mr. W. F. Brophy, chief of the bookkeeping department has been advanced to the cashiership of the Baltimore office vice Mr. Deitrich, promoted.

Mr. G. M. Purdy, manager of the Dayton, Ohio, office, has been advanced to the managership of the Cleveland office, vice B. J. Ross resigned. Mr. F. T. Bott, who left the service some time ago to enter other business, has returned to the Dayton office as manager.

This company occupies an elegant office in the main waiting room of the Pennsylvania Terminal, New York, from which direct wires run to all the principal cities of the country. This office will provide the best of telegraph facilities for the railroad company's patrons and for the section of the city adjacent to the terminal. As yet the permanent office fixtures have not been placed in position, but provision is being made to make this a model office in every respect. Mr. J. Sheffrey is in charge of the office. He was formerly manager at 624 Madison Avenue and was succeeded there by Mr. H. T. Barkman of the 853 Broadway office.

Mr. E. J. Nally, vice president and general manager of the Postal Telegraph-Cable Company, New York, is the author of a card addressed to the public, a copy of which is posted in the offices of that company. The card is under the head of "The Employee and the Company," and reads as follows:

"It is a fact that the public regards the representative it meets and with whom it transacts business as the Company itself. We know this from our personal experience in stores, for instance—if we are well treated by the clerks, if they are pleasant and affable, if they impress us by their alertness and their knowledge of their business, our trade naturally gravitates toward that store. We like to go there; we are glad to tell our friends about it and to influence their patronage in that direction.

"So it is with the representatives of the Postal Telegraph. The public receives its idea of the Company largely through you. You are the ones they meet and from whom, as a rule, they form their impression of the Company itself. Hence it behooves all to be efficient, alert, honest and obliging, since in so doing we not only build character for ourselves, but we likewise give character and reputation to the company we serve."

Mr. E. Y. Ouderkirk, of Johnstown, Pa., has been appointed manager of the Wheeling, West Va., office, vice E. H. Worden resigned.

Mr. L. A. Seaman, formerly of the Wichita, Kan., office, is acting manager of the St. Joseph, Mo., office vice manager W. G. Brinson granted an extended leave of absence on account of sickness.

Mr. C. M. Breese has been appointed night chief operator at Toledo, Ohio, to succeed Mr. C. B. Holley, promoted, and Mr. V. A. Gaiser, has been appointed all-night chief operator in the same office.

This company has for some time been using Wright printing telegraph instruments on circuits between New York and Boston and between New York and Washington, and is now introducing the system between Chicago and St. Louis.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of the company, now occupies the office on the fourth floor of the building on Broadway front, formerly used by Mr. George J. Gould. The office vacated by Col. R. C. Clowry is now occupied by Mr. Newcomb Carlton, vice president. Col. R. C. Clowry's office is now in the Hudson Terminal Building, at 30 Church Street.

At a special meeting of the American District Telegraph Company of New Jersey, held Tuesday, December 6, the resignation of Col. R. C. Clowry as president was accepted, and Mr. Theo. N. Vail was elected a director, member of the executive committee and president of the company. Mr. Newcomb Carlton was elected a director, member of the executive committee and a vice president. The following named gentlemen now comprise the board of directors and officers of the company:

Board of Directors.—Messrs. Theo. N. Vail, Wm. H. Baker, Union N. Bethell, H. A. Bishop, B. Brooks, Newcomb Carlton, G. H. Fearons, T. F. Clark, G. W. E. Atkins, L. F. Loree, C. F. Patterson.

Executive Committee.—Messrs. Theo. N. Vail, Wm. H. Baker, Union N. Bethell, H. A. Bishop, Newcomb Carlton, B. Brooks, G. H. Fearons, T. F. Clark.

Officers.—Theo. N. Vail, president; Wm. H. Baker, vice president; Newcomb Carlton, vice president; A. R. Brewer, treasurer; L. Dresdner, assistant treasurer; I. B. Ferguson, secretary and auditor; C. F. Patterson, general manager; Geo. H. Fearons, counsel; H. D. Estabrook, solicitor.

At a special meeting of the American District Telegraph Company of New York, held Tuesday, December 6, the resignation of Col. R. C. Clowry as president was accepted, and Mr. Theo. N. Vail was elected a director, a member of the executive committee, and president. Mr. Wm. H. Baker and Mr. Newcomb Carlton were elected vice-presidents. The directors and officers of the company are as follows:

Directors.—Messrs. Theo. N. Vail, Wm. H. Baker, Union N. Bethell, Newcomb Carlton, W. C. Humstone, C. F. Patterson, P. V. R. Van Wyck.

Executive Committee.—Messrs. Theo. N. Vail, Union N. Bethell, Wm. H. Baker and Newcomb Carlton.

Officers.—Theo. N. Vail, president; Wm. H. Baker and Newcomb Carlton, vice presidents; A. R. Brewer, treasurer; I. B. Ferguson, secretary and auditor; D. Skelton, general manager, and W. A. May, chief clerk.

This company has inaugurated the "special ocean mail service," which is designed to save time in foreign correspondence. It is proposed to facilitate delivery of foreign mail to steamers by shortening the time it takes to carry on the trans-continental service. The night letter and other telegraphic service will be used to send messages from distant points to New York, from which place they will be sent to the first outgoing Atlantic steamship mail. The same plan will be carried on in San Francisco, Seattle and Vancouver for trans-Pacific mails. This will enable correspondents to dispatch telegraph letters from any part of the United States for an ocean mail within a few hours of sailing time. The only extra charge will be five cents for the postage. The great saving in time effected by this service will be appreciated when it is remembered that a letter from San Francisco to London requires as much time to cross the continent as it does to cross the ocean. A New York merchant writing to Yokohama must post his letter practically a week before the mail steamer sails from San Francisco or Vancouver.

Mr. Joseph Wilkes Brooks, recently appointed district traffic superintendent, with headquarters at Oklahoma City, Okla., was born at Wheelock, Tex., February 11, 1855, and began his telegraphic career at Navasota, Tex., in April, 1871. He has held positions as operator in many places in Texas, and was manager of the offices at Bryan, Corpus Christi, and El Paso; also at Las Vegas, N. M. He also occupied the position of night chief operator at Houston and Dallas, Tex., and all-night chief at Galveston. Mr. Brooks has been in the Western Union service continuously for nearly forty years, and his recent promotion is a well-merited recognition of his ability and of his long and faithful service. He is a brother of Mr. Belvidere Brooks, general manager of the Western Union Telegraph Company, and father of Mr. B. L. Brooks, division traffic superintendent, at Denver, Col.

Mr. B. J. Ross, manager Postal Telegraph-Cable Company, Cleveland, Ohio, has accepted the position of special agent with this company, with headquarters at Cleveland.

Mr. G. W. Fleming, chief clerk traffic department Postal Telegraph-Cable Company, New York, has accepted a position in the traffic department of this company in New York.

Mr. Marshall L. Bird, for sixteen years executive messenger for the Postal Telegraph-Cable Company, New York, now occupies a similar position in the office of Mr. W. H. Baker, vice-president of the American District Telegraph Company of New Jersey.

A conference of the officials of the Gulf Division of this company was held at Dallas, Tex., November 28 and 29. Those present were: Mr. L. McKisick, general superintendent; Mr. J. C. Smith, division commercial superintendent; Mr. L. K. Whitcomb, division traffic superintendent; Mr. M. B. Wyrick, division plant superintendent; Mr. Norman Ringer, district commercial superintendent; Mr. J. G. Hilbert, district plant superintendent and Mr. W. P. Davis, district traffic superintendent, of Dallas; Mr. T. P. Cummings, district commercial superintendent and Mr. H. Van Devender, district traffic superintendent, New Orleans; Mr. A. R. Lingafelt, district commercial superintendent, and Mr. J. W. Brooks, district traffic superintendent, Oklahoma City, and Mr. F. H. Gournoe, district commercial inspector. Besides the superintendents the following-named managers attended the conference: Messrs. H. G. Robinson, Oklahoma City, Okla., Gus Schultz, Galveston, Tex., J. L. Newton, San Antonio, Tex., S. P. Jones, Houston, Tex., W. Y. Nolley, Fort Worth, Tex., W. A. Porteous, New Orleans, and W. B. Tyer, chief clerk in the manager's office at Houston, Tex.

H. C. Worthen, General Superintendent, Southern Division, Western Union Telegraph Company, Atlanta, Ga.

Mr. H. C. Worthen, the new general superintendent of the Southern division of the Western Union Telegraph Company, with headquarters at Atlanta, Ga., is a Southerner by birth, and at the age of thirty-four has reached one of the highest positions in



MR. H. C. WORTHEN,

General Superintendent, Southern Division, Western Union Telegraph Company, Atlanta, Ga.

the telegraph service. He was born in Shelby, N. C., and being left alone by the death of his parents, was raised in the Oxford Orphan Asylum, where he learned telegraphy. When thirteen years old he started out for himself as an operator on the Seaboard Air Line Railway. In 1898 he joined the

Western Union Company as an operator and was stationed in various Western cities. His rise was rapid, and in the recent reorganization of the company he assumed a prominent position in the traffic department at New York headquarters.

Canadian Notes.

The legislature of the Province of Quebec, has instituted a Public Utilities Commission, with power to regulate public service utilities, including the telegraph and the telephone. It has authority to fix charges for public service and to regulate the use of appliances. The commission's decisions are final within its jurisdiction, the only grounds for appeal being upon a point of law or the question of jurisdiction. The Attorney-General is empowered to dissolve any corporation refusing to obey the commission's orders.

The case of the Imperial Press against the Canadian Pacific Railway's Telegraph was heard before the Board of Railway Commissioners of Canada, on December 2. The original claim was made that the Canadian Pacific Railway should transmit all messages of this party or firm at press rates or half rates. The Canadian Pacific Railway refused to do this as the association in question neither received nor forwarded newspaper despatches by wire but was engaged in a business of supplying matrices as fillers to newspapers and other publications, and therefore was not entitled to press rates on queries. When the case was called, Mr. Epstein, who practically constitutes the Imperial Press, changed his attitude and claimed that the telegraph company would not accept at press rates queries regarding despatches to be forwarded by telegraph, but he did not take up the original question, stating that that was not his claim. The Canadian Pacific Railway assured the Chairman of the Board that on any messages which had been forwarded referring to newspaper despatches by wire, a refund would be made if there was an overcharge. The case was thereupon dismissed.

General Manager I. McMichael, of the Great North Western Telegraph Company, held a meeting in Toronto, Ont., December 8 and 9, of the head-office officials and managers of the company's principal offices in Eastern Canada for the purpose of a thorough discussion of the company's business with a view of improving the service. Those present at the meeting were: Messrs. I. McMichael, vice-president and general manager; S. B. McMichael, assistant general manager; Geo. Hogarth, manager, and C. McConnell, auditor; W. J. Duckworth, superintendent of construction; D. E. Henry, chief clerk to general manager; Geo. Hogarth, manager; and C. E. McManus, chief operator, Toronto; L. S. Humes, manager, Montreal; C. E. Davies, manager, Ottawa; C. E. Lillie, manager, Quebec; J. Jamieson, manager, Hamilton, and D. Adams, manager, London.

T. W. Carroll Becomes Assistant to the General Manager of the Western Union Telegraph Company.

Mr. Thomas W. Carroll, general superintendent of the Postal Telegraph-Cable Company, at Chicago, Ill., has accepted a position with the Western Union Telegraph Company at New York, with the title of assistant to the general manager.

Mr. Carroll was born at Cleveland, Ohio, January 22, 1871, and began his telegraphic career in that city in 1888, when he entered the Western Union service. He afterwards made an excellent record as an operator at Cleveland and Pittsburgh, and later was promoted to the position of repeater chief in the overland service at Albuquerque, N. M., for the Postal Telegraph-Cable Company, subsequently going to Denver, Col., as day chief operator. He acquired an excellent electrical training, and



MR. THOMAS W. CARROLL.
Assistant to the General Manager, Western Union Telegraph Company, New York.

his proficiency in this regard led to his transfer to the headquarters of the Postal Company at New York, where he was attached to the electrical engineer's office. In April, 1901, he was appointed assistant electrical engineer for the same company at Chicago, and held that position until October 1, 1906, when he was promoted to be a superintendent. On January 1, 1908, he received the appointment of division superintendent, and afterwards was elevated to the position of general superintendent to succeed Mr. W. I. Capen, who was transferred to New York.

Mr. Carroll is a gentleman of high character and is extremely well liked by all who know him, whether he be superior or subordinate.

A. C. Cronkhite, District Commercial Superintendent, Western Union Telegraph Company, Indianapolis, Ind.

Mr. Albion C. Cronkhite, whose appointment as district commercial superintendent of the Western Union Telegraph Company, at Indianapolis, Ind., was announced in a previous issue, was born in Warren County, Ind., February 7, 1878, and entered the

telegraph service at Marion, Ind., as a messenger in November, 1893. He afterwards became an operator at Marion, Ind., and later went to Kokomo, Ind., as operator and acting manager. Subsequently he became operator and clerk in the Indianapolis office of the Western Union Company and relief manager in Superintendent J. F. Wallick's district. He was manager of the Mattoon, Ill., office from June, 1901, to May, 1905, after which he spent about a year in the brokerage business. On February 14, 1910, he returned to the Western Union as clerk and inspector in Superintendent Wallick's office, and afterwards became clerk in Superintendent I. N. Miller's office, at Cincinnati. On April 1, 1910, he was appointed manager at Terre Haute, Ind., which position he held at the time of his present promotion.

Mr. William J. Smith, district commercial agent of the Western Union Telegraph Company, with headquarters at Seattle, Wash., was born at Newport, R. I., May 21, 1882. After graduating from high school in May, 1897, he started his telegraphic career as a messenger in the Providence, R. I., office and advanced through the positions of chief delivery clerk, night chief operator, operator and assistant manager, during which time he took a commercial law course at a local business college. In 1903 he accepted a position with Dr. Lee De Forest in wireless work, and a year later became associated with the Marine Transmission Company, of Providence, R. I., as superintendent and assistant manager. Later in the same year he entered the service of the New England Navigation Company to take charge of its wireless department. In 1907 he was with the Massie Wireless Telegraph Company as Pacific coast manager, and in 1909 accepted a position with the Western Union Telegraph Company at San Francisco as operator. He was afterwards made manager at Klamath Falls, Oregon, but returned to San Francisco later as district inspector, which position he held until his recent appointment as district commercial agent.

Wm. J. Dodge, District Traffic Superintendent, Western Union Telegraph Company, Pittsburg, Pa.

Mr. Wm. J. Dodge, recently appointed district traffic superintendent of the Western Union Telegraph Company with headquarters at Pittsburg, Pa., was born in Utica, N. Y., in 1869. He first entered the telegraph service in his native city in 1885 as operator and all through his telegraphic career he has been in the employ of the Western Union Company. In 1889 he was appointed night chief operator in Utica, and afterwards day chief. In 1897 he became circuit manager of the fifth district, and in 1902 was transferred to Pittsburg, Pa., as day wire chief. In July, 1905, he was appointed night chief operator at Pittsburg, and in April, 1907, was transferred to the same position, days. He occupied this latter position at the time of his present appointment on November 1.

S. B. Haig, of the Traffic Department, New York.

Mr. S. B. Haig, whose appointment to a position in the traffic department was announced in our issue of November 1, was born in New York City in 1869. He entered the telegraph service at Cobourg, Ont., in 1884. He was connected with the Postal Telegraph-Cable Company in its New York office as night city chief, day city chief, general traffic chief, and assistant manager of the branch office at 20 Broad street. He was superintendent of traffic for that company when he received the offer to enter the Western Union service.

