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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Mechanical Terms.

No doubt there are a great many electricians well informed as to the meaning of electrical terms and who pride themselves on their electrical knowledge, who would feel greatly offended if some one would tell them rather undiplomatically that they did not understand the English language. Yet the charge would be true.

The fact is nearly all of us are unfamiliar with a very large percentage of words in common every day use simply because they are out of our line, so to speak, and we do not notice our deficiency until they come to our attention frequently.

For example, how many of us can read a patent specification understandingly, that is to say, form anything like a correct mind's picture of the real construction and appearance of the mechanical device described? The fact is mechanical literature is just as full of appropriate terms as is electrical, and just as important, but being out of line for most of us we never bother ourselves by looking up their meaning until necessity arises.

Now there are a certain number of mechanical terms that no electrician who claims to be well informed should be unfamiliar with, especially just now, and more so in the near future, when instruction papers describing the construction and assembly of switchboards and other new telegraph equipments will find their way to managers and local electricians.

These papers will be full of such terms as lug, cam, pawl, dowel, etc.; words that have no bearing whatever on theoretical or practical telegraphy, yet have a very direct bearing on telegraph and telephone apparatus.

Take for example the word "dowel." This word refers to the "feet" under the wooden base of sounders and other flat base apparatus. The wooden "dowels" are the tubular shaped feet through which the screws go for fastening the sounder to the table or resonator. Inverted blunt nose brass upholstering tacks, when used as feet, are also called dowels.

A cam refers to a revolving wheel or shaft having an irregular periphery or set of face grooves which impart a correspondingly irregular motion or position to some piece of mechanism pressed against it by means of a compression spring or lever, or to a "roll" which follows the contour of the irregular grooves.

The word "pawl" refers to a hinged lever which rests through gravitation or spring pressure against a set of teeth for the purpose of either checking the motion of a wheel or imparting motion to it as the case may be.

The word "lug" means a projection, not necessarily of any particular shape, however. Telephone people often refer to the terminal pieces on the end of telephone jacks as lugs. The word will also apply equally well to any other projection on the framework. Reference will also be found to various kinds of springs to be used, such as retractile, compression, valve, and torsion springs.

The retractile spring used on relays is too well known to need description.

Compression springs operate in the opposite direction from retractile springs, viz.: by lengthening when the pressure is removed. They will be found on the shafts of relay magnets for the purpose of regulating the air gap, that is, for moving the magnet and coils backward or forward.

A valve spring is one in which each coil has a smaller diameter than the one below it, so that it may be compressed into a very small space. This type will be found in some types of pushbuttons, and in a modified form they are used in Morse telegraph keys for regulating the tension.

Then we have what is called a torsion spring. It is helical shaped and operates by means of a twist motion, that is, with a coiling or uncoiling action similar to that of a door spring.

Again we have terms which apply to telephone apparatus. These are probably pretty well understood by telephone operators, but most of our Morse operators are more or less unfamiliar with them. A knowledge of the particular application of such terms should be acquired at once as the days of springjacks, wedges and the present type of switchboards will soon have passed. Telephone jacks and plugs are to replace the first two mentioned, while white porcelain panels of various types, as mountings for the different apparatus, will give the new switchboard an entirely different appearance from that of the old style.

While all telephone jacks and most of the plugs look alike from the outside they are not all constructed alike within. Some have two conductors and an extra terminal connection, others have four and five terminals each which type is constructed for a special class of work. There are also solid plugs, and still another type is called an "idler."

The official instruction papers describing the manner in which the connections are to be made when installing these apparatus will call each type or part by its proper name. For instance the ball at the end of a plug is officially designated as the "tip" and the lever in the jack it makes contact with, the "tip spring." In like manner the long brass neck of the plug is called the "sleeve," and the jack conductor it connects with, the "sleeve spring." In every jack of two conductors there is always an extra spring that closes the circuit when the plug is removed. This is referred to as the "normal contact." There is also a three-conductor plug that possesses a "ring."

Space will not permit a full description of each type of plug and jack at present, but later we shall give the readers of this journal a diagram and complete description of each new type to be installed, and state the particular class of work for which each is designed as well as the boards or other locations where it will be principally used.

Recent Telegraph and Telephone Patents.

ISSUED DECEMBER 5.

1,010,413. Transmitting Apparatus for Telegraph Systems. To A. G. Crehore, Yonkers, N. Y.

1,010,449. Sanitary Telephone Transmitter. To J. H. O'Connell, Boston, Mass.

1,010,471. Telephone System. To C. S. Winston, Chicago, Ill.

1,010,478. Subscriber's Telephone Apparatus. To H. P. Clausen, Rochester, N. Y.

1,010,505. Telephone System. To R. H. Manson, Elyria, Ohio.