**MR. S. B. HAIG.**

Traffic Department Western Union Telegraph Company, New York.

Mr. Haig is one of the best posted men in the service and will carry with him a ripe experience that will be valuable in his new position.

Mr. Return J. Meigs, whose appointment as district plant superintendent, with headquarters at Philadelphia, Pa., was announced in our issue of November 16, was born in Washington, D. C., January 9, 1876. He entered the telegraph service in 1894 as block operator for the Baltimore and Ohio Railroad Company, and afterwards filled various positions with the Chesapeake and Potomac Telephone and Telegraph Company, at Washington, D. C., and the American Telephone and Telegraph Company, at Washington, Baltimore and Philadelphia. He was superintendent of traffic for the latter company at the time of his present appointment to the Western Union service.

**Ralph W. Kean, District Traffic Superintendent,
Western Union Telegraph Company,
Minneapolis, Minn.**

Mr. Ralph W. Kean, district traffic superintendent of the Western Union Telegraph Company, with headquarters at Minneapolis, Minn., was born at Pella, Iowa, November 30, 1878. He entered the telegraph service at Ottumwa, Iowa, in 1894, and has held positions at various places as operator, chief operator and traveling inspector. He received his present appointment on October 15 of this year.

**H. Van Devender, District Traffic Superintendent,
Western Union Telegraph Company,
New Orleans, La.**

Mr. H. Van Devender, whose appointment as district traffic superintendent for the Western Union Telegraph Company at New Orleans, La., was noted November 16, was born at Shuqulak, Miss., January 3, 1870. He entered the telegraph service as a messenger boy in his home town, mastering telegraphy during his spare moments, and in September, 1884, accepted his first position as telegraph operator for the Mobile and Ohio Railroad at Artesia, Miss., which position he resigned the following year to go with the Western Union Telegraph Company, at Atlanta, Ga. In 1896 he was promoted to traffic chief, which position he held until 1902, when he was again promoted to the managership of the same company at Mobile, Ala. In 1906 further recognition of Mr. Van Devender's ability was shown in his promotion to the managership at Atlanta, Ga., which position he held until 1908, when he resigned to engage in mercantile pursuits. "The call of the key" however, brought Mr. Van Devender back into the service in October, 1908, as traffic chief at New Orleans, which position he held up to the time of his present promotion.

Mr. Van Devender is considered one of the best all-around traffic men in the South, and his faculty of "getting the business through" has won for him the recognition he rightly deserves.

Mr. William Walter Watt, district plant superintendent at Cleveland, Ohio, is a Pennsylvanian by birth, being born at Sonman, Pa., October 27, 1873. He entered the telegraph service of the Pennsylvania Railroad, at Altoona, Pa., in January, 1889, and held the position of operator for that company until October 18, 1898. On this latter date he was appointed wire chief for the American Telephone and Telegraph Company, and was promoted through the positions of manager and district plant chief of the same company. On November 1, 1910, he received his present appointment.

Mr. Charles William McKee, district commercial superintendent, sixth district, Eastern Division, with headquarters at St. John, N. B., whose appointment was noted in the November 16 issue, was born in that city on April 7, 1860. He entered the telegraph service at East Weymouth, Mass., in 1876, on the Old Colony Railroad, and in 1877 returned to St. John, N. B., where he was engaged as operator until 1883. He went from there to North Sydney and then to St. John and was transferred to Halifax, N. S., in 1885, as chief operator. In 1892 he was appointed manager of the Halifax office, which position he held until his present appointment.

**M. B. Wyrick, Division Plant Superintendent,
Dallas, Texas.**

Mr. M. B. Wyrick, whose appointment as Division Plant Superintendent at Dallas, Texas, was

announced in our issue of November 1, was born at Olean, Mo., October 1, 1871, and began his telegraphic career in 1891 as lineman and operator for the Missouri Pacific Railway. He filled similar positions with the Postal and Western Union companies in the West, and prior to his recent appointment, was superintendent of Construction and Equipment for the Postal Telegraph-Cable Company of Texas.

The Turner Monument Fund.

The sending of the first telegraph train order is to be fittingly commemorated by the erection of a bronze and granite monument at Turner, N. Y., from which point the order was sent by Charles Minot, general superintendent of the Erie Railroad, in the autumn of 1851. The monument will cost about \$3,000 and to defray the expenses subscriptions are invited from all railroad, telegraph men and others who believe it proper and advisable to commemorate important events in such a manner that future generations may be reminded of what has been accomplished for them by pioneers. The telegraph and the railroad are two of the greatest civilizing agencies of the age and all connected in any way with these important interests should possess enough pride in their calling to aid in the realization of this worthy movement. The Association of Railway Telegraph Superintendents and the Old Time Telegraphers' and Historical Association have given the proposition their official endorsement and are heartily co-operating in the work of raising the necessary funds. Mr. Thomas A. Edison was one of the first to express endorsement of the movement and contributed \$50.00; Mr. F. D. Underwood, president of the Erie Railroad, leads the railroad subscriptions with a contribution of \$25.00; Mr. T. M. Emerson, president of the Atlantic Coast Line, at Wilmington, N. C., has subscribed \$15.00, and Mr. George T. Williams, of Cleveland, Ohio, formerly superintendent of telegraph for the Nickel Plate Railroad has subscribed \$25.00. These generous subscriptions, however, should not influence the man who would like to contribute, but who can afford only a small amount. No limit is placed upon contributions; the committee is glad to receive any amount, however small. The acknowledgments of subscriptions so far published in *Telegraph and Telephone Age* show amounts ranging from 25 cents to \$50, therefore there should be no hesitancy on the part of those who can afford but little.

All railroad, railroad telegraph men and others interested are urged to subscribe toward the fund, whatever they can afford, for the object is a worthy one and should receive universal support.

All contributions are acknowledged in the columns of *Telegraph and Telephone Age*.

The following named gentlemen constitute

the committee in charge of the Monument Fund: E. P. Griffith, superintendent telegraph Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, *Telegraph and Telephone Age*, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York, who has been elected treasurer of the fund.

According to the plan of the monument now before the committee for its consideration, the memorial will be 11 feet 2 inches in height.

The contributions received up to date are as follows: Previously acknowledged, \$457.50.

F. E. Bentley, St. Louis, Mo., and twelve telegraph operators, St. Louis, Mo., \$1.50; P. H. Leonard, Chicago, Ill., \$2.00; L. S. Wells, New York, \$5.00; D. L. Gray, New York, \$5.00; J. C. Stuart, New York, \$10.00; E. J. Pearson, Seattle, Wash., \$1.00; R. M. Calkins, Seattle, Wash., \$1.00; R. F. Weitbric, Denver, Col., \$5.00; Geo. T. Williams, Cleveland, Ohio, \$25.00; P. J. Flynn, New York, \$5.00; A. C. Elston, Buffalo, N. Y., \$5.00; E. W. Day, Baltimore, Md., \$2.50; F. J. Washburn, Malden, Wash., \$1.00; D. W. Cooke, New York, \$5.00; E. J. Nally, New York, \$5.00; G. W. Brownell, New York, \$10.00; J. W. Quackenbush, Waldwick, N. J., \$1.00; E. E. Dildine, St. Paul, Minn., \$1.00; W. H. Porter, Washington, D. C., \$2.50; B. H. Fox, Murphysboro, Ill., \$1.00; J. B. Murphy, Jackson, Tenn., \$2.00; G. Swope, New York, \$25.00; G. R. Hill, Jersey City, N. J., \$2.00; F. A. Mombert, Paterson, N. J., \$2.00; W. W. Ashald, Montreal, Can., \$1.00; E. A. Wescott, Meadville, Pa., \$1.00; Wm. H. Baker, New York, \$5.00; H. L. Lewis, Hohokus, N. J., \$1.00; C. A. Tinker, Brooklyn, N. Y., \$5.00; Chas. L. Seeley, Jersey City, N. J., \$1.00; W. H. Willis, Nutley, N. J., \$5.00; Theo. Mackrell, Salamanca, N. Y., \$5.00; W. J. Southworth, Washington, D. C., \$1.00; J. W. Fry, Seattle, Wash., \$0.50; Total \$609.50.

The Cable.

Mr. E. Heurtley, who was in the service of the Eastern Extension Companies for many years, has invented a device to be used in connection with the syphon recorder at cable terminal stations. It is designed to overcome the effects of retardation and get a clearer record of incoming signals. The instrument is being tested on the British Pacific Cables at Bamfield, British Columbia.

A telegraph pole on Banks street, New London, Conn., besides supporting the wires supports several growths of fungus, and is an interesting sight to passers by.

The Brown Magnetic Bridge.

BY DONALD MURRAY.

I was specially interested in the description by Mr. William Finn of the Western Union Telegraph Company's improved quadruplex published in your issue of November 1, because one of the essential features of the new arrangement is the Brown magnetic bridge. It is described in Mr. Finn's article as the impedance coil 5U. No mention being made of Mr. S. G. Brown's name in the article, I take it for granted that Mr. Finn did not know that it was Mr. Brown's invention.

The Brown magnetic bridge has been in use on long ocean cables all over the world, by the Eastern and most of the other great cable companies, for about ten years, the reason for its adoption being that it materially increases the speed of operating ocean cables. It may be mentioned incidentally that Mr. Brown's patents on the magnetic bridge were taken out only in connection with his other cable inventions, so that its use is free on land lines. The same arrangement is used in telephone work; but as far as I am aware, the improved

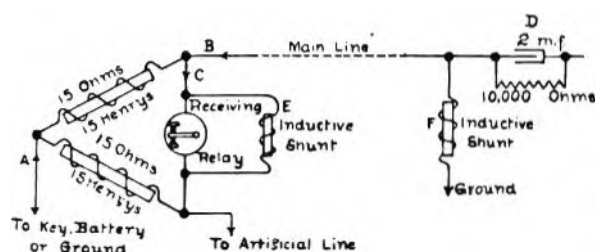


FIG. 1.—DIAGRAM OF BROWN MAGNETIC BRIDGE.

Western Union quadruplex is the first instance of its application to aerial line telegraphy, though the British and German Telegraph Administrations have been trying it for underground cables.

Like all inventions which prove of great financial value, the Brown bridge and cable-relay patents were the subject of a lawsuit in London a year or two ago, Dr. Muirhead challenging the validity of the patents. The judges, however, both in the court of first instance and in the court of appeal, upheld the patents, and Mr. Brown and his partners won their case.

For ocean cable work the Brown bridge is a very large instrument weighing about three hundred pounds and is built up like a transformer with sheets of transformer iron. The inductance in each arm of the bridge is also adjustable to a fine degree so that a very close magnetic balance can be obtained. One of the most valuable features of the bridge is the very low resistance combined with the relatively large inductance.

In Fig. 1, let us assume that there is an outgoing signal shown by the arrow *A*. The bridge being exactly balanced, there will be no inductive reactance to the outgoing current in the arms of the bridge. It will split and behave exactly as in the two windings of a differential relay. There will be a resistance of about 15 ohms. Compare this with

the old form of bridge with a resistance in each arm of 1,000 to 3,000 ohms or even more. Compare it also with a differential relay where the lowest resistance is not less than 100 ohms, and bear in mind the fact that any resistance at all at the entrance to the line is an impediment to speed and clearness of signaling. The sooner the current can pass into the line the sooner and more sharply does it reach the other end. The only limit to the speed of charging the line is the necessity for inserting sufficient resistance to safeguard the sending contacts from destructive sparking, especially on underground cables. The foregoing explanation gives a brief idea of the advantage of the Brown bridge for outgoing signals.

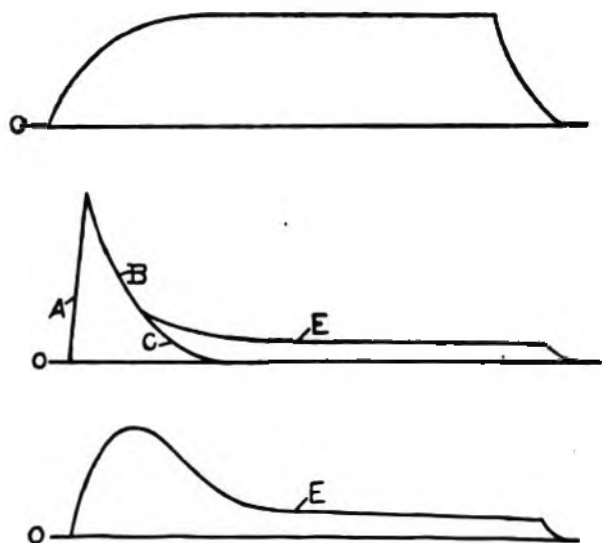
Now let us take an incoming signal *B*. The first part of this signal cannot pass the inductance of fifteen henrys in the upper arm of the bridge, because the inductance is like a flywheel. It has inertia and is slow to start and slow to stop. It takes time to create the inductance. The first part of the signal is therefore diverted and flows along *C* through the receiving relay. It is the first part of a signal that has most work to do in a relay, and it should therefore be the stronger part. As the signal continues the inductance gradually builds up and the signal current begins to flow through the upper arm of the bridge to earth. This prevents the receiving relay from being choked and clogged by more current than is necessary to operate the relay tongue. The signals that reach the relay may be described best as "tadpole" signals. They have a big head and a small body. The effect is almost like working through a condenser, with the advantage, however, that the magnetic bridge is an ideal duplex, while duplex working through a condenser is troublesome. The inductance flywheel has now started moving, and, as it does not stop readily, it not only short-circuits the receiving relay but also powerfully sucks out the remainder of the signal from the main line and leaves the wire more or less clear for the next signal. The Brown magnetic bridge in short has the same effect on the receiving relay as the old device of the shunted condenser (shown at *D*, Fig. 1) without any of the disadvantages of the shunted condenser for duplex working. The shunted condenser has a truly remarkable sharpening and strengthening effect on the received signals when working fast simplex, but it is more or less of a nuisance in duplex working.

The Brown magnetic bridge was unquestionably originated by Mr. Brown, a fact proved at great expense in the law courts; but the Brown inductive shunt is simply the old Edison idea in a new dress. Instead of a comparatively small coil of iron, the Brown shunt for ocean cables weighs from two to three hundredweight, and like the Brown bridge, is made up on the same lines as a transformer with sheets of transformer iron, and with a low resistance and high inductance. The inductance may rise to many henrys, and the resistance drop to a few ohms. It may be placed as a shunt round the

receiving instrument as at *E*, or it may be employed as a leak from the line to the earth as at *F*, Fig. 1. In each case it acts in the same way as the magnetic bridge. The inductance or magnetic inertia of the shunt deflects the first part of the signal through the receiving instrument, and then when the inertia is overcome it draws off the rest of the signal through what is practically a short-circuit of a few ohms to earth. The idea of connecting a telegraph wire direct to earth through a leak of only 15 ohms does not seem to be a very practical way of working a telegraph line, but the inductance makes all the difference and the scheme is all right.

The current curves shown in Figs. 2, 3 and 4 show clearly the actions of the bridge, shunt and shunted condenser. These curves are the result of observations with an oscillograph, and they are substantially accurate.

Why the Brown magnetic bridge has not been used before on land lines I do not know. It is simple and effective and there are no royalties to pay for its use on such lines. Just one word of caution to intending users, however. The mag-



FIGS. 2, 3 AND 4.—CURRENT CURVES UNDER DIFFERENT CONDITIONS.

netic bridge must be employed at both ends of the line or not at all. It may also be mentioned that in order to secure the best results it is necessary to adjust the resistance and inductance to suit the particular line to which the bridge is applied.