1,010,531. Telephone Instrument. To W. F. Taylor and V. Durbin, Brookline, Mass.

1,010,590. Telephone-Transmitter. To H. P. Clausen, Rochester, N. Y.

1,010,593. Wireless-Telephony Apparatus. To V. Colin, Neuilly-sur-Seine, and M. Jeance, Paris, France.

1,010,669. Wireless Telegraph Apparatus. To D. McF. Moore, New York.

ISSUED DECEMBER 12.

1,011,141. Illustrative Telegraphy. To N. S. Amstutz, Cleveland, Ohio.

1,011,168. Telephone System. To W. W. Dean, Elyria, Ohio.

1,011,210. Cable-Relay Apparatus. To I. Kitsee, Philadelphia, Pa.

1,011,405. Telephone Desk Set. To P. C. Burns, Chicago, Ill.

1,011,600. Line Tapping Device for Telegraph and Other Circuits. To C. B. Forrest, Middleport, Ohio.

1,011,777. Wireless Telegraphy. To J. Harden, Schenectady, N. Y.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange December 26:

Amer. Telep. and Teleg. Co.	140
Mackay Companies	80⅛
" " pfd.	70
Western Union Tel. Co.	79

Personal.

Mr. Frank J. Howell of Corning, N. Y., an old time telegrapher now in other business in that city, recently spent a brief vacation in New York while en route home from the South.

Mr. Levi Wild, manager of the Butte, Mont., Western Union office, is the subject of an interesting sketch in the *Standard* of that city. He is an old timer and has grown up with the Western country.

Mr. W. N. White, of Covington, Tenn., member of the Society of the United States Military Telegraph Corps, suffered a stroke of paralysis on December 16, while on a visit to his son-in-law, Mr. F. S. Alden, at Cedar Rapids, Iowa.

Mr. W. G. Van Vleck, vice-president and general manager of the Southern Pacific Lines in Texas and Louisiana, at Houston, Tex., was formerly a telegrapher on various railroads in the West, and has had large experience in railroad work.

Major J. O. Kerbey, of Washington, D. C., an old time telegrapher, and formerly United States Consul at Para, Brazil, is the author of an interesting and well illustrated article on "Amazonia," in the November number of the "Bulletin of the Pan-American Union."

Mr. George M. Eitemiller of Detroit, Mich., the well-known telegrapher, recently received an autographed photograph from Mr. Thomas A. Edison. Mr. Eitemiller is proud over the possession of this portrait. He and Mr. Edison worked together at the key many years ago.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. B. Pillsbury, general superintendent, New York, has returned to his office after a trip of inspection of offices in New York State.

Mr. Minor M. Davis, superintendent of telephones of the Postal Telegraph-Cable Company, announces that his company has issued instructions to its construction department to proceed with the erection of additional heavy copper wires between all important points on the system of the company for the purpose of extending the telephonic use of the same to the independent telephone companies.

Among recent executive office visitors were Mr. J. D. McDonald, chief operator, at Boston, Mass., and C. Weydman, traffic chief, Buffalo, N. Y.

Mackay Company's Austin, Tex., Office.—The Mackay Telegraph and Cable Company opened its new office at Austin, Tex., on December 10. Mr. J. B. Sampley, formerly with the Postal Telegraph-Cable Company at Des Moines, Iowa, is manager; C. M. Thompson, day chief operator; J. K. Box, night chief operator; Miss Nora Jones, day clerk and Ivon Isbell, night clerk.

Postal Christmas Reception.

The president and executive officers of the Postal Telegraph-Cable Company held a Christmas reception in the company's headquarters in New York in the afternoon of December 22, and there was an attendance of 1,500 persons. The guests were received by Messrs. Clarence H. Mackay, president; E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company; C. C. Adams, C. P. Bruch and G. G. Ward, second, third and fourth vice-presidents, respectively, Postal Telegraph-Cable Company and W. I. Capen, general superintendent of plant of the Postal company.

Refreshments were served, punch in one room, salads in another and cigars in a third. Everyone connected with the service in New York was present. The affair was a very delightful one and the utmost good cheer prevailed. The offices were decorated with flags, Christmas trees and flowers, and the figures "73" in electric lights greeted the guests as they entered.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president, has returned to New York after an absence of several weeks on the Pacific Coast.

Mr. C. H. Murphy, general superintendent of time service, New York, has returned from a business trip to Chicago and the West in the interest of that service.

Mr. S. M. Williams has been appointed manager of press service of this company at New York.

Mr. P. J. Casey, special agent, New York, has returned from a two-weeks' trip through the South. He was accompanied by Mrs. Casey.