The curve in Fig. 2 shows an ordinary Morse dash after being received in a relay over a comparatively short line. In Fig. 3 the curve *ABC* shows the same Morse signal passing through a condenser. It is cut down to a short dot. The high-resistance shunt round the condenser *D* in Fig. 1 allows a little current to leak past the condenser, and we get the curve *ABE*. The peak *ABC* throws over the relay tongue and *E* holds it over. This is an ideal signal for working a relay, provided there is sufficient current at *E* to neutralize inductive interference from other lines.

The curve in Fig. 4 shows the shape of the original Morse dash after it has passed through the shunted condenser and the receiving relay. The inductance of the relay rounds the sharp condenser peak of Fig. 3. With the magnetic bridge and shunt the signal in the line more or less remains like Fig. 2, and it is through the relay only that the signal takes the form of Fig. 4. Inductive interference from other lines is therefore less important, with the bridge and magnetic shunt, than with the shunted condenser. The effect of the magnetic bridge and also the magnetic shunt is to send exactly the same kind of signal shown in Fig. 4 through the receiving relay. That is to say, the first part of the original Morse dash signal goes through the relay in full strength, and most of the rest is drained away through the bridge. The action of the relay is therefore not clogged by more current than is necessary to work it properly. The first part of the signal must be the strongest because it has most of the work to do. It has to throw over the tongue of the relay. The rest of the current has merely to hold over the tongue, and therefore does not need to be so strong.

Poles and Pole Lines.

BY C. T. DAY.

Assistant Superintendent of Telegraph, Ferrocarril Sud-Pacífico de Mexico, Ferrocarril de Sonora, Empalme, Sonora, Mexico.

I read with much interest the article by Mr. F. L. Rhoades in your issue of November 16, regarding pole lines, but wish to call your attention to the paragraph in which he says: "It is also a fact that creosoted wood poles are practically free from attack by woodpeckers."

In our section of the country on the Sonora Railway, between Magdalena and Torres, a distance of 236 kilometers, or nearly 147 miles, we have since last March put in 250 new burnetized poles with creosoted butts to replace other poles removed on account of the attacks of woodpeckers. The poles taken out are a variety of redwood and cedar, and creosoted pine. A section of one the latter poles now in my office, shows a hole four inches long by two and one-half inches wide outside measurement, and eighteen inches deep and five inches in diameter inside. The piece shows that the pole was well saturated with creosote and the pole had been in the ground only two years. We are spraying other poles with a solution of carbolic acid, but the birds are beginning to attack these. There are still about 100 more poles to be taken out on account of the damage done by these birds. The new poles have not as yet shown any evidence of attack. On the south end of our line the birds have started to pecking the poles, and they seem to grow fat on the creosoted ones.

If any of your readers can give us a solution of the problem outside of a shot gun it would be most gratefully received.

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December 16, 1910.

The Book Department of Telegraph and Telephone Age has always been a prominent and carefully conducted feature of this journal. The desire has been and is to furnish our readers and buyers everywhere the readiest means possible of securing such technical books as they may require. Aiding buyers in their selection with advance information, which at all times is cheerfully furnished; promptness in sending books, filling all orders on the same day of their receipt, has brought to this department a generous clientage. Catalogues fully covering the range of books treating on the telegraph, wireless telegraphy, the telephone, as well as those on the general subject of electricity, together with the principal cable codes, will be sent to any one asking for the same.

Christmas Greetings.

Once more it gives us pleasure to extend Christmas greetings to our many readers and friends. In some parts of this great country we will have a white Christmas and in others a green Christmas, but in whatever clime, the Christmas spirit will prevail and joy and happiness will be the uppermost thoughts in men's minds.

As we approach a new year it is natural to look back over the old and note wherein we have been deficient, with a view to doing better during the coming year. This is true of a business enterprise as well as of an individual.

This journal has during the past year, more than ever before, applied itself diligently to the betterment of the class of readers which it especially represents. Its chief aim has been to be accurate in all its statements, for upon its accuracy depends its character and support. Accuracy, therefore, may be said to be the corner stone of the structure.

We have every reason to believe that our efforts to make Telegraph and Telephone Age a reliable mouthpiece of telegraph and telephone happenings is appreciated, and it is our purpose to make the paper of greater and increasing value to the subscribers and readers, for a paper of this character depends upon these for its material support. The advertising patronage of a journal of this class is necessarily limited because the telegraph and telephone fields are, in a sense, limited as to the amount of advertising obtainable therein. It is necessary therefore, to secure and hold the good will of every individual connected with these interests, so that they will feel that the paper is really theirs and will take personal interest in its affairs.

In the matter of advertising we have decided to confine our work henceforth strictly to telegraph, telephone and kindred interests and omit all advertisements of the popular magazine character. The paper, after January 1, will therefore reflect electrical interests alone in its advertising as well as in its editorial pages, eliminating everything of an irrelevant nature.

Altogether a higher standard has been set for the paper and we feel confident that all our readers and others interested will exert their influence to widen the circulation and usefulness of this journal in addition to giving it their individual support. In renewing our greetings we wish to express our thanks to all of our friends who have loyally stood by this paper during the past twenty-seven years and we assure them that during the coming year our constant aim will be to make the journal more serviceable and valuable to them.

As to Qualifying for Promotion.

During the past two months about forty of our active agents throughout the country have received recognition of their worth and been promoted to positions of responsibility by the Western Union Telegraph Company and the Postal Telegraph-Cable Company, many of them becoming superintendents and some of them attaining even higher positions. We do not claim that their advancement was due to the fact that they were our agents, but we do assert that it was largely due to broad knowledge of things telegraphic that they obtained through their studious reading of the columns of this journal.

Many of those who have received preferment have candidly stated that the information and encouragement received through our columns have been largely instrumental in fitting them for the higher positions. This is a compliment that is highly appreciated and these acknowledgments simply show what can be done by close study of the educational articles printed in the columns of this paper. The study of the articles does not in itself bring promotion, but it does fit the diligent student to fill higher positions when vacancies occur and, as a rule, the man best qualified receives the appointment.

The Davenport Memorial Tablet.

Considerable interest to telegraph people attaches to the recent dedication in Forestdale, Vt., of a memorial tablet commemorative of the invention of the electric motor by Thomas Davenport. The telegraph has been greatly benefited by this historical invention, which was the progenitor of the electric motor of to-day, and of its near relative, the motor-generator. Motors and motor-generators are now in use in all telegraph offices of importance.

Like many other inventors, Mr. Davenport died in comparative poverty, his invention having not been appreciated in his day. It is stated that Davenport gave some attention to the improvement of the telegraph, which was then being developed by Morse, and that Joseph Henry, the famous scientist, advised him to "go slow," when he proposed to build motors up to one horse-power.

Mr. Thomas Commerford Martin delivered the dedicatory address and paid a high tribute to Davenport and his work, touching at the same time upon the work of Franklin, Morse, the two Fields, Alexander Graham Bell and Thomas A. Edison. He also referred to the fact that Col. A. B. Chandler, chairman of the Board of Directors of the Postal Telegraph-Cable Company, New York, and Mr. C. A. Tinker, formerly general superintendent of the Western Union Telegraph Company, New York, were natives of Vermont, many of whose sons had brought distinction to American invention.

The monument was unveiled and dedicated September 28, the ceremonies being attended by a large gathering of electrical people.

It is worthy of note in this connection that Davenport was the editor and publisher of the first electrical journal in the world. In January, 1840, he established in New York a paper called "The Electro-Magnet and Mechanical Intelligencer," which was printed by electric power.

Military Telegraphers' Appeal to Congress.

Col. W. B. Wilson, of Holmesburg, Pa., president of the Society of the United States Military Telegraph Corps, is sending to the members of that Society a copy of an appeal to Congress to "grant a military status to the men who were enrolled in the United States Military Telegraph Corps." In a communication accompanying the appeal Mr. D. H. Bates, New York, secretary of the Society, requests each member to send a copy to his Congressman and both his Senators, with a brief but urgent request for effective support. It is thought that concerted action on the part of the members of the society will result in favorable legislation by Congress. The request of the Military Telegraphers is a just one, and Congressional action in granting the members of the Society a military status has been long deferred; but there is every reason to believe that success will be ultimately achieved. All the members and others feeling so disposed should act at once and impress their Senators and Congressmen with the justice of the appeal for a military standing for the war telegraphers.

A Plea for the Repeater Chief.

A repeater chief in one of the western offices writes to us complaining that a good repeater chief is never selected for promotion as are other members of the staffs in the various offices. The repeater chiefs are a class of employes, he states, of whom the general telegraphing public hears but little and thinks of but seldom. Our correspondent continues:

"Calling on an old friend in the middle west I learned that as an evidence of appreciation of his some years of close application in the study of general practical electrical matters, after a graduating course in electrical engineering, he had been promoted (?) from the operating table to the position of 'repeater chief,' and was in charge of one section of 'overland circuits.' Perhaps on the day I called on him it may have been an unusual day, with rain in one section and fog in another; certainly his lot was not a happy one. In spite of his fairly successful efforts to duplex and at times to quad, himself, orders, like those in the Exchange on a 'bull market,' accumulated in his hands rapidly. 'Come to third Pacific, quick.' 'Which way is Portland failing?' 'Second Seattle won't double, come to it quick.' 'S. F. local failed, which way.' All these were in his hands at one time I noted. The thought came to me then, and I have dwelt upon it since, of what his intelligent services meant in detail; of the many thousands of miles of wire in circuit; either idle or earning revenue for his company; of from four to a dozen first class operators, each one receiving greater remuneration for his services than this one man, either moving business to the full capacity of men and circuits, or sitting idle with business accumulating and delayed, and their full salaries credited to them; of the scant thanks, lack of appreciation for his successful work, criticism for the contrary, without full consideration of adverse conditions and circumstances.

"Somewhere in tale or story, I've read of a sarcastic query made by some jealous 'foot soldier' reading something like this: 'Who ever heard of a dead cavalryman?' I might say, 'Who ever heard of a repeater chief promoted to a higher, a more remunerative position?' Traffic chiefs, chief operators, even managers of small way offices, yes! But the repeater chief is lost to view.

"To my personal knowledge, there are in the employ of both companies a large number of men who are electrical and mechanical experts; who now see but little before them but a day's work for a day's wage; who are, as I have stated, receiving a less remuneration for their work than are the operators working at either terminal of the wires over which they have charge. It is to be hoped that the officials of the companies will make the lot of the repeater chiefs as comfortable as possible from the financial standpoint as well as in other respects."

Mr. L. Derrick of Philadelphia, in renewing his subscription for *Telegraph and Telephone Age*, writes: "I would just as lief do without my Christmas turkey as to do without the *Age*."

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Mavor and Davis' "Quadruplex" and other standard works on telegraphy and treat them in the same manner.]

CHAPTER XXVI.

Why has it not been possible to utilize polar relays on single line circuits at way stations?

What advantage would be derived by such use of a polar relay?

Describe the operation of an instrument devised to meet this requirement.

CHAPTER XXVII.

In selecting a dynamo for the operation of a definite number of circuits how is its capacity calculated?

Why does wet weather along the line call for a greater output of current from the dynamo?

In what respect does a dynamo constructed to give a large volume of current differ from one constructed to give a small volume?

Why cannot a dynamo of the latter class be used to generate a heavy current?

What is the general rule for determining the size of wire to use for the delivery of electric current?

If wires are too small for the current they should carry what is the effect upon the operation of the instruments?

What is the material used for office conductors?

In distributing current what is the primary object to be attained?

Will the same system arranged for a supply of dynamo current answer as well for a supply from a storage battery?

Give the reasons why.

Could such a wiring system be operated advantageously by current from a primary battery?

If not, why?

Describe the method of obtaining dynamo current of different voltages?

Describe the method of arranging the dynamos with reference to one another to give the different voltages.

In multiplex work why is it necessary to have duplicate "gangs" of dynamos in operation?

What is the name given to taps from the dynamo?

How should taps be formed and carried to the operating room?

What is the method of connecting taps with the dynamo brushes?

How are the battery disks arranged on the switchboard?

Why is it necessary to provide separate taps from the main battery leads to each individual circuit?

What is the purpose of inserting lamp resistance between the dynamos and the wires?

Can any other resisting material be employed besides the lamp filament?

What is the advantage of using lamps for resistance?

When a circuit becomes overloaded how is the fact indicated on the lamps used as resistance?

Give the rule governing lamp resistance.

CHAPTER XXVIII.

What is the method of choosing dynamos for the operation of local circuits?

Why is it desirable to use a separate set of dynamos to supply current for loop and local circuits?

What is the approved method of arranging dynamo local circuits in an office?

Why is it more economical to connect the sounders in parallel?

How is the proper electromotive force of the dynamo determined for local circuits?

Express the rule by formulas. What is the object of inserting non-inductive resistance in local circuits?

New Book.

Standard Hand Book for Electrical Engineers, New York: McGraw-Hill Book Company, Third Edition, 1500 pp. When this work was first brought out three years ago it met with an immediate popularity. A second edition was soon made necessary to meet the demand, and the third edition has been thoroughly revised and brought up to date. The book is divided in twenty sections, covering every branch of electrical application and miscellaneous matters, such as standardization rules, tables, statistics, etc. Each section was prepared by a specialist of broad experience. The sections on telephony and telegraphy are very complete, that on telegraphy having been revised and made to cover a greater scope than in the earlier editions.

This handbook will be found valuable to all electrical, telegraph and telephone engineers. It is a book of basic electrical facts, many of which every electrical engineer is constantly looking up, and as a work of reference it is in a class by itself.

Those of our readers who are studying electrical engineering will find this book of great service. It gives tables and formulas which are being constantly referred to, and the descriptions of electrical apparatus of all kinds are concise and complete.

This book is of pocket size and is strongly bound in flexible leather. The price is \$4.00, and copies are for sale by Telegraph and Telephone Age, 253 Broadway, New York.

Any book on the telegraph, telephone or any other electrical subject can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York. Send for book catalogue.

Some Tests on Splices on Galvanized Iron Wire.*

BY C. T. RASHMAN.

Galvanized iron wire is used for guying and in some localities for telegraph and telephone circuits. The joints or splices between adjacent ends are usually made by twisting the ends one upon the other and are not ordinarily soldered. Several types of splices are in use, and to ascertain which is best a series of tensile tests was made on all of the commonly used types under the writer's directions. The desideratum was to find out which type of splice behaved best when subjected to tension, and if possible to determine a style of splice that would develop a tensile strength equal to that of the wire of which it is made.

Commercial wire cut from coils in the stockroom of a telephone company was used. It was probably of the grade known as "best best," or BB, although it was not possible to ascertain accurately what the grade was. The samples were tested in an Olsen testing machine.

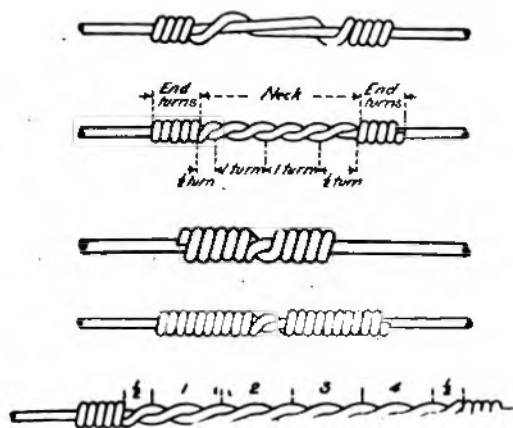
First, a length of No. 12 (B. W. G.) wire was stressed to failure and was found to break at 475 lbs. This value is the average of several. Then splices of the typical forms of Figs. 1, 2 and 4 were made of No. 12 wire, and tested to destruction. None of the three was found to be as strong as the wire of which it was made. Finally, after some trials, splices like that shown in Fig. 5 were formed, and it was found that the wire would break before a splice of this type failed.

Splices like that shown in Fig. 1 are made by clamping the two wire ends to be joined in a pair of connectors—the tool used by linemen for holding wires in correct relation while they are being spliced—and, with a pair of pliers, forming the wire into close end-turns around the wire bodies. What is meant by "end-turns" can best be explained by the illustration, Fig. 2, whereon the end-turns of a certain splice are indicated. The neck—the portion of the splice between the end-turns in the type of splice shown in Fig. 1—is not twisted. This type of splice was largely used at one time, but does not appear to be used now. When a splice like that in Fig. 1 is subjected to tension the end-turns first pull together along the main wires and finally assume the position indicated in Fig. 3. Then, as the stress is continued, the end-turns gradually unwrap and the two spliced wires usually pull entirely apart. In some cases one of the wires will break before the end-turns entirely untwist. The break often occurs at a point where the wire is nicked in making the splice. Increasing the number of end-turns increases the load at which the joint will start to yield, but in no case could a joint having a reasonable number of end-turns of this type be made to develop the full strength of the wire of which it was made without yielding excessively.

In Fig. 4 a splice is shown which is frequently called in books the American Telephone joint. It has a short neck containing one turn and a num-

ber of end-turns varying with the maker of the splice. The idea appears to be prevalent among linemen that the strength of a splice is dependent almost wholly on the number of end-turns it has, and that the number of turns in the neck is of little consequence. It was shown by tests that this idea is erroneous. As tension is applied to a joint like that of Fig. 4 it will untwist entirely, or often, partially untwisting one of the wires, will break at a load considerably less than one equivalent to the full strength of the wire.

It having been shown definitely that increasing the number of end-turns of a splice does not increase its yielding point to any great extent, tests were made to ascertain the effect of increasing the number of turns in the neck. Several sample splices were made, each having but two end-turns, but the



FIGS. 1, 2, 3, 4 AND 5.—TYPICAL FORMS OF WIRE SPLICES TESTED.

number of turns in the neck was made different in each case. Each of these splices were tested to failure. The results of the test were as follows:

Turns in Neck	Failure: Tension, Lbs.	Cause of Failure
3	230	Splice slipped.
4	230	" "
5	475	Wire broke outside of splice.
6	475	" " " " " "

It is apparent from the above observations that if a joint has five turns in the neck the full strength of the wire composing it will be developed. The joints for the above-recorded tests were all made from No. 12 wire having a breaking strength of 475 lbs. The results in the table are averages of several.

Fig. 5 shows a joint having five turns in the neck, that is as strong as the wire of which it is made. When subjected to tension such a joint will at first yield slightly until it is "set," but as the load on it increases there is little yielding and finally one of the wires will break outside of the joint at about its normal breaking point. The length of neck of such a joint is determined by the size of the wire composing it. In each case the neck length should be such that it will just

*Electrical World.

safely contain five turns. If the turns be made too short the wires will be "burned" in twisting the splice and if the turns be made too long their power of resistance will not be a maximum. It was found that proper neck lengths to contain five turns safely for different gauges of wire are about as follows: No. 14 wire, $3\frac{1}{2}$ in.; No. 12 wire, $3\frac{3}{4}$ in.; No. 10 wire, 4 in.; No. 8 wire, 6 in., and No. 6 wire, 7 in. After the tests were completed on splices made from No. 12 wire, more were made on the other sizes just named and it was found that for each size the number of turns in the neck of a safe joint should be five. Although five end-turns are shown in the illustration of the typical safe joint, Fig. 5, the tests indicated that two are ample. A joint having five end-turns has a better appearance than one having two, hence five is suggested as a standard number.

A few soldered joints were tested and it was found that, at least for the wire sizes used, almost any joint if soldered would develop a strength greater than that of the wires composing it. Joints of No. 12 and No. 14 wire made with one twist in the neck and one end-turn at each end would, when subjected to tension, remain intact, while the wire from which the joints were formed would break outside of the joint.

Summarizing, the results of the tests may be stated as follows: (1) End-turns do not have much holding power. (2) Most of the holding power of a joint is due to the turns in the neck. (3) A joint having five properly made turns in its neck will be as strong as the wire from which it is made and will yield but little when stressed.

Impregnation of Standing Poles.

The preservation of telegraph and telephone poles is a problem that is receiving wide-spread attention, and, since the supply of poles is rapidly diminishing, the difficulties of the situation are becoming more pronounced. The impregnation of poles with creosote and other preservatives is usually effected before the poles are placed in position. This treatment lengthens the life of poles, as has been abundantly proven. Attention is now being directed toward prolonging the life of poles now standing, and a process invented by Mr. John C. Morin, of Brookville, Ind., is described by Mr. H. H. Bement in the November number of the *Telephone Engineer*.

Mr. Morin employs creosote as a preservative, just as nearly all the more successful systems have done, but the method of injecting it into the wood is quite novel. It reverses the old process of tree-tapping, pouring sap in instead of drawing it off. The instrument by means of which the creosote is injected is very simple, consisting merely of an iron reservoir in the shape of a good-sized pipe about two feet long. A three-quarter inch hole is bored well into the center of the pole, about a foot above the ground, and the reservoir is there attached. About a gallon of creosote oil is poured into the reservoir and left to stand. No further labor is necessary, as

capillary attraction does the rest. Diffusion of the oil gradually takes place until the pole is thoroughly saturated below the level where the reservoir is attached. When the pole is thus suitably saturated, the reservoir may be removed and used in the treatment of another pole. Or, in the case of large and valuable poles, the reservoir may be left permanently attached, so that treatment can be given annually or semi-annually. The process of diffusion works to some extent above the reservoir as well as down, so that if sufficient creosote were administered, the entire pole might in time become impregnated.

The advantage of this process lies in the fact that the pole becomes saturated from the core out. A recent United States Forest Service report states that the value of the preservative treatment is directly proportional to the depth of penetration.

Minor advantages claimed for the system are as follows: The poles may be treated at any time without removing them from the ground, or interfering with the service; the pole can be treated at the ground line where decay first takes place, without the expense of treating any other part of the pole; the treatment, being accomplished by absorption, or diffusion, does not weaken the fibrous strength of the wood. As to the cost of applying the treatment, it is claimed to be cheaper than the boiling method. According to government experiments, the protection afforded by the boiling method is sufficient to prolong the life of the pole for twelve years. We may surmise then that complete saturation would prove at least equally beneficial.

There is undoubtedly a large demand for a satisfactory pole-preserving process. The average cost of a pole set in line is \$7, and it lasts thirteen years. The annual charge, then, compounding interest at six per cent., is seventy-eight cents per pole. The same pole treated costs \$8.50, assuming that the average treatment costs \$1.50; but now the pole has a life of twenty-three years, and the annual charge is reduced to sixty cents. A preservative treatment, then, reduces the annual charge per pole by eighteen cents. As there are about 50,000,000 poles now in use in the United States, an annual saving of about \$5,000,000 would ensue from proper treatment of them all. These figures are based on the twelve-year prolongation of the life of the pole, due to three-fourth inch penetration. If complete penetration should prove to extend this period, the annual charge per pole would be further reduced, and a corresponding greater saving would result.

Another economy accruing from preservative treatment lies in the fact that the basal circumference of poles can be reduced. The government experts compute that the basal circumference of thirty-six inches considered necessary for thirty-foot poles, could be safely reduced to twenty-eight inches, and the extra eight inches now allowed for decay would be saved.

Balancing Quadruplexes and Duplexes.

BY EDGAR C. DODGE, CHICAGO.

I have read with great interest the article in the December 1 issue of *Telegraph and Telephone Age* by a correspondent in a western city, and the statement of Mr. Minor M. Davis, electrical engineer of the Postal Telegraph-Cable Company, New York. Notwithstanding the assertions of the writer, I maintain that if I cannot get as perfect an ohmic and static balance on quadruplexes and duplexes without a ground as they can with the ground, I shall be pleased to recede from the position and retract the statement which I have often made that incompetent quadruplex chiefs who stick to the old method of balancing quadruplexes and duplexes were costing the telegraph companies thousands of dollars every year by unnecessary delay in getting wires lined up that were out of balance.

The writer of the article misquotes me. He says that I make the statement that magnetic balances are never maintained for more than a few minutes at a time, and that an operator will throw out his magnetic balance if it will improve the working of the circuit. Further on, he speaks of biasing the relay. I made no reference to what an operator would do, or to biasing a relay. I was speaking of quadruplex chiefs and repeat that after you have your wire in balance and start up, if it is a little too light or too heavy, change your magnetic balance to bring it to the proper position. If you are in balance and the signals come "light," that has nothing to do with your ohmic balance. They will be light to your open pole or your closed pole, and the proper thing to do is to adjust your relay the same as you would an ordinary relay, until the signals come clear and distinct. Biasing a relay to compensate for an uneven balance beyond the repeaters is bad practice.

Now, let us consider this matter from an unprejudiced standpoint. Balancing a circuit means just one thing, and that is giving an ohmic resistance to the artificial line which shall equal the ohmic resistance of the main line and thereby neutralize the effect of the home battery on the differential relays. Of course we must consider the static balance, but this may be obtained perfectly in the same manner as I have described in taking the ohmic balance. Once you have obtained these balances the magnetic balance is simply a matter of adjustment, and if the man at the repeater point comes in later and balances beyond the repeaters and passes it to you you will not be called back to rearrange your balance, providing you have not tried to do his work for him by biasing your relay.

Let me again state that I claim nothing new. I simply took my cue three years ago by seeing Mr. B. M. Gosselin balance a duplex, and I have never asked for a ground since. The approximate balancing and refining method referred to is where all the time is wasted, and is what we want to get away from. Take half a minute to properly balance a wire in the first place and then get away from the circuit.

No doubt your correspondent is familiar with all the principles and electrical phenomena of quadruplexes and duplexes, and could intelligently explain the windings, whys and wherefores of the polar relay, neutral relay, proportion box, etc., but the fact remains that nine-tenths of the so-called quadruplex men cannot give a correct diagram of the local connections between the loop board and the operator's table, or a double loop repeater. I claim that a competent quadruplex man should know these things and be able to explain all the functions of the different instruments. Then, and not until then, will he be able to locate and remedy trouble with any degree of promptness.

A person of ordinary intelligence should be able to master the subjects satisfactorily in one year, if he will give them careful and conscientious thought and study, but the majority who take up the work acquire a knowledge of how to balance a quadruplex to a ground and let it go at that. They know the way they were taught is the right way, because that is what their instructor told them, and besides, "Didn't the book say so?" The great majority take it for granted that it must be right because it has been done that way for forty years.

In conclusion, permit me to make it clear, if possible, what prompted me to bring up this question. I had noticed that nearly all the wire messages received from the numerous repeating points between Chicago and distant cities were requests to come to this or that wire, and in the majority of cases I would find the circuit stopped and four operators waiting, simply for me to give the repeating station man a ground. If the weather conditions are bad and balances constantly changing, this means an enormous waste of time, from the fact that a normal force of quadruplex men cannot respond promptly to all the demands. It is, therefore, obvious that if men at repeating points would discontinue the use of the ground for balancing and master the simple method of balancing to the distant battery, it would mean the elimination of at least fifty per cent. of delays caused by waiting for the quadruplex man at the other end to get to you.

Keep your pole changers clean and properly adjusted, also your transmitters and neutral relays; keep your end in balance and let the other fellow do the same. This will not only save you a lot of time and make your work easier, but will double your efficiency, avoid a lot of unnecessary wire messages and keep the business moving with greater promptness.

Mr. S. E. Barton, of Boston, Mass., an old-time and military telegrapher, but now engaged in other business at that point, writes: "Although it is thirty-five years since I left the business, I can safely say that there is no publication out of the many which I subscribe for and read that I enjoy more or read more completely than I do *Telegraph and Telephone Age*, and I should not want to be without it."

The Field Quadruplex.

On November 15 Mr. Stephen D. Field, of Stockbridge, Mass., was granted a patent for a quadruplex.

The objects of the invention are to obviate the necessity for the use of an artificial resistance in the transmitter branch; to provide for informing the transmitting operator of the character of the transmitted signals at a point in the circuit between the transmitter and the main line; to provide for bridging the interval of no current incident to a reversal of the battery and apparent in the neutral relay; to provide for locating the transmitter which varies the strength of current in both the main and artificial lines at a point between the connection with the transmitter branch and the receiving relays; and to provide means whereby the transmitter operating magnets operate on both the up and the down stroke with equal force, so that the movements of the lever to make the space between the elemental parts of a letter or character is produced by the same force which produces the dot or dash; this obviates the use of a spring retractor. To attain these objects a lamp of high resistance is placed in each of the leads from the dynamo to the transmitter, and these lamps are normally cut out of circuit by a fusible section of conductor of low current carrying capacity or any other known automatic circuit interrupting device of negligible resistance may be used. There is a Hughes magnet in a branch circuit, in series with a condenser, connected to the transmitter branch at or about its junction with the main and artificial lines; this branch is grounded. The receiving relays are preferably differentially wound, and the neutral relay is provided with a supplemental holding coil connected in series with a condenser in a branch circuit, the opposite terminals of which are connected to the main and artificial lines at a point between the transmitter and the neutral relay. The receiving relays are arranged to receive one set of signals due to current reversals, and one set of signals due to variations in current strength. The transmitters are the ordinary pole changing transmitters and the "shunt and leak transmitter" characteristic of what is well known in the art as "the Field key system." In this improved arrangement this shunt and leak transmitter is duplicated at each station, or it may be said to be in two identical sections, one complete section being in the main line, the other complete section in the artificial line, both at corresponding points in the main and artificial lines, between the point of connection of the transmitter branch and the receiving instruments; this places the artificial resistances forming part of the key system in the main and artificial lines, and the static discharge resulting from a current impulse of charge flows back and is thus made effective in the branch circuit containing the extra coil on the neutral relay.

A special device is provided whereby the contact points of the two sections of the current varying transmitter are caused to engage at exactly the same time. This consists of a special pivoted lever re-

tained in set position by friction at the pivotal point of support; at opposite ends of this pivoted lever is fixed one contact of each transmitter section; the complementary contacts are mechanically united and carried by the armature levers of the magnet or magnets forming part of the transmitter. This pivoted lever resembles a whiffle-tree, as used in a single vehicle; the first engagement of the contacts sets the whiffle-tree lever in position, so that thereafter the engagement of the two pairs of contacts occurs at identically the same time.

The transmitter levers are operated in both directions by electromagnetism, and a spring or gravity retractor is avoided. Heretofore where retractile springs have been applied to the armature they have given rise to inequalities.

The space in Morse signals should be made in the same time and by the same agency as the dot or dash in order to obtain uniform and exact signals. The improvements provide for this and render the transmitter magnets self-adjusting, so that they can be changed from a local circuit into a city line or short line circuit without changing any springs or in any way changing the retractile force, no matter what variation in the current strength or polarity there may be. The improved arrangement consists in the employment of two electromagnets located on opposite sides of the pivoted transmitter lever; the coils of these magnets are in a local circuit in series with the manually operated key; both magnets have the same ampere turns, but one magnetizes and demagnetizes more rapidly than the other; the magnet to produce the down stroke of the transmitter lever has a short core and charges and discharges quickly. The magnet on the opposite side retracts the armature lever and is slow acting; it has a long core, and this core is in a copper tube. When the circuit is closed, the quick acting magnet draws the armature out of the field of the slow acting magnet to produce the down stroke of the transmitter lever, and when the manually operated key is opened, the quick acting magnet discharges, while the slow acting magnet holds its magnetism long enough to retract the armature lever with a firm and solid contact.