Mr. C. A. Fonville has been appointed district manager, with headquarters at Montgomery, Ala., to succeed Mr. W. D. Stead, transferred to Birmingham, Ala., as district manager in that territory.

Mr. C. A. Crane, manager of the Western Union Telegraph office at St. Paul, Minn., looked after telegraph matters in connection with the recent tour of western governors. He accompanied the party on the train.

Mr. W. R. Edmondson has been appointed manager of the Jacksonville, Fla., office to succeed C. M. Holmes, resigned. Mr. Edmondson was district manager with headquarters at Jackson, Miss., at the time of his appointment.

The Chicago messenger boys of this company were given a holiday dinner by the company, December 18. After the dinner a vaudeville entertainment was provided by the Young Men's Christian Association. Several officials of the telegraph company attended the dinner.

This company has installed branch offices in all of the city and suburban stations of the Cleveland Telephone Company, Cleveland, Ohio, twenty in number.

The Western Union Telegraph Company has filed condemnation proceedings to secure the right to build its lines over the right of way of the Louisville & Nashville Railroad in the States of Kentucky, Tennessee and Mississippi, this action to be followed by similar proceedings to cover the remainder of the railroad system. The contract between the two companies will expire in August this year.

This company has advised the Public Service Commission, second district, New York, that arrangements have been completed for the delivering free of messages within corporate or municipal limits in the State of New York, including the large territory comprising Greater New York. In the outlying boroughs, however, the company will not undertake to make deliveries at any hours of the night when the local offices serving those boroughs are closed.

Mr. J. S. Calvert, district superintendent, Richmond, Va., announces the following recent appointments of managers in his district: J. W. Stephenson, at Suffolk, Va., vice T. C. Parker, transferred; T. C. Parker, at Gaffney, S. C., vice Mrs. M. B. Hardin; W. J. Terry at Aiken, S. C., vice Sam Poliakoff; E. D. House, at Spartanburg, S. C., vice C. E. Senseman; Miss E. M. McLellan at Yorkville, S. C., vice R. H. Callahan; Miss Carrie Richardson at Beaufort, S. C., vice Herbert Hall; J. P. Wimbish at Rockingham, N. C., vice Percy C. Bowling. Mrs. Hardin and Messrs. Poliakoff, Senseman, Callahan, Hall and Bowling resigned to leave the service.

General Eckert's Will Sustained.

The will of the late General Thomas T. Eckert, former president of the Western Union Telegraph Company, New York, who died on October 20, 1910, has been upheld by Surrogate Cohalan of New York. The will was contested by Mr. James Clendenin Eckert, one of the sons of the deceased, who sought to have it set aside on the ground that a fair distribution of the property had not been made. It was also charged that General Eckert was of unsound mind when he made the will of August 30,1910.

In view of the wide interest in the case and the desire of General Eckert's many friends to know the truth in the matter, we have decided to print the Surrogate's decision in full.

SURROGATE'S COURT.

By Cohalan, S.