Claims 20, 21, 22, 23 and 24, which cover the apparatus, read as follows:

20. In a multiplex telegraph, a main telegraph line, suitable receiving and transmitting instruments at each station, and a transmitter consisting of a lever operated by a circuit and two electromagnets, one of said magnets being constructed to operate in advance of the other magnet, substantially as described.

21. In a multiplex telegraph, a main line in combination with suitable receiving and transmitting instruments, including a transmitter composed of a pivoted lever, a short core quick-acting magnet arranged to move said lever in one direction, a long core slow-acting magnet arranged to move said lever in the opposite direction, and an electric circuit containing a circuit changing device and said magnets, substantially as described.

22. In a multiplex telegraph, a transmitter lever

suitably pivoted and having suitable stops located on opposite sides thereof, a short core electromagnet to move said lever in one direction, a long core magnet having a copper covering on the core to move said lever in the opposite direction, both said magnets having coils with substantially the same ampere turns and a circuit containing said coils and a manually operated circuit controller.

23. In a multiple telegraph the combination of a main line, an artificial line, suitable balanced receiving instruments, and a self-adjusting transmitter consisting of a pivoted armature bar, a quick-acting magnet, and a slow-acting magnet arranged to move said lever in opposite directions respectively, a suitable circuit including said magnets, and means for retaining said armature bar at rest during no-current intervals.

24. In a multiple telegraph the combination of a main line, an artificial line, suitable balanced receiving instruments and a self-adjusting transmitter consisting of a pivoted armature bar, a quick-acting magnet and a slow-acting magnet, arranged to move said levers in opposite directions respectively, a suitable circuit including said magnets and a spring for retaining said armature bar at rest during no-current intervals.

Telegraph and Telephone Age a General Subscription Agency.

We are frequently asked if we will accept subscriptions for other publications and thus save individuals the trouble of writing to several different papers when their subscriptions expire, usually at the end of the year or the first of July. We desire to inform all that this publication acts as a clearing house for such matters. Those desiring to subscribe for or renew their subscriptions for any publication in the world can do so through this office without any expense or trouble to themselves beyond remitting to us the amount of their subscription and giving the particulars.

The practical side of the telegraph is discussed in every issue of *Telegraph and Telephone Age* in a manner to interest and aid every individual operator in the service. Why not secure the benefits of such information by subscribing for the paper—\$2 a year.

A Timely Study of Wireless Telegraphy.

There has been a steady demand for operators in the wireless telegraph service, as that system has extended its operations, until to-day hundreds who were formerly employed as Morse operators are now occupying lucrative positions in the wireless field, at seaside, or on steamer, stations. The rapid increase in the number of wireless stations both on land and sea makes it evident that a very much larger field of employment, and at good pay, in the immediate future is opening up to the telegraph operator who will adapt himself to the newer method of radio-telegraphing. Operators everywhere are earnestly investigating this branch

of the telegraph, since as its vast opportunities to benefit the individual become more apparent with the development of the system now progressing so rapidly.

A good text book on wireless telegraphy is the first need of any who contemplate the study of that system. The sale of such works has increased enormously of late, clearly indicating the development of a widespread desire for knowledge on the subject.

For the convenience of our readers we have prepared and published in our catalogue, together with prices, a carefully selected list of standard books treating on wireless telegraphy. These volumes, which include the most up-to-date works upon the subject, furnish the best information obtainable, the kind giving the most efficient aid and direction to the student. Orders for the books enumerated, or indeed for any others that may be required, which must be accompanied by the cash, will be filled on the day of their receipt, and sent with all the carrying charges prepaid. Address J. B. Taltavall, *Telegraph and Telephone Age*, 253 Broadway, New York.

Mr. L. W. Storrer, commercial agent of the Pacific Telephone and Telegraph Company, San Francisco, in renewing his subscription recently says: "I don't know just how the readers of the *Age* would manage to keep in touch with what is going on in the telephone and telegraph world were it not for your ever welcome paper."

Mr. J. W. McMahon, district commercial manager, Western Union Telegraph Company, New York, in renewing his subscription takes occasion to say: "Your columns, which I have followed for some time, have contained the careers of many famous telegraph celebrities, which have been an inspiration to me and I believe the *Age* has been instrumental in encouraging all employees of the telegraph toward a higher goal."

Mr. P. H. Burns, superintendent of the telegraphs, telephones, and electric lighting for the government at Nassau, Bahamas, in a recent letter says: "Do not on any account drop me from the list of subscribers to *Telegraph and Telephone Age*. I find it getting better every issue and keeping me advised of the advancement and location of many old friends, besides the great value of the technical notes published, as I am still 'going to school.'"

(Mr. Burns is a native of Cleveland, Ohio, and occupied many positions as operator in the United States before entering the service of the English Government, in January, 1892, since which time he has been located at Nassau in charge of the telegraphs, telephones and electric lighting. He has installed a 118-cell storage battery and is soon to establish a wireless equipment.)

Any book on electrical subjects can be obtained through *Telegraph and Telephone Age*, 253 Broadway, New York.

Fire Alarm Systems.*

In a report to the National Fire Protection Association on "fire alarm systems," Mr. Ralph Sweetland says:

"Special importance should be placed upon the necessity of designing, installing and maintaining municipal fire alarm systems so that alarms may at all times and under the most adverse conditions be promptly transmitted to the fire departments. To this end attention is called to the supreme desirability of providing headquarters, which, as far as practicable, will be free from liability of damage by fire, either by internal or external causes; of installing apparatus which may promptly and correctly transmit alarms, but which will be simple and easy of maintenance; of placing all wires outside of buildings, as far as practicable, underground; of having frequent and systematic tests of all apparatus, and of having in charge of such systems only men of known judgment and ability. These rules cover requirements for the construction and installation of appliances most commonly used at the present time. Any other types of apparatus which are judged to have merit should be submitted for examination and test and, if found efficient, will receive recognition accordingly.

(Note.—The portion of these rules relating to the design and construction of appliances are but a partial outline of requirements. A device which fulfills the conditions herein outlined, and no more, will not necessarily be acceptable. Samples of all appliances should be submitted to the Underwriters' Laboratories for examination and report before being introduced for use.) *

MANUALLY OPERATED FIRE ALARM SYSTEMS.

(For cities having a population of more than 100,000.)

Systems requiring operators in headquarters for the transmission of alarms.

(1) *Headquarters.*—(a) The building to be of fireproof construction. Note.—No wood should be permitted in the construction, even for top flooring, window or door trim, closets, instrument cases, etc.

(b) The building should preferably be located so as to be unexposed for a distance of at least 150 feet. If so located as to be exposed, then especial attention should be given to guard against damage from such exposure by protection of exposed openings, of so constructing roof as to resist damage which might be caused by falling walls. Note.—It is desirable to locate the building in a park or public square, where the conditions as regards exposure can be fully met. As the building, even for a large city need not be large, and since for a slight increase in cost it can be made artistic in appearance, objections to such locations should not be insurmountable.

(c) The building should be used for no other purpose than that relating to the fire alarm service.

(d) One approved three-gallon chemical fire extinguisher and six sand pails to be provided for

each 2,500 square feet of floor area. When any portion of the building is occupied as a stable, garage, machine shop or for storage purposes used in connection with the up-keep of the system, the part thus occupied to be protected by an approved system of automatic sprinklers.

(e) Approved registers and tappers speeded for "fast" time to be provided, on which box signals may be received. Approved time and automatic dating stamps by which time of receipt of alarms may be recorded also to be provided.

(f) An approved transmitter, speeded for "fast" time to be provided, by means of which alarms may be sent to the fire department houses by automatically repeating from box circuits, subject to the control of manually-operated interlocking switches.

(g) An approved manually-operated transmitter, speeded for both "fast" and "slow" time, to be provided, by means of which alarms may be sent over the "slow" time circuits to the fire department houses; also sounded on outside bells and whistles, if any, and arranged so that it may, if desired, be run at "fast" time and control the tapper circuit.

(h) There must be means provided for telegraph communication from central office over each box circuit, and there must be telegraph keys at central office by which signals may be sent, both over each alarm circuit separately, and also over all "fast" time circuits simultaneously, and over all "slow" time circuits simultaneously.

(i) An independent reserve source of electrical energy of proper capacity constantly available to be provided. The following sources of energy are given in their order of preference: (1) Storage batteries; (2) motor generators or rotary transformers.

(j) Approved heavy current protectors to be provided near the point of entrance of wires or cables into the building.

(k) Approved automatic devices to be provided, by means of which grounds or openings of circuits will be immediately announced by visual and audible signals. Manual tests of all circuits to be made at least four times during each twenty-four hours, a record of all tests being filed for reference.

(l) Approved slate or marble switchboards to be provided, on which shall be mounted the various switches, relays, protectors, etc. Switchboards should be located so as to be readily accessible from all sides.

(m) Plans of all outside circuits and records of all tests to be kept on file.

(n) To have at least two competent men on duty constantly, and in addition linemen to be available so that in case of derangement of outside circuits prompt attention can be given same.

(2) *Boxes.*—(a) To be of an improved keyless, non-interfering and successive type. Note.—Boxes may be of the key type, if key is properly attached to box.

(b) To be located so as to suitably protect the city. Note.—No definite rules can be given for the location of boxes. In general, it is considered that from any building in the mercantile and manufacturing

*From Fire and Water Engineering.

districts it should not be necessary to traverse over 300 feet in order to reach a box; in closely built-up residential districts this distance should not be over 500 feet.

(c) Circuits to be so arranged that not more than twenty boxes will be on any circuit, and no apparatus other than boxes to be connected on box circuits outside of fire alarm headquarters. Note.—It is desirable to so arrange circuits that adjacent boxes will be on different circuits. It is recommended that all circuits be brought to easily accessible terminals, mounted on slate or marble bases for testing purposes.

(d) The placing of municipal boxes inside of buildings should be discouraged as far as possible, and where private boxes are used, they should be conveniently located on the outside of buildings. Note.—When located inside of buildings they must be mounted on filled hardwood blocks not less than $1\frac{3}{4}$ inches in thickness; the supports of blocks and of the boxes must be independent of each other.

(3) *Wiring.* Note.—To secure the largest measure of safety and efficiency in the operation of municipal fire alarm systems, all wires outside of buildings should be placed under ground.

(a) Must under normal conditions employ only closed metallic circuits.

(b) Aerial wires should have an approved insulating covering; to be equivalent in conductivity and tensile strength to No. 10 galvanized iron when single wires are used, and to No. 16 B. and S. hard-drawn copper wire where cables are used.

(c) Aerial wires to be supported entirely on glass or porcelain petticoat insulators at least every fifty feet; run as far as possible under rather than over electric light or power wires, and especial attention should be given to preventing liability to accidental contact with such wires.

(d) Wires and cables inside headquarters to have approved insulated covering and to be so supported that they will be as free as possible from liability of grounds or mechanical injury.

(e) Wires inside fire department houses to have approved insulated covering and to be so supported in conduit, in armored cable, or on non-combustible non-absorptive insulators, and so arranged that the covering will come in contact with no other substances than the designed supports, the protecting bushings and the connecting instruments.

(4) *Fire Department Houses.*—(a) An approved perforating register and 6-inch gong for the "fast" time service to be provided by means of which alarms may be received.

(b) An approved 15-inch electromechanical gong for the "slow" time service to be provided, by means of which alarms may be received.

The Delaware Telegraph Company has been chartered at Dover, Del., to establish, it is stated, underground cables, subways and protected telegraph lines and despatch systems. The capital stock of the company is \$100,000.

Report of Chief Signal Officer United States Army.

The annual report of Brigadier-General James Allen, Chief Signal Officer of the United States Army, for the fiscal year ended June 30, 1910, is an interesting record of the work done in that branch of the service during the period named.

On June 30, the Washington-Alaska military cable and telegraph system comprised 2,629.35 miles of submarine cable, 367 miles of double and 996 miles of single land line and 934 miles of wireless. During the year "this line" receipts aggregated \$188,109.36 and "other line" receipts \$18,974.55. Official messages to the value of \$174,005 were transmitted and \$57,764.40 was transferred by telegraphic money orders.

Work on the Alaskan wireless telegraph system has been directed chiefly to the betterment of existing stations rather than to extensive new construction. "The operation of the wireless telegraph stations in Alaska has been of such a character," says General Allen, "as to warrant consideration being given to the abandonment of a portion of the land telegraph lines over the routes now covered by wireless, thus relying on this as the sole means of communication instead of as an auxiliary to the land lines as originally intended."

In the Philippine Islands the military telegraph system comprises thirty-four miles of line and twelve offices. There are twenty post telephone systems equipped with 473 telephones. There are four long distance systems with 106 miles of line. Five wireless stations have been established for the insular government. In the United States schools are maintained at Forts Omaha and Wood, for the instruction and training of the enlisted men of the Signal Corps. Both posts are equipped with wireless sets. A wireless station has been put in operation at the Army Signal School at Fort Leavenworth, Kan., and the School has been enlarged and improved. During the year the cable ships *Burnside*, *Joseph Henry* and *Cyrus W. Field* were actively engaged in cable operations. The wireless equipment furnished by the signal corps for installation on army transports has continued to give very satisfactory service.

At the close of the year there were 113 post telephone systems. On November 1, 1909, the electrical and telegraph divisions were consolidated. The army now has fifteen wireless telegraph stations located at military posts in this country and nine stations at points in Alaska.

An excellent map shows the United States telegraph and cable system in Alaska and United States cables and Canadian lines connecting with the United States.

Telegraph and Telephone Age constitutes a "school of instruction" to every would-be telegrapher. It is accurate and authoritative and worth many times the price of subscription (\$2.00) to any who would inform themselves respecting the telegraph.

The Military Telegrapher in the Civil War.

PART I.

In these days of profound peace, it is difficult to realize the hardships experienced by the brave military telegraphers during the war of the rebellion. The stories of these experiences published in past issues have excited universal admiration for the fortitude, courage and patriotism displayed by these men, and they constitute collectively a most interesting chapter in the history of that great struggle.

The late W. K. Applebaugh, a well-known member of the New York profession a few years ago and remembered by many living operators, gave an interesting account of his war experiences for Colonel W. R. Plum's book on "The Military Telegraph During the Civil War in the United States." The narrative, in part, follows: "I was Sergeant-Major of the Sixteenth Pennsylvania Cavalry, Col. John Irwin Gregg, when I was transferred on order by the Secretary of War, Mr. E. M. Stanton, January 6, 1864, and assigned to duty as a telegrapher at Warrenton, Va., where I remained until Spring. General D. McM. Gregg was in command of this post. In the Spring I was transferred to Belle Plains Landing, Va., a base of supplies, and remained there a few days. Then, as the army advanced, the base was transferred to White Plains, Va., on the Pamunkey River, where a number of army operators were awaiting orders. About this time, which was shortly after the battle at Cold Harbor, there was some trouble with telegraph communication at the mouth of the Mattaponi River, and a small party of us was sent down in a tug-boat to investigate. The break was repaired and on account of the enemy firing at us from the river banks on our downward trip, one of the boat hands abandoned the tug at Little York. On the return trip I acted as pilot so that the captain could attend to other duties. I took charge of the wheel for about sixteen miles up the Pamunkey River with occasional assistance from the captain. The pilot house was protected by bales of hay placed around its sides, so there was but little danger from the sharpshooters on the banks. Only a few shots were fired at us during the entire trip.

"A week or two later several operators, including myself, were sent to Bermuda Hundred, Va., to the Army of the James. While located there General Grant established his headquarters at City Point and as his regular operators had not arrived from Fortress Monroe, I was sent to his headquarters temporarily. Next, I think in July, I was assigned to General Brooks, commanding the Eighteenth Army Corps of the Army of the James, on the Bermuda Hundred front. In the Fall of 1864 the Army of the James crossed the James River at Jones Neck and advanced to within about six miles of Richmond. At this point I was assigned to General D. B. Birney's headquarters of the Twenty-fourth Army Corps. Our office was located for the Winter in a small log house on the Varina road, near the Charles City

road. We remained here until the evacuation of Richmond.

"On the morning of April 3, 1865, I was with General Weitzel and staff, and we were among the first to enter Richmond. As we passed up Main street the heat from the burning buildings was so great that we were obliged to protect our faces with the capes of our overcoats.

"As soon as the wires were reconstructed I opened an office at General Devens' headquarters, second division, Twenty-fourth Army Corps, at Mansfield, Va., on the south side of the James River, near Richmond. I remained there until the Department of Southwestern Virginia was established, with headquarters at Lynchburg. I was stationed at the latter place until March, 1866, when I resigned and came North. I have been in New York ever since and am at present general superintendent of this company."

[The company referred to by Mr. Applebaugh was "The Telephone Company of New York," whose offices were at 203 Broadway. Mr. Applebaugh's communication was dated June 6, 1878, thus taking us back to very near the time of the birth of the telephone.

In the spring of 1879, Mr. Applebaugh was sent to France by the telephone company and introduced the first telephone system in that country. He returned to America in the Fall of the same year on account of ill-health, which continued until his death in Philadelphia, October 21, 1883.

Mr. Applebaugh was a member of the Operators' Reception Committee at the inauguration of the Morse Statue in Central Park, New York, June 10, 1871, and in the evening of that day the memorable event took place at the Academy of Music, when Professor S. F. B. Morse sent the now historical message, "Greeting and thanks to the telegraph fraternity throughout the world. Glory to God in the Highest, on Earth Peace, Good Will to Men." All the telegraph wires in the country had been connected as one circuit for the occasion, and Mr. Applebaugh took a prominent part in the ceremonies attending the sending of this message.—Ed.]

"Spare Pair" Society of Philadelphia.

The "Spare Pair" Society of Philadelphia, which is composed of employees of the telephone service in that city, held its monthly meeting, November 16. Mr. P. G. Burton, division plant chief, of the American Telegraph and Telephone Company, Washington, D. C., gave a very interesting talk on "The Cable," dwelling upon its manufacture, installation and its effect upon speech transmission and signaling. He also referred to the Pupin coil, its advantages, etc. A discussion followed the address and was participated in freely by those present. The entire programme proved both instructive and entertaining and was enjoyed by all. About seventy-five persons were in attendance.

The Telegraph and Telephone Equipment of the Pennsylvania Railroad Company's New York Terminal.

The magnificent terminal station of the Pennsylvania Railroad Company in New York, which was recently opened, is provided with very complete and most modern telegraph and telephone equipment.

All of the telegraph apparatus employed is of special design and made from the company's specifications by Messrs. J. H. Bunnell & Co., New York. The work of installing the apparatus and all of the wiring was done by the railroad company's electrical department, under the supervision of Mr. M. J. Kelly, general foreman from the office of superintendent of telegraph, Philadelphia.

In the main telegraph office the switchboard is mounted in an elegant and highly polished mahogany cabinet case. It has a total capacity of 100 lines, being divided in two boards of fifty lines each. It is of the double spring-jack type, and the cords pass through hard rubber bushings mounted on the switchboard shelf. These cords are kept taut by means of weights and pulleys. There are forty wedges and connecting cords, the wedges being of the standard type. They are so constructed that the cord can be fastened to the wedge in such a manner that there will be no strain on the connection between the wedge and the cord when handling the wedge.

A special distributing rack is provided for bringing in the wires to the board through cables.

Two lamp resistance panels of marbleized slate are mounted on top of the switchboard. Each is 11½ inches thick, 54 inches long and 19½ inches high. Each panel is provided with 150 Edison base receptacles arranged in rows of twenty-five and connected in pairs, each double row being connected with a bus-bar. There are sixty tubular resistance lamps, twenty of 100 ohms, twenty of 200 ohms and twenty of 300 ohms.

The operating tables have twelve positions. The sounders are all placed in resonators of a special type made from the railroad company's specifications. They are mounted on iron standards, the cords running up through the standards to the resonator. The wires are not connected directly with the sounders, but terminate at a connector attached to one side of the box, and the binding posts of the sounder are connected with the connectors on the box by means of a short piece of flat brass. By this arrangement a very large contact surface is secured and all danger of breaking a wire is avoided.

There are four direct wires to Philadelphia and two telephone circuits, all used for handling the railroad company's business. One of the telegraph circuits is duplexed to Philadelphia.

The operating department is served with five pneumatic tubes which run into different parts of the great building. All the current used in the telegraph service for main lines and local circuits is generated by motor-generators, operated by energy taken from the railroad company's service lines at 440 volts. There are five motor-generator sets installed, three generating 115 volts and two eight volts. These machines also supply the energy to operate the seventeen telautographs, twelve pneumatic tubes and all the buzzer circuits. The motor-generators were made by the Holtzer-Cabot Electric Company, of Boston. These machines are located in the power room adjacent to the telegraph office. In this room there is also a three-panel slate switchboard fitted with the necessary switches, fuses, etc., for the control of the current. Weston ammeters and voltmeters are used. The board was furnished by Westinghouse, Church, Kerr & Co., New York.

One of the most interesting features of the train handling system is the equipment of the main switch tower, a little to the west of the station. This tower contains the most modern appliances and to the uninitiated the multiplicity of apparatus is bewildering. Communication to and from this tower is done by telephone principally. On the instrument table there are four flush type monitor telephone boards, each with two telephone sets, so eight men can handle business at the four boards. An interesting piece of apparatus is the telautograph which is used for receiving and transmitting information regarding train movements. Telautographs are installed in the other switch towers, the telegraph office and the train dispatcher's office, so that these various points can communicate with one another by this means. These instruments were supplied by the Gray National Telautograph Company of New York. In transmitting an order a copy of the message is reproduced before the operator's eyes, thus serving as a check upon his work.

Telegraph circuits run from this tower to the other towers, to the telegraph office, the train dispatchers' office and to other points concerned in the handling of trains. In the operation of the telephone system from this tower excellent provision is made for an emergency ringing current in case of interruption of the regular supply of energy. For this purpose a Warner pole-changer is provided. This instrument is operated by one cell of Edison-Lalande battery, and in producing the emergency ringing current it transforms the direct current from sixty cells of dry battery into alternating current, by the operation of a vibrator. This instrument is very effective in operation, and is manufactured by the Warner Electric Company of Muncie, Ind.

Sandwich selectors, made by the Sandwich Electric Company, Sandwich, Ill., are installed in the various towers on the train despatching

circuits, and enable the train despatcher to call any desired tower at will. All the selecting is done on one pair of wires.

The pole line along the right of way across the meadows, between the Hackensack portal and the Manhattan transfer station at Harrison, N. J., is of the most substantial character. It consists of 207 reinforced concrete poles of square section with the corners beveled off. The poles vary in length from thirty-five to sixty feet, according to local conditions. They are provided with steps set in the concrete. The cross arms are of wood and the insulators are of brown glazed porcelain. The poles carry forty telegraph and telephone wires besides one lead-covered and one rubber covered cable. The poles were manufactured by the railroad company, and were designed by Mr. R. D. Coombs, assistant engineer of the Pennsylvania Tunnel and Terminal Railroad Company. Some of the poles are equipped with double cross arms in situations where additional strains are exerted on the poles.

Time is transmitted all over the company's system by telegraph twice every twenty-four hours—at 2 a. m. and 2 p. m.—from the Allegheny observatory, at Allegheny City, Pa. Mr. C. G. Baird is manager of telegraph and telephones at the Terminal and to him we are indebted for the foregoing information.

The following description of the telephone service is given by Mr. J. N. C. Graham, in the *Electrical Review* and *Western Electrician*.

The telephone equipment of the new station represents the highest development in plants of this character, both as regards scope and flexibility. The apparatus was furnished by the New York Telephone Company, which has provided for three classes of service, i. e., commercial service, operating service and pay-station service.

The commercial equipment, as the name implies, has been installed to care for the telephone service between the railroad company and the public. It comprises: (1) A main private-branch-exchange switchboard, having trunk lines to the telephone company's nearest central office; tie lines to other private branch exchanges in offices of the Pennsylvania and Long Island Railroad Companies in New York and other cities; extension lines to the various offices of the Pennsylvania Tunnel and Terminal Railroad Company, and of the Long Island Railroad Company located in the Terminal Station. (2) A private-branch-exchange switchboard for use in connection with the Bureau of Information.

The operators' quarters and the room which contains the terminal equipment, auxiliary apparatus and power plant for operating the switchboards are adjacent to the switchboard room. These rooms overlook the main concourse and have been arranged with a view to caring for a 100-per-cent. increase in the already large telephone business of the railroad.

The switchboard is of the standard common-bat-

tery type, has a capacity of 1,000 lines, which are multiplied in every second position, and is at present equipped for 520 lines, of which 40 are arranged for trunk lines to the telephone company's central office, 80 are arranged for tie lines, 80 for magneto extension lines, and 320 for common-battery extension lines.

There are six operating positions, of which two and one-half positions are arranged for handling incoming traffic and three and one-half positions for originating traffic.

A day force of six attendants and a supervisor are necessary to handle the traffic on the board. A smaller number of attendants are required during the evening and at night. The work of the attendants is supervised from a regulation chief-operator's desk.

The instruments for the use of conductors and gatemen are contained in boxes located in the columns on the train platforms and at the gates opening off of the main concourse.

The switchboard serving the Bureau of Information has four positions.

The restaurant pay-station equipment consists of two switchboards, one located in each restaurant. Extending from these switchboards are a number of lines which terminate in jacks at each table in the restaurant. A person wishing to make a telephone call while dining, asks the waiter for a telephone. A portable telephone is brought to the table and connected with the jack referred to, and the call made in the regular manner. The amount of the charge for this call is placed on the restaurant check.

Lines extend from the main private-branch-exchange switchboard to jacks located at convenient points under the train platforms. The observation cars of the more important trains are equipped with telephones, which also terminate in jacks under the car. A flexible cable is used for connecting the train jack and the platform jack, thus making a connection to the private-branch-exchange switchboard and enabling passengers to make telephone calls until a few seconds before the departure of the train. These pay-stations are in charge of the stenographer in the observation car.

Adequate facilities have been provided for reaching any point within the terminal area or along the road where there is a possibility of a telephone being required. In the terminal building alone, there have been installed for use in connection with the commercial service, 6,900 feet of lead-covered telephone cables. These cables contain 450 miles of copper wire and weigh eleven tons. The largest cable contains 1,212 wires and weighs over seven pounds to the foot. It was necessary to make forty-three branch splices, in one of which 2,828 wires were connected. These branch cables connect to eighty cable terminals containing nearly 5,000 binding posts. To extend the lines from the cable terminals to the various instruments within the terminal building required 39,000 feet of twisted-pair wire.

In addition to the cable plant referred to, approximately thirty miles of lead-covered telephone cable, containing 240 miles of copper wire, has been installed in the terminal area and along the right of way to connect the operating equipment. This is all large-gauge cable and weighs over one hundred tons. In all cases this cable has been installed in ducts in the tunnels and along the right of way on the side opposite to the high-tension power lines.

The operating equipment has been installed primarily for use in connection with the dispatching of trains and the operation of the railroad. It is arranged, however, to permit of connections to the commercial system. Such connections may be made only in emergency cases.

The equipment comprises: (1) Twenty-five monitor switchboards, located in the offices of the train dispatchers, yard masters, station masters, switching cabins, power houses, etc. (2) A number of magneto telephones located at convenient points in the tunnels, yards and along the right of way of the railroad. Some of these stations terminate in the monitor boards referred to, and others terminate in the main private branch exchanges, all being arranged to permit of the greatest operating efficiency and flexibility.

Monitors which are intended merely for outgoing business or for use on an official's desk have no drops or signals. All of the monitors are really terminal switchboards. They provide a convenient method of terminating at one point a number of lines which are used by those who have to do with the dispatching and switching of trains from that location. The selective apparatus used in the new terminal is of the Sandwich Electric Company's make.

The convenient location of the many telephones on the station platforms and in the various yards, towers, cabins, offices and tunnels, makes it possible for any railroad employe to communicate promptly with any department, and thus care for any emergency which may arise.

The telephones used in the tunnels were designed to meet the unusual conditions experienced in submarine tunnels. The apparatus is treated to resist moisture and is contained in an iron case, the front of which forms two doors. Fifty-three of the tunnel sets are installed on the walls at intervals throughout the six tunnels. All of the wiring to the sets is done in conduit. Normally, the tunnel sets are not connected to any circuit. They are arranged so that connection can be made by means of switching keys to either one of the four circuits. These circuits terminate as follows:

One for each tunnel in the main private-branch-exchange switchboard.

One for each tunnel in the train dispatcher's monitor switchboard.

One for each tunnel in the power director's monitor switchboard.

One for each tunnel, spare.

In addition to the four circuits mentioned, there is a fifth circuit in each of the tunnels to which are

connected a number of loud-ringing bells used for signaling. Employes of the various departments having business in the tunnel may thus be called to the nearest telephone by means of code signals.

The pay-station service is of three kinds: (1) Standard pay-station service, where the patron makes a call from a booth. (2) Restaurant pay-station service, where the patron makes a call from the table while dining. (3) Train pay-station service, where the patron makes a call from a telephone located on a train.

Groups of booths for standard pay-station service have been furnished in the main waiting room, ladies' waiting room, exit concourse and Long Island concourse.

Electrical Conductivity and Temperature Coefficient of Resistance of Copper.

In Volume 7 of the Bulletin of the Bureau of Standards, Washington, will appear a paper by Messrs. F. A. Wolff and J. H. Dellinger, on "The Electrical Conductivity of Commercial Copper." After a thorough and precise investigation of the subject the authors conclude that the best value to be assumed for the resistivity of annealed copper, in the preparation of wire tables and in the expression of percent conductivity, etc., is the previously used standard value, viz.: 0.153022 ohm per meter-gram at 20 degrees C. The conductivity of hard-drawn No. 12 B. and S. wires was found to be less than the conductivity of annealed wires by a mean value of 2.7 per cent. The difference between the conductivity of annealed and hard-drawn wires increases as the diameter of the wire decreases.

The same publication will also contain a paper by Mr. J. H. Dellinger, entitled "The Temperature Coefficient of Resistance of Copper." In summarizing, Mr. Dellinger says that his investigation shows that for representative samples of the copper at present furnished for electrical use, the conductivity and temperature coefficient are proportional, to a high degree of accuracy for differences in physical condition, and to a fair accuracy for differences in chemical composition of samples.

This relation may be put in the following very convenient form for reducing the results of resistivity measurements to a standard temperature: The change of the resistivity per degree C. of a sample of copper is 0.000598 ohm per meter-gram, or 0.00681 micro-ohm per centimeter cube.

The distortions caused by bending and winding a wire are shown to produce no material change in the temperature coefficient; so that the temperature rise in machines and instruments may be calculated from measurements of the resistance of the windings with greater confidence than heretofore.

The measurement of temperature coefficient is shown to present an advantageous substitute for the direct measurement of conductivity in a number of cases.

Mr. Guy E. Paine Becomes General Superintendent at Chicago.

Mr. Guy E. Paine, assistant general superintendent of the Postal Telegraph-Cable Company, at Atlanta, Ga., has been advanced to the general superintendency of the Western Division of the same company, with headquarters at Chicago, to succeed Mr. Thomas W. Carroll, resigned. Mr. Paine was born at Madison, Wis., and entered the telegraph service in February, 1881, as a messenger for the Western Union Telegraph Company in that place. After passing through various positions, he finally became manager of the office. Mr. Paine entered the service of the Postal Company in November, 1891, as a clerk in general superintendent Parker's office, Chicago. He was afterwards promoted to be chief clerk in that office, and later became manager of the Chicago office. On January 1, 1898, he was appointed superintendent at Kansas City, the headquarters afterwards being transferred to St. Louis. In January, 1904, he was appointed general superintendent of the Southern Division, with headquarters at Atlanta, Ga., vice Mr. Charles C. Adams, transferred to New York. When Mr. George H. Usher assumed the general superintendency at Atlanta, Mr. Paine became assistant general superintendent, which position he held until his present advancement.



MR. GUY E. PAINE,
General Superintendent Western Division, Postal Telegraph-Cable
Company, Chicago, Ill.

Mr. Paine is an earnest and conscientious worker and has a wide grasp of the details of his duties. His personal qualities, which are of the highest character, combined with his varied experience, eminently fit him for the duties of his new position.

Jesse Hargrave Becomes Division Superintendent, Southern Division, Postal Telegraph-Cable Co.

Mr. Jesse Hargrave, for the past three years superintendent of the Postal Telegraph-Cable Com-

pany, at Birmingham, Ala., has been advanced to the position of division superintendent of the southern division of the same interests, with headquarters at Atlanta, Ga.

Previous to his assuming the superintendency at Birmingham, Mr. Hargrave was an assistant electrical engineer of the company at New York, where he made many friends, all of whom congratulate him on his present promotion. Mr. Hargrave was born



MR. JESSE HARGRAVE,
Division Superintendent Postal Telegraph-Cable Company,
Atlanta, Ga.

at Lexington, N. C., February 18, 1865, and began his telegraphic career at Laurel Hill, N. C., in 1884, for the Seaboard Air Line Railway, and later was with the Chesapeake and Ohio and the Pennsylvania Railroads. He was afterwards in the Western Union Telegraph Company's service at Augusta, Ga., at Nashville, Tenn., and at Chicago. In 1888 he went to Nashville for The Associated Press. Here he remained for three years, and then entered the Postal Company's service at New Orleans, soon being advanced to the position of chief operator. Later he went to Atlanta, Ga., as electrician and division assistant electrical engineer for the company. He was next called to New York and given the office of assistant electrical engineer, and was afterwards appointed superintendent at Birmingham, Ala., which position he now relinquishes to accept his new appointment. Mr. Hargrave will continue to direct the affairs of the third southern district of the Postal Company, with headquarters at Birmingham, until January 1, 1911, when he will remove to Atlanta to assume active charge of his new duties.

F. F. Norton Becomes Traffic Superintendent of the Postal Telegraph-Cable Company, New York.

Mr. F. F. Norton, manager of the operating department, main office, of the Postal Telegraph-Cable Company, New York, has been advanced to fill the position of superintendent of traffic, vice S. B. Haig, resigned. Mr. Norton is an Englishman by birth, having been born at Barton, Oxfordshire, July 23, 1858. He was engaged in the telegraph service in

Canada until 1881, when he came to New York and entered the employ of the Western Union Company. In 1888 he went with the Postal Company, and has been with it ever since.



MR. F. F. NORTON.

Traffic Superintendent, Postal Telegraph-Cable Company, New York.

Mr. Norton's long experience in various capacities that go to make up a telegraph company eminently fit him for the duties of this important office.

J. J. Whalen Becomes Day Manager of the Postal Telegraph-Cable Company, New York.

Mr. J. J. Whalen, assistant day manager, has been appointed day manager of the Postal Telegraph-Cable Company, New York, to succeed Mr. F. F. Norton, promoted. Mr. Whalen was born at Long Branch, N. J., June 11, 1872. He entered the tele-



MR. J. J. WHALEN.

Manager Postal Telegraph-Cable Company, New York.

graph service as messenger, and soon became an operator. He was a member of the New York police force for a time, but returned to telegraphy in 1897, and has been with the Postal Company ever since.

Mr. Whalen is extremely popular, and his method of handling men is one that fosters a kindly feeling which is necessary in these days to obtain the best results. Mr. Whalen is as popular with the rank and file as he is with his superior officials, and everyone extends best wishes to the new head of the operating department.

D. F. Mallen Becomes Assistant Manager of the Postal Telegraph-Cable Company, New York.

Mr. D. F. Mallen, night manager, has been advanced to the position of assistant day manager of the Postal Telegraph-Cable Company, New York, vice Mr. J. J. Whalen, promoted. Mr. Mallen began his telegraphic career as messenger for the Atlantic & Pacific Telegraph Company in Jersey City in 1876, and afterwards entered the service of the Western Union Telegraph Company in that city, and



MR. D. F. MALLEN.

Assistant Manager Postal Telegraph-Cable Company, New York.

later in the main office in New York. He went with the Western Union Company at 195 Broadway in 1881, and in 1884 with the Bankers' & Merchants' Company, which later became the United Lines, and finally the Postal Telegraph-Cable Company. He has held various positions with the Postal Telegraph-Cable Company since its inception, and for a long time was general traffic chief. His experience gives him an excellent grasp of the general run of the company's business, and he is therefore well qualified to fill his new position.

Mr. Walter L. Jones, secretary and auditor of the Postal Telegraph-Cable Company of Texas, was born at Belton, Mo., November 15, 1872. He entered the telegraph service in Kansas City, Mo., in March, 1888, as messenger and clerk in a branch office of the Western Union. He afterwards became an operator in the main office, and in 1892 entered the railroad service in Colorado on the Atchison, Topeka and Santa Fe Railroad. For two years, between 1893 and 1895, he was operator in the general offices of the St. Louis Southwestern Railway

in Texarkana, Tex. Later he was engaged in various newspaper and broker offices in St. Louis and Kansas City, and during the year 1898 filled the position of operator in the Western Union Chicago office. In October, 1898, he entered the service of the Postal Telegraph-Cable Company of Texas, when this company's lines were built into Texas, and has been in the company's employ ever since, first at Galveston as operator, then assistant chief operator at Dallas, and finally manager at Fort Worth. In June, 1906, he returned to Dallas as manager, which position he held until November 1, when he received the appointment as secretary and auditor.

Obituary.

William S. Worl, a forty-niner of the telegraph, died in New York, November 24, at the age of 76 years. He was born in Philadelphia and entered the telegraph service in 1849. Mr. Worl was in the service of the Magnetic Telegraph Company at Philadelphia, between 1849 and 1854, when he became assistant manager of the Philadelphia office of the New York and New Orleans Telegraph Company. In 1864 he and his brother, Mr. J. N. Worl, organized and constructed the lines of the Western Maryland Telegraph Company from Baltimore westward. They were the first to introduce private lines and built many of them, until the introduction of the telephone, when they abandoned that feature of the business. After this the two brothers conceived the idea of the American Atlantic Cable Company, after the failure of the first cable laid by Mr. Cyrus W. Field, and in 1867 received a grant from Congress to lay Atlantic cables. Mr. W. S. Worl was also interested in a plan to lay a cable from Philadelphia to New York, thence to Bermuda Islands and Europe. The company, however, suffered financial difficulties and the scheme was abandoned. Under the grant obtained by the Worl brothers the United States Direct Cable was laid by the Siemens Brothers, also the French Atlantic cable.

Edward F. Buchanan, an old time telegrapher, but for many years junior partner of the brokerage firm of A. O. Brown and Company of New York, which failed in 1908, died at Atlanta, Ga., on December 4. Since the failure of A. O. Brown and Company Mr. Buchanan had been indisposed, until recently when he accepted a position with the Western Union Telegraph Company as commercial agent at Atlanta. Mr. Buchanan was well and favorably known to the telegraphic profession throughout the country. While connected with the brokerage house of which he was a partner, he employed a large staff of telegraph operators, paying the highest wages of any concern in the United States for that class of service. Mr. Buchanan was born at Norcross, Ga., fifty-six years ago.

Mr. Edward B. Havis, a well-known telegrapher in the south and one of the oldest citizens of Birmingham, Ala., died in that city December 1, after an illness of several months. Mr. Havis learned telegraphy at Newnan, Ga., shortly after the close

of the civil war, and was in the service of the Western Union Telegraph Company as operator until 1889, when he entered the employ of the Postal Telegraph-Cable Company at Birmingham. He was in the service of this company at the time of his death. Mr. Havis is survived by his wife and two sons.

Mr. W. L. Butman, aged 55, for many years manager of the Western Union Telegraph office at Fremont, Ohio, died on November 21.

New York Telegraphers' Aid Society Entertainment.

The annual entertainment and reception of the New York Telegraphers' Aid Society, for the benefit of the Relief Fund, was held at the Lexington Avenue Opera House and Terrace Garden, on the evening of November 30. The decorations of the hall were very harmonious and attractive, and the enjoyment of the affair was greatly enhanced by the fine weather. There was a large attendance and an excellent program was provided.

The object of the relief fund is to assist those members of the profession, not members of benefit societies, in times of sickness and, in case of death, to provide means to secure proper burial. The officers of the Society are:—President, R. J. Marrin; vice-president, H. C. Worthen; treasurer, T. M. Brennan; financial secretary, C. A. Kilfoyle; recording secretary, Mary E. Saunders.

Executive Committee—J. A. Hill, E. F. Howell, J. F. Zeiss, E. Mesler, F. King, Miss S. Dougherty, E. E. Brannin, W. T. Rogers, A. J. Gillman, C. J. Lemaire, and H. M. Heffner.

Relief Fund—E. F. Howell, Miss S. Dougherty and E. E. Brannin.

Auditing Committee—F. J. Nurnberg, J. F. E. Hopkins and H. M. Heffner.

Trustees—T. M. Brennan, J. K. Calvert and J. C. Robinson.

Mr. J. C. Watts was the chairman of the entertainment committee and Mr. J. F. King, floor director, was assisted by Messrs. Wm. J. Gomber, F. J. Sheridan and Wm. H. Matthews.

The reception committee consisted of Messrs. E. E. Brannin, chairman; J. F. E. Hopkins, J. W. McMeen and W. W. Price, assistants.

Mr. R. J. Marrin, president of the society, wishes to thank the members and their friends for their generous support, also the officials of the Western Union and Postal Telegraph-Cable Companies, Mr. J. C. Watts, chairman of the entertainment committee, and the hustling financial secretary, Mr. C. A. Kilfoyle, and Miss M. E. Saunders, the recording secretary, for valuable services rendered.

Serial Building Loan and Savings Institution.

The regular December meeting of the shareholders of the Serial Building Loan and Savings Institution will be held at 195 Broadway, New York, at 5 p. m., December 20, for the purpose of nominating officers and directors for the ensuing year. The annual meeting of shareholders will be held at the same place on January 17.



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The indestructibility of KERITE and its power to resist deteriorating influences should be carefully considered in specifying an insulated wire or cable.

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The Railroad.

The telegraph office of the Boston and Maine Railroad at Clinton, Mass., was recently wrecked in a peculiar manner. A collision of trains occurred at the station and the impact drove a passenger coach through the walls of the telegraph office. Mr. Clarence M. Lenna, manager of the office, Mr. George Cordoniere, operator, and the messenger had warning of the impending danger and escaped in time.

The next annual convention of the Association of Railway Telegraph Superintendents will take place at Boston, Mass., June 19 to 23. Arrangements are now being made to take care of the visiting members and friends and ample space will be provided for exhibitors. Mr. P. W. Drew, 135 Adams St., Chicago, is the secretary of the association, and will be glad to furnish any information desired pertaining to the coming convention. Many new problems in connection with the railway telegraph and telephone service are constantly coming to the surface for consideration, and developments are taking place so rapidly that no member can afford to be absent from these meetings. There is much to learn by attendance upon these gatherings and it is hoped that the Boston meeting will be largely attended.

Mr. Francis M. Benning, recently appointed assistant superintendent of the Lackawanna Railroad, at Hoboken, N. J., was formerly operator and train despatcher on the Wabash Railroad. He was born in Hannibal, Mo., in 1865, and has been in the Lackawanna Company's service since 1889.

The Pennsylvania Railroad Company is replacing its old wooden telegraph poles in Union City, Ind., with concrete poles.

Mr. Fred. C. Fox, recently appointed general manager of the western lines of the Atchison, Topeka and Santa Fe Railway, began his business career as an operator on that road in 1880. He was born at Maysville, Ohio.

The Canadian Pacific Railway has authorized the installation of a telephone despatching circuit between Farnham and Megantic, a distance of 132 miles. This circuit will be completed about the end of the year and then the road will have a total mileage of despatching by telephone of 2,251 miles. This mileage will probably be largely added to next year.

International Control of Wireless Telegraphy.

The annual report of Brigadier-General James Allen, chief signal officer of the United States Army, for the fiscal year ended June 30, 1910, has this to say in regard to international control of wireless telegraphy:

The international wireless-telegraph business of the world is conducted under a treaty signed at Berlin on November 3, 1906. This treaty was the result of a convention which was participated in by twenty-six of the principal nations. Of these countries, the following have confirmed the treaty: Belgium, Denmark, the Netherlands, Norway, Brazil, Sweden, Mexico, Roumania, Germany and all its protectorates, Great Britain (under certain reserva-

tions), Japan (under certain reservations), Spain, Bulgaria, Persia, Russia, Austria-Hungary, Portugal, and Turkey.

As the United States up to this time has not given its adherence to the convention, ships flying the American flag find themselves without standing in international wireless telegraph, as none of the contracting countries is compelled to receive a telegram from the ship of a noncontracting country, and any coastal station in a foreign country may refuse transmission of a message to a station on shipboard subject to a noncontracting country.

In view of the difficulties which ships bearing the United States flag have in communicating with foreign ports, General Allen recommends that the matter again receive attention, and, through the proper channels, be brought anew to the consideration of the United States Senate.

Municipal Electricians.

Patent No. 976,578 has been granted to E. J. Kingsley, J. Greene and Wm. J. Sadleir, Salt Lake City, Utah, for a Police Signal Device.

Patent No. 976,645 has been granted to J. H. Field, Victoria, B. C., for an Electrical Fire Alarm System.

Patent No. 977,219 has been issued to C. H. Pool, New York, on an Electrical Signaling System.

Patent No. 977,295 has been granted to A. Goldstein, New York, for an Electrical Thermostatic Alarm System.

Patent No. 977,206 has been granted to A. Goldstein and C. H. Pool, New York, on a Central Energy Electrical Temperature Alarm System.

Legal.

The United States Supreme Court in a decision on November 28, held the telegraph company liable for damages for failure to transmit a message from Detroit, Mich., to Kansas City, Mo., after accepting it. Suit was brought against the telegraph company by a Detroit milling company for \$2,000 damages resulting from the failure to deliver the message. The suit was decided in favor of the milling company in the trial court, in the Michigan Supreme Court and finally in the United States Supreme Court.

It is stated that Governor-elect Dix, of New York, will probably recommend to the legislature that the two public service commissions of New York State be either consolidated into one body or a new commission be created, with a redistribution of duties.

The British Postmaster-General recently stated that the latest experiments of the Post Office engineers show that the leadless glaze insulators are less efficient for telegraphic and telephonic purposes than the insulators with lead glaze, and cannot, therefore, be used on long-distance lines; for that reason only about 20 per cent. of the insulators ordered by the Post Office during the last four years have been leadless glazed. The actual number is 4,600 gross out of 23,700 gross.

Radio-Telegraphy.

No. 976,500. Wireless Telegraphy, to F. G. Sargent, Graniteville, Mass. A coherer in which the tube is of elastic non-conducting material, and the electrodes at the opposite ends.

An order has been issued by the Austrian Minister of Commerce, providing that Austrian passenger ships whose service extends beyond Gibraltar or Aden must be fitted with wireless telegraph apparatus.

The United Wireless Telegraph Company of New York, has closed a contract with the Merchants and Miners Transportation Company of Baltimore, Md., for the installation on twenty-three of its steamers of this system.

At the meeting of the Wireless Institute, at the United Engineering Societies' Building, New York, December 7, Mr. J. Martin, expert electrical aid, Brooklyn Navy Yard, presented a paper entitled "Side Lights on the Navy Department Wireless Telegraph Specifications."

The operator of the naval wireless station at Newport, R. I., was in communication with the naval station at Colon, Panama, on the night of December 7. The distance between the two points is about 2,400 miles. It is stated that the two operators conversed with each other for twenty minutes without difficulty.

An electrical school is maintained by the government at the United States Navy Yard, Brooklyn, where an operator may take a course in general electricity and wireless telegraphy, provided he enlists for a term of four years. Everything is provided by the government and the course of instruction covers twenty-two weeks. Further information may be obtained by applying to Mr. George W. Hickey, Room 502, 30 Church street, New York.

A new idea has been worked out in the use of the wireless telegraph on the ships of the navy, according to the annual report of the Chief of the Equipment Bureau, Navy Department, Washington, D. C. A portable apparatus has been devised that will enable the long-distance aerial wires to be taken down in time of battle and replaced by a short wire running up to the yardarm, connected to a set of instruments carried by the operator behind the armor inside the upper deck. The shore wireless stations of the navy have been much improved, and communication is now had nightly between Colon and Key West.

A relay for wireless telegraphy has been patented in England by Mr. W. P. Thompson, of Berlin, Germany. In order to be able to receive very weak signals use is made of an oscillating relay in combination with a local telephone circuit. The relay consists of a light oscillating armature supported on two stretched wires and having fixed to it one electrode of a sensitive carbon microphone contact. The armature is tuned to the periodicity of the received signals and resonates to them, the resultant parallel movement giving a good microphone action

at the contact. Several such relays may be connected in series with their armatures tuned one to another. Magnetic control of the sensitiveness of the relay is provided.

In a recent article in the *Electrotechnische Zeitschrift*, of Berlin, Mr. G. Dettmar reports that wireless telegraphy in Germany is making progress. From stations on shipboard it has been possible to transmit wireless messages to a maximum distance of 2,300 miles and from stations on land to distances of 3,200 miles. Automatic and semi-automatic telephone systems appear to find favor at some places where they have recently been installed. Several long-distance telephone lines have been improved by the Pupin system, which has also been employed on a submarine cable of 7 miles length. This has been in operation for four years and has proved very successful. There are also in operation several telephone cables of an aggregate length of 75 miles, with extra self-induction uniformly distributed all along the line by means of an iron wire spun around the copper conductor.

The Telephone.

Patent No. 973,644 for an aeroplane, has been granted to L. De Forest, New York, N. Y. This is a wireless telephone system, including a singing arc circuit for creating oscillations in the aerial by means of varying the amplitudes by sound waves acting through a transformer.

Mr. M. C. Rorty, manager of the Pittsburg division of the Bell Telephone Company of Pennsylvania, has been promoted to important duties in the office of Mr. H. B. Thayer, vice-president of the American Telephone and Telegraph Company, New York. Mr. Rorty is a graduate of Cornell University and entered the telephone service in 1897. He has held important positions with the telephone companies in New York, Boston and Pittsburg.

Mr. Simon Baer, who organized the Atlanta Telephone and Telegraph Company of Atlanta, Ga., died in that city, December 4, of Bright's disease. He was sixty-three years of age.

In many cities when a telephone subscriber wishes to call up the Western Union Telegraph office it is not necessary to give the telephone number, but simply say "Western Union."

Fire insurance companies have decided upon a material concession in rates on telephone exchange property, including switchboards and other apparatus.

Consul-General E. D. Winslow at Stockholm, Sweden, reports that the Swedish Telephone Company has secured an order in Cape Town, South Africa, for 50,000 telephones, valued at nearly \$100,000.

Mr. Lloyd Espenschied, of the Telefunken Wireless Telegraph Company, New York, is now with the engineering department of the American Telephone and Telegraph Company, New York.

ST. LOUIS AMERICAN TELEGRAPH AND TELEPHONE NOTES.

Mr. E. A. Shelnutt, late night test board man, has been transferred to Nashville, Tenn., as test board man. Mr. J. D. Stephens of this office, and Miss Hattie Sprague of Bloomington, Ill., were married on Sunday, December 4, at the residence of the bride's parents at Bloomington. Mr. John J. Dale, for several years with the Postal Telegraph-Cable Company, and later in the brokerage business, is now a member of the test room force. Mr. J. C. Fallinger has accepted a position in the test room. Mr. J. L. Fennell, formerly of this office, and now agent for the Southern Pacific Railway, at South Vallejo, Cal., was a recent visitor in St. Louis.

For the third time within a few months a suit has been started at Trenton, N. J., against the Continental Telephone and Telegraph Company, capital \$50,000,000, which controls various telephone companies in different parts of the country, alleging mismanagement and insolvency, and asking for the appointment of a receiver.

Letters from our Agents.

OMAHA, WESTERN UNION.

Mr. H. C. Pierce, who has been appointed wire chief of the Omaha office, vice Mr. W. Salisbury, advanced to the position of district plant superintendent, Omaha, was born at Waterloo, Iowa, September 27, 1878. He entered the telegraph service for the Postal Telegraph-Cable Company, at Waterloo, thirteen years ago, and from there was transferred to Des Moines, Iowa, as night chief operator, serving in that capacity for two years. He then went to Davenport, Iowa, to work for the Associated Press and later to the Postal Company at Omaha as traffic chief. Later he was employed at Denver as night chief operator, and afterwards at Colorado Springs as chief operator. He returned to Omaha for the Western Union Company in August, 1903, serving as operator and later was placed in charge of the printer department from whence he was advanced to his present position November 10, 1910.

Mr. C. M. Trimble, who was appointed chief operator of the Omaha, Neb., office in place of Mr. J. P. Barnhart, promoted, was born near Meriden, Kan., December 27, 1874. He learned telegraphy when about seventeen years of age, and was employed by the Atchison, Topeka and Santa Fe Railway Company for eight years, as operator and agent, and as relay operator. After severing his connection with the railway, he entered the Western Union office at Wichita, Kan., in August, 1901, and was appointed to the position of chief operator in that office in 1904, which position he occupied until transferred to the Omaha office November 1.

Mr. B. Paul Powell has been appointed night wire chief of the Omaha, Neb., office vice Mr. J. P. Barnhart, promoted to be district traffic superintendent at the same place, and Mr. B.

Jaeger has been appointed wire chief, days, in the same office.

PHILADELPHIA, WESTERN UNION.

Mr. R. J. Meigs, district plant superintendent, has effected an organization of his district as follows: Mr. S. R. Crowder, supervisor of equipment, with Mr. John J. Richards as assistant; Mr. J. W. Benckert, inspector of equipment, Mr. C. M. Pennypacker, of the Barclay system, chief of equipment; Mr. Robert C. Murray, plant chief; Mr. John V. Berger, wire chief, with Messrs. E. L. Maize, G. Orem Gregg, Morgan G. Moyer, S. S. Peck, and O. M. Pennypacker as assistant wire chiefs; Mr. J. O. Edmonson, district foreman, with Mr. A. H. Yates as assistant.

The following-named gentlemen have been appointed as assistants to Mr. Mahlon G. Moyer, traffic chief; Mr. Edward V. McElroy, Mr. John Truitt and Mr. Joseph T. Wilde.

Mr. W. A. Sawyer, district commercial superintendent, has divided the city in three districts and appointed the following-named gentlemen district commercial managers to take charge of these districts: Mr. Harry M. Hahl, formerly manager at 931 Chestnut Street, Maurice Neipling, formerly manager at the Bourse, and Mr. E. H. Shriner, lately assistant manager.

Mr. Ernest Brenzel, clerk in superintendent Sawyer's office, has been promoted to fill the vacancy caused by the advancement of Mr. Joseph Slater as chief clerk to Superintendent Meigs.

PITTSBURG, WESTERN UNION.

The following appointments and promotions are announced: Mr. J. A. Larimore, chief operator; Mr. C. H. Rugg, assistant chief operator; Mr. D. D. Calvert, southern wire chief to succeed Mr. J. A. Larimore. Messrs. W. S. Philp, C. E. Wilson, J. C. Connor, Wm. Schragen and F. L. Wheeler have been appointed supervisors of traffic. Messrs. E. Fisher and W. W. Creahn have been advanced to the repeater department.

NEW YORK, POSTAL.

A complimentary dinner was tendered to Mr. J. J. Whalen, manager, and Mr. D. F. Mallen, assistant manager, of this office, by about seventy-five associates and friends at Monquin's Sixth avenue restaurant, on the night of December 7, to celebrate the recent promotions of these gentlemen. Among those present were: Mr. C. F. Leonard, superintendent; Mr. Charles Shirley, assistant superintendent of traffic, and Mr. E. P. Tully, city manager; Messrs. Wm. Carroll, John Costello, Frank E. McKiernan, Thos. J. Dunn, John Dempsey, Thos. Doyle, John P. Regan, E. J. Rankin, J. F. J. Murphy, Marion J. Pike, and Drs. P. Burns and William Davis. Mr. P. F. Larkins acted as toastmaster.

NEW YORK, WESTERN UNION.

Mr. O. H. Peacock has been transferred from this office to take charge of the winter office at Pinehurst, N. C.

Mr. A. M. Lewis, chief in the Eastern Division, Battalion Quartermaster, Twenty-second Regiment of Engineers, was presented last week with a hand-

some cup, inscribed as follows: "From Officers and Members of Co. F, Twenty-second Regiment, as a token of their regard and friendship."

Mr. Maxwell Green (assistant wire chief on South), who is quite a fraternity man, was recently elected to the Junior Warden's chair in his Masonic Lodge, "Eastward Ho." Mr. C. F. Van Winkle, of this office, received the appointment of Senior Deacon in the same lodge.

The Robert W. Martin Fund.

Mr. Charles Shirley, assistant traffic superintendent of the Postal Telegraph-Cable Company, New York, together with a few other friends of Mr. Robert W. Martin, have contributed \$15.00 for the relief of their old friend who has been suffering from a paralytic stroke for several years past and who has been for the past four years confined to his bed. "Bob" Martin, as he was familiarly called, was one of the best known and finest operators in the country during the past forty years. His illness has been of a lingering nature and his friends have generously contributed toward his support for some time past. Mrs. Martin in a recent letter to the editor of this publication stated that she was in needy circumstances and she hoped a few of "Bob's" old friends who could afford to do so would come to his relief in this hour of their necessity. No doubt many of Mr. Martin's friends will be glad of an opportunity to help their former fellow-worker in distress, and those who have already subscribed toward this worthy purpose may find it possible to make further contributions.

Assessment No. 516 has been levied by the Telegraphers' Mutual Benefit Association, to meet the claims arising from the deaths of James Swan, at Minneapolis, Minn., Isaac W. Hallam, at Wilmington, Del., John J. Barrett, at Brooklyn, N. Y., John V. O'Brien, at San Francisco, John H. Beymer, at Wheeling, W. Va., and David Davis, at Syracuse, N. Y.

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Mr. H. R. Cook, manager of the Postal Telegraph-Cable Company at Pittston, Pa., writes:—"Enclosed find \$2.00 for another year of the much looked for and helpful Telegraph and Telephone Age. Need it in my business."

DISAPPEARED

Information wanted as to the present whereabouts of William H. Bogar, a telegrapher. Last heard of at Hopkins, Michigan; formerly of Armington, Illinois. Important to him or his family: Write JOHN D. SAGE, Box 892, Cincinnati, O.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, enables telegraph and telephone employees to provide for their families life insurance in reasonable amounts, at a cost so low as to be within the reach of all. It has already paid beneficiaries of deceased members \$1,500,000, at an average annual cost per \$1,000 of about four cents a day, and has also accumulated \$317,000 Reserve Fund securely invested, to provide against excessive cost in the future. Membership is easily acquired and cannot be invalidated during life for any cause except failure to pay the necessary mortuary calls.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, should interest every sober-minded telegrapher in New York and vicinity. To married men it affords an opportunity to own a home on very easy terms. What is now paid for rent goes to your credit if paid into the Institution and in a few years your home will be entirely paid for. There are scores of men connected with the telegraph and telephone services who would like to have a home of their own. They should write to the Institution and find out what it can do for them in this regard.

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TELEGRAPH AND ELECTRICAL TRADES DIRECTORY

NOTICE

To Managers of Telegraph Offices and Users of the Wires:

On December 1 the Western Union and Postal Telegraph Companies put into effect new rules governing the transmission of domestic messages sent in code language.

Those who have been in the habit of using mutilated words will have to exercise great caution if they desire to get their messages forwarded promptly and at the same time avoid complications in the settlement of their accounts with the telegraph companies.

As the Western Union and Postal Telegraph Companies have given their stamp of approval on Official Vocabulary words, those who use the particular words referred to can feel absolutely safe.

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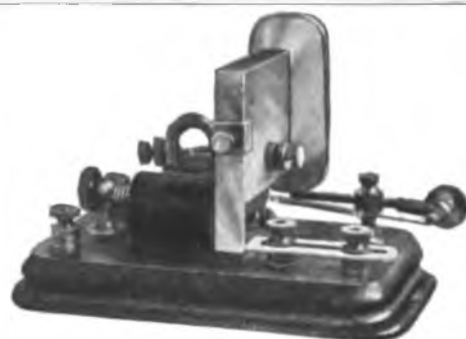
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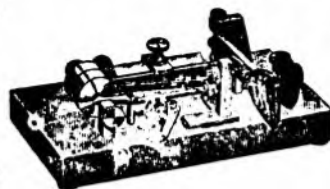
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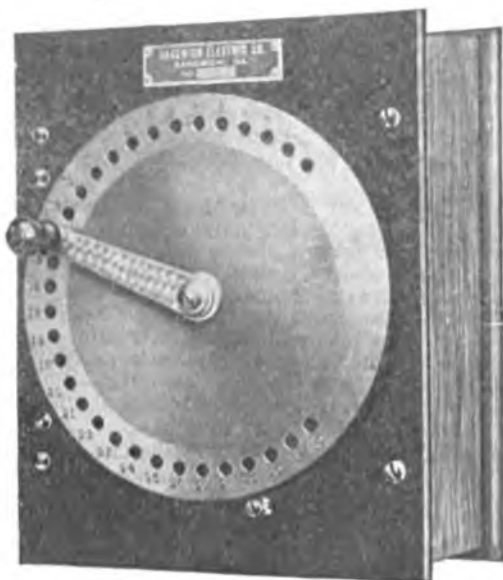
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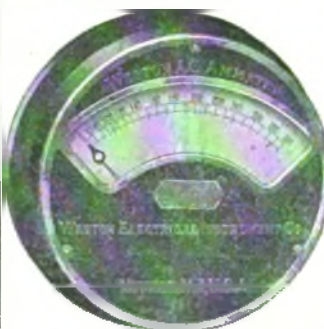
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