Estate of Thomas T. Eckert—Thomas T. Eckert, the testator herein, died October 20, 1910, at Elberon, New Jersey, leaving him surviving James Clendenin Eckert and Thomas T. Eckert, Jr., his only heirs at law and next of kin. The paper propounded for probate herein as his last will and testament bears date August 30, 1910, and is signed by Thomas T. Eckert, the testator, and by Thomas C. Ennever, the attorney who drew the same, John Thom and James Miles as subscribing witnesses. The instrument devises the property known as Carlton Terrace, at Elberon, New Jersey, to Joanna Eckert, the daughter of the testator's son, James C. Eckert; devises the property known as Hearts Content, at Elberon, New Jersey, and certain coal lands in Pennsylvania, to Thomas T. Eckert, Jr.; bequeaths the sum of $5,000 each to testator's brother, William H. Eckert, and to his nieces, Mary P. Taft and Alice B. Hamlin; bequeaths the sum of $50,000 outright to his son, James Clendenin Eckert, and the sum of $100,000 to Richard G. Page, Jr., and the Central Trust Company of the City of New York, in trust, to pay the income thereof to James C. Eckert during his lifetime, the principal to be distributed among his children at his death. The residue of the testator's property, real and personal, is devised and bequeathed to Thomas T. Eckert, Jr. James C. Eckert, Thomas T. Eckert, Jr., and Richard G. Page, Jr., are named as executors. On October 31, 1910, Thomas T. Eckert, Jr., and Richard G. Page, Jr., two of the executors so named, filed in this court a petition praying for the probate of said instrument as the last will and testament of Thomas T. Eckert. James Clendenin Eckert failed to join with the other executors in the petition for probate, and on November 9, 1910, filed a verified answer praying that the probate proceedings be dismissed on the following grounds, to wit: 1. That the paper writing was not the last will and testament of Thomas T. Eckert. 2. That said alleged will was not duly executed by the testator; that he did not publish it as his last will in the presence of the witnesses whose names are subscribed thereto; that he did not request said witnesses to be witnesses thereto; that said witnesses did not sign as witnesses in his presence or in the presence of each other. 3. That on said 30th day of August, 1910, the testator was not of sound mind or memory, or mentally capable of making a will. 4. That said paper writing was not freely or voluntarily made or executed by said Thomas T. Eckert as his last will and testament, but that it was obtained, and the subscription and publication thereof were procured, by fraud and undue influence practiced on testator by Thomas T. Eckert, Jr., or some person or persons acting in concert or privity with him. 5. That said paper was not subscribed, published or attested as testator's will in conformity with the statute; and, 6, that the paper propounded was invalid as a last will and testament, and is null and void. All parties interested were duly served with citation, and the issues raised by said petition and answer came on duly to be heard before me. In considering the questions raised by the answer and by the evidence herein I shall discuss them in the following order: First. The question as to the execution of the will; second, the question of testator's mental capacity to make a will; and, third, the question of undue influence. In this connection I do not think any benefit is to be derived by quoting in detail the mass of testimony taken in this proceeding, and shall confine myself to a recital of such portions thereof as I consider essential to a fair and proper discussion of the questions at issue herein. As to the factum of the will, Thomas C. Ennever, a reputable attorney of thirty-eight years' standing at the New York Bar, the draughtsman of the will and one of the subscribing witnesses, testified that the paper offered for probate herein was drawn by him from memoranda left with him by Richard G. Page, Jr., the secretary of the testator; that he attended at Elberon, New Jersey, on August 30, 1910, at the summer residence of testator; that the will was read to the testator at testator's request in his (Ennever's) presence by Richard G. Page, Jr.; that he (Ennever) followed Page's reading of the will in a copy thereof in his possession; that the testator stated that the will as read (being the paper offered for probate herein) fully carried out his wishes, and that thereupon Page went out of the room for the other two subscribing witnesses, John Thom and James Miles, and on their arrival in the library, where General Eckert and Ennever had remained seated, testator signed the paper, declaring it to be his last will and testament, and requesting Ennever, Thom and Miles to sign same, as subscribing witnesses; that thereafter, in the presence of the other two subscribing witnesses, Thom and Miles, he (Ennever) read the attestation clause attached to the will, and thereupon Ennever, Thom and Miles signed their names as subscribing witnesses thereto. John Thom, bricklayer, another of the subscribing witnesses, testified that General Eckert signed the will in the presence of the subscribing witnesses, declared it to be his last will and testament in their presence, and requested them to sign as witnesses, which they did in his presence and in the presence of each other. He also testified that before the witnesses signed their names the attestation clause was read by Mr. Ennever. James Miles, houseman, the third subscribing witness, called by the surrogate at the request of contestant, in answer to counsel for contestant stated that testator mentioned the words "Adams Street and Barber," and "asked Mr. Page about Joanna and Carlton Terrace," and Mr. Page said, "Never mind, General, that is all right;" that testator said nothing further while he was in the room; that he saw testator sign his name, also Ennever and Thom, and that he signed his own name, but stated that after the signing of testator's name no one said a word. On cross-examination by counsel for proponement he admitted that Ennever had read the attestation clause after General Eckert had signed the will. See stenographer's minutes (p. 134) the following testimony: Q. And after that was done Mr. Ennever read the attestation clause which you have just read? A. Yes. Q. Read it aloud? A. He read that clause to us. Q. Aloud? A. Yes. Q. You heard it read? A. Yes. Q. And understood it? A. I understood it, he said yes. Q. And it was true, wasn't it? A. Just as he read it there. Q. And after he had read it, then you and Ennever and Thom signed it, wasn't that it? A. Yes. And at page 135 (steno. min.) that thereafter Ennever, Thom and himself signed, and that the statements contained in the attestation clause were true—"just as he read it there" (p. 135). He also admitted that he had before the trial signed an affidavit in which he stated (see steno. min., pp. 136 and 137): Q. Now, I will read this to you: "James Miles, of 38 West 86th Street, Borough of Manhattan, City of New York, being duly sworn in the above entitled matter, and examined on behalf of the applicant to prove said will, says: 'I was acquainted with Thomas Thompson Eckert, now deceased. * * * The subscription of the name of said decedent to the instrument now shown to me and offered for probate as his last will and testament, bearing date the 30th day of August, in the year one thousand nine hundred and ten, was made by the decedent at Elberon, New Jersey, on the 30th day of August, in the year one thousand nine hundred and ten. * * * in the presence of myself and John Thom and Thomas C. Ennever, the other subscribing witnesses. * * * At the time of such subscription the said decedent declared the same instrument so subscribed by him to be his last will and testament, and I thereupon signed my name as a witness at the end of the instrument, at the request of said decedent and in his presence.'" Richard G. Page, Jr., secretary of the testator, and one of the executors named in the will, called by the surrogate at request of contestant, testified that before the signing of the will he read it to General Eckert, at Eckert's request (p. 398); that during the reading thereof General Eckert interrupted him from time to time by asking for a diagram of property (proponent's Exhibit R), also spoke about a fence; that General Eckert, in answer to a question of Mr. Ennever, stated that he wished Thom, Miles and Ennever to act as witnesses to his will; that testator signed the will in presence of the three subscribing witnesses; that the attestation clause was read by Ennever, and also by Thom and Miles; that testator declared the paper to be his last will and testament, and the witnesses signed in the presence of testator and of each other. In view of this testimony, none of which was contradicted, the objections of the contestant as to the execution of the will are of no weight and must fall, and I feel that I must find that all the formalities of law in regard to the execution thereof were fully complied with. With regard to the mental capacity of testator to make a will, the cross-examination of Ennever brought out a somewhat lengthy conversation of General Eckert concerning a suit against a Mrs. Barber and others, and the story of an all-night search by Mrs. Eckert for a certain map or survey, which was finally found by her, and when submitted to the court settled the action in favor of General Eckert. Eckert also discussed the description of the Pennsylvania coal lands, and told Ennever of the visit of his secretary, Page, to the firm of Snyder & Zieber, of Reading, Pennsylvania, to obtain from them a proper description of that property. He also followed on a diagram the description read by Page of the property known as Hearts Content, at Elberon, and at one place in the description, where a fence was referred to, said: "That fence is not yet up. * * * What are we going to do about it?" took part in the general conversation between Ennever, Page and himself, and invited Ennever to visit his power house with Thomas T. Eckert, Jr. John Thom, another subscribing witness, also testified that the testator was of sound mind at the time of signing the will. James Miles, the third subscribing witness, who attempted to discredit the mental capacity of General Eckert, admitted on examination of proponents' counsel that he had signed the affidavit previously referred to in which he swore that testator was of sound mind and under no restraint when making his will. The secretary, Page, corroborates Ennever as to the conversations of testator at the time of the signing of the will, tells of memoranda dictated to him by the testator from which wills were to be drawn; tells of his efforts to persuade testator to be more liberal with the son Clendenin Eckert, and of testator's dissatisfaction with him because of the many unfortunate schemes in which he had invested his money; and testifies that the memoranda submitted to Ennever, from which the will was drawn, were dictated to him by General Eckert and contained a true statement of the manner in which testator finally directed that his property was to be distributed. The witness Reilly, the nurse of testator, told at length of testator's visits to No. 549 Fifth avenue, to observe the remodeling thereof; his visits to Raelly, the horse dealer; his visits to the haberdasher, the shoemaker and hatter, from each of whom he made purchases; his insistence on obtaining goods just as he wished them, and his discussion of the political situation, all of which, in my opinion, displayed a keen mind and an intelligent interest in the matters under discussion. In fact none of the witnesses testified to anything which would lead me to believe otherwise than that testator was for one of his age a man of unusual mentality, capable in all respects to understand the nature and extent of his property and his duty toward the various members of his family, which none of his relatives ever seemed to have questioned when there was an opportunity of appealing to his generosity, but which, according to their ideas, seems only to have failed when he neglected in his will to continue toward them the bounty he had exercised in his lifetime. The testimony as to the undue influence claimed by contestant to have been exercised by the son Thomas T. Eckert, Jr., is so tenuous that I do not consider it worthy to be dignified by a discussion thereof. In fact all the evidence adduced before me can lead me to but one conclusion, and that is that the paper propounded for probate herein was the free and unrestrained act of a man mentally capable of making same, and that in the execution thereof all legal formalities were strictly complied with. In arriving at this conclusion I have utterly ignored the testimony of the alleged widow, Marie L. Davies, or Dore, whose claim, in my opinion, arose solely from the hallucinations of a disordered mind. Submit decision and decree admitting propounded paper to probate as the last will and testament of Thomas T. Eckert, and tax costs on notice.

Thomas H. Brooke, An Old War Telegrapher.

Thomas H. Brooke, the Western Union Telegraph operator at Anadarko, Okla., is one of the oldest operators in the United States, says the Anadarko "Tribune." He served as a military telegraph operator in the civil war. Early in March, 1863, Mr. Brooke reported to Captain Samuel Bruch, superintendent of the United States military telegraph corps, at Louisville, Ky., for duty as an operator. He was sent to Columbia, Ky., where the Ninth Kentucky Cavalry was then encamped. The calvary was soon withdrawn, leaving Mr. Brooke, then very young, in charge with a lineman and a secret service man or a spy, to keep up correspondence with the department at Louisville, as to the movement of General John Morgan. Often times Mr. Brooke was driven from his duty by the enemy and many times volleys of shot were fired around him. With the wire and his spy Mr. Brooke kept informed as to the moves of the enemy and kept the officers well posted as to their whereabouts. His life was risked all of the time, night and day. He was captured, made a prisoner of war, marched to a tree where preparations were made to hang him, but later it was decided to take him to camp.

He was employed at special service along the line of the Baltimore & Ohio Railway. Here is where he saw General Crook driven back by General Early. Here is also where he found that he was the only operator, railroad or commercial, in the city, as the other boys had retired beyond the city limits. Mr. Brooke carried a message to General Crook and was fired at by the enemy as he ran, but it only helped to increase his speed. Thirty years later Mr. Brooke met General Crook, who complimented him on his bravery, as the message was a very important one.

Mr. Brooke is now nearly seventy years of age. Up to this time the government has never recognized in a material way the services of the Military Telegraph Corps. A bill will be introduced at this session of Congress asking for pensions for men like Mr. Brooke. They deserve recognition.

Mr. Brooke, in spite of his years, is still young in spirit. He justly feels proud of his war record and distinctly remembers the night that the message announcing the assassination of President Lincoln was brought to him.

Western Electric Extra Dividend.

The gross sales of the Western Electric Company promise to total between $66,000,000 and $67,000,000 this year (1911). Last year, in addition to the regular quarterly dividend of 2%, the directors declared an extra dividend of 2%, and there is every reason to believe that the company will do as well by its shareholders this year, as it is in a position to make such an extra distribution.

Mr. C. F. Annett of Jerome, Idaho, a former telegrapher, writes: "I keep getting younger by reading TELEGRAPH AND TELEPHONE AGE and who knows but some day I may be induced to return to the fold. I noticed in your issue of November 16 the familiar faces of several old friends. B. E. Sunny, president of the Chicago Telephone Company, Chicago, used to send press report to me from that city when I was located in Cheyenne, Wyo., in the early seventies. Frank B. Knight, special agent for the telephone company, at Dallas, Tex., was then in Omaha for the Western Union and I worked with him frequently over the wires. Jasper N. Keller, president of the New England Telegraph and Telephone Company at Boston, was in those days a telegraph operator on the Union Pacific Railroad. Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, was also at that time employed in the same general locality, and is now chief of them all." Mr. Annett is now a member of the Telephone Pioneers of America.

Telegraph and Telephone Age

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January 1, 1912.

Our New Year Greetings.

On the threshold of the New Year we extend to our friends our heartiest wishes for a happy and prosperous one. The year 1911 is now a thing of the past; it is beyond recall. The future lies before us and is yet unborn, but the present is ours, and it is our privilege to avail of the opportunities that it brings.

We are all looking to the future with the hope that it will bring us success, but as a matter of fact it will not bring us anything if we do not work in the present for what we desire. Predictions are not always reliable; there is always in them a large element of doubt, but to the optimistic mind this element approaches the vanishing point, while to the pessimist it preponderates. But we are not in the latter class; we see good and success in the next year, and in all the years to come.

In reviewing the record of the past year we find much to encourage us as to the future, and the wail of the pessimist that telegraphy is stagnant and unprogressive is not borne out by the facts. There has been improvement all along the line and what has been done in the telegraph and telephone fields during the year just closed will bring forth fruit this year. The year 1911 has truly been one of experiment in these lines and we hope the results will more than justify the effort.

Thirty Years of Successful Journalism.

Few people realize the great importance of the time element in human affairs. It is probably the most important, for without it no results could be accomplished. All the money and wisdom in the world could not bring success to any enterprise without taking time into account.

We frequently hear that this or that has stood the test of time and to the thoughtful man this means a great deal. Any business that has stood this test must necessarily be successful to some degree, for, if there were anything radically weak in its organization time would have revealed the defects; men would lose confidence in it and failure would be the inevitable result. This brings us to a consideration of the question of success. What is success? From a broad point of view success is measured by the amount of good that is exerted by one's efforts. We may be pardoned for the pride we have in the success of TELEGRAPH AND TELEPHONE AGE, viewed from this standpoint, and we can truthfully say that it has and is standing the test of time. It has labored for thirty years to bring hope and extend encouragement to those to whom it caters, and we certainly are proud of the results. The paper has assisted thousands of operators to advancement in their line of work and otherwise benefited them, both mentally and materially, and we can say without fear of contradiction that its life has so far been a successful one. What more can be said of any human enterprise?

"Be helpful" is the motto of this paper, and there is a great wealth of meaning in these two words when the duty is lived up to. In order to succeed in any undertaking that involves social and business relations one must make friends, and the faculty of doing this is one of the most desirable attainments.

It is easier to make friends than to make enemies, yet many people choose to take the latter course of action in their daily lives with the result that they are in constant trouble. TELEGRAPH AND TELEPHONE AGE has always practiced the principle of making friends, and it need hardly be said that if it had not done so it would not have survived the many years of its existence. But the friendship it has in all ranks of the great telegraph and telephone industries is its most cherished possession. It is a pleasure to work for the good of others, and with the sustaining influence of our friends, we will be able to meet our responsibilities toward them with a greater degree of success and satisfaction than ever before.

A Call to Action.

The remnant of that gallant telegraphic corps who rendered such brilliant and important service to the government during the civil war, is again appealing to Congress for the justice so long acknowledged yet thus far denied. With a bold front, though, of an average age of 70 years, the survivors are marching to the grave as heroically as they marched to battle. They are deserving of everything the government can grant them, much more than they ask. Today, under the leadership of Colonel William Bender Wilson of Holmesburg, Pa., David Homer Bates of New York and A. A. Zion, of Indianapolis, Ind., they are conducting a campaign of appeal to Congress and to the patriotic spirit of the country for full and proper appreciation of their services. Bills have been introduced into Congress intended to give them the same rights, including pensions, which have been granted all other soldiers who served in that war. Telegraphers in all armies in the world today, in times of peace, are enjoying all the rights and privileges accorded to soldiers in other branches of the service. There is no reason why these rights and privileges should be denied our own veterans. It behooves the telegraph fraternity to take up their cause and make it their own. Wherever there is a telegraph operator in this country he or she should at once circulate petitions and send them to Congress asking that a law may be enacted to place these old and honorable members of the craft in the position they won in war. The honor and the high position in the world's advancement which telegraphy has reached demands that those who are engaged in its activities should rally to the support of this little band of military telegraphers. Superintendents, managers and operators are urged to take action at once in this worthy cause.

The Cable.

Cable Communication Restored.—Cable communication with Iceland was restored December 16.

Pacific Cable.—The new cable to be laid between Australia and New Zealand, will cost about £175,000 ($875,000), which will be taken out of the reserve fund of the Pacific Cable Board, leaving £100,000 ($500,000) still in reserve. The cable will run between Sydney and Auckland, and the New Zealand headquarters of the Board will be removed to Auckland, in order to expedite the transmission of messages.

Repairing an Atlantic Cable Under Difficulties.—The captain of the steamer *Oceanic* on a recent voyage to New York, reports passing at sea, the cable steamer *Mackay-Bennett* of the Commercial Cable Company, making repairs to a deep-sea cable in mid-ocean during a heavy storm. The *Oceanic* almost ran the cable steamer down in a dense fog. As the *Oceanic* passed the *Mackay-Bennett* the latter was shipping tremendous seas.

A small boat was out repairing the cable in the blackness of the fog and night, and the appearance of the cable ship and the small boat under these circumstances was a weird sight.

French Cable Company Adopts Reduced Press Message Rate.—The French Telegraph-Cable Company, Mr. E. C. Sweeney, traffic manager, New York, on December 15, put into effect a flat cable rate of five cents a word for deferred press dispatches between New York and London and London and New York, thus meeting the 5-cent rate for similar cablegrams by the Commercial Cable Company and the Western Union Company. Mr. Sweeney announced that a flat rate of five cents for deferred press dispatches between New York and Paris and Paris and New York was contemplated, and would be made operative as soon as the assent of the French administration had been obtained. The belief was expressed that no serious obstacle would be met in this direction.

The Cable Leases and Deferred Cable Business.

In a recent speech in London regarding the lease of the Anglo-American and Direct United States Cables to the Western Union Telegraph Company, Hon. Herbert Samuel, the British Postmaster-General said that some people feared that a monopoly might be created. He had, however, made it a condition of the Government's consent to the transfer of the landing licenses of these companies that there should be Government control in future of the cable rates across the Atlantic. He had thus been able to secure the consent of the Western Union and its allied companies to the reduction in the non-urgent press rates. The Australian Government had come into the scheme at his request, but he had not secured yet similar facilities for India and South Africa as the Eastern Telegraph Company had not been able to see its way to agree to the reductions, but the Government was pressing a scheme for a chain of wireless telegraph stations between the United Kingdom, the Mediterranean, India, Australia and New Zealand, and by that means in any event it hoped to be able to cheapen communication along the empire route.

Telegraphers of Today.

An excellent opportunity is offered to telegraph people in general to become acquainted with over 600 prominent telegraph officials and others identified with the telegraph, the railroad, the submarine cable service and press associations of the past generation, through their portraits and sketches of their careers as published in "Telegraphers of Today."

This work was issued in 1894 and includes biographical sketches of all the individuals connected with the interests mentioned at that period, many of whom have passed away from their earthly labors. The younger generation, however, will find much of interest in looking upon their portraits and reading of their achievements in life. Many of them are still alive and in harness, in the telegraph and other fields of activity.

This book, which is 11½ x 14 inches in size. was originally published at $5 per copy, but in order to close out the remaining copies we offer them at $1 per copy by express, charges collect.

Send orders to TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Russian Woman Chief of Telegraph.—Mlle. Hozlova has been appointed chief of the postal telegraph branch at Saratoff, Russia.

Course of Instruction in the Elements of Technical Telegraphy—VI.

(Copyrighted.)

(Continued from page 827, December 16.)

[We began in our issue for October 16 the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.

The mathematical section which is now running will carry the student through fractions, decimals, proportion, elementary algebra, etc.]

ADDITION.

Addition in Algebra is the process of finding the simplest equivalent expression for several algebraic quantities. Such equivalent expression is called the *sum*.

Example: What is the sum of $3ax + 2ab$ and $-2ax + ab$?

Solution:

Reduce the terms to their simplest form:

$$\begin{array}{rr} 3ax & +\ 2ab \\ -\ 2ax & +\ ab \\ \hline ax & +\ 3ab \end{array} \quad \text{Ans.}$$

Example: Let it be required to add together the expressions $3a$, $5b$, $2c$.

The result is expressed thus: $3a + 5b + 2c$, and cannot be reduced to a simpler form.

For the addition of algebraic quantities we thus have the following general rule:

RULE (2). *Write down the quantities to be added so that the similar terms shall fall in the same column, and give to each term its proper sign.*

Reduce the similar terms, and after these results write, with their proper signs, the terms which cannot be reduced.

Example: What is the sum of $4ab + 8ac$ and $2ab - 7ac + d$.

Solution:

$$\begin{array}{rrr} 4ab & +\ 8ac & \\ 2ab & -\ 7ac & \\ & & +\ d \\ \hline 6ab & +\ ac & +\ d \end{array} \quad \text{Ans.}$$

NOTE. The co-efficient 1 of ac is omitted.

Example: Add together the polynomials,

$3a - 2b - 4ab$, $5a - b + 2ab$, and $3ab - 3c - 2b$.

Solution:

$$\begin{array}{rrrr} 3a & -\ 4ab & -\ 2b & \\ 5a & +\ 2ab & -\ b & \\ & 3ab & -\ 2b & -\ 3c \\ \hline 8a & +\ ab & -\ 5b & -\ 3c \end{array} \quad \text{Ans.}$$

SUBTRACTION.

Subtraction in Algebra is the process of finding the simplest expression for the difference between two algebraic quantities.

To subtract algebraic quantities:

RULE (3). *Write the quantity to be subtracted under that from which it is to be taken, placing the similar terms, if there are any, in the same column.*

Change the signs of all the terms of the subtrahend, and then reduce the polynomial result to its simplest form as in addition.

Example:

$$\begin{array}{lrrr} \text{From} & 6ac & -\ 5ab & +\ c \\ \text{Take} & 3ac & +\ 3ab & +\ 7c \\ \hline & 3ac & -\ 8ab & -\ 6c \end{array} \quad \text{Ans.}$$

NOTE. The subtrahend with the signs changed becomes $-3ac - 3ab - 7c$, and the process is then the same as in addition.

Example: From $6am + y$ take $3am - x$

Solution:

$$\begin{array}{rrr} 6am & +\ y & \\ 3am & & -\ x \\ \hline 3am & +\ y & +\ x \end{array}$$

MULTIPLICATION.

To multiply monomials:

RULE (4). *Multiply the co-efficients together for a new co-efficient. Write after this co-efficient all the letters which enter into the multiplicand and multiplier.*

Example: $8abc \times 7xy$

Multiplying the co-efficients,

$8 \times 7 = 56$.

Annexing the letters contained in multiplier and multiplicand, $56abcxy$. Ans.

To multiply a polynomial by a whole number:

RULE (5). *Apply Rule 4, but multiply each term of the multiplicand by the multiplier.*

When two terms of the multiplcand and multiplier are affected with like signs the corresponding product is affected with the sign +; and when they are affected with minus signs, the product is affected with the sign —.

Example: Multiply $3a - 5b + 2c$ by $2x$

Solution:

$$\begin{array}{rrr} 3a & -\ 5b & +\ 2c \\ 2x & & \\ \hline 6ax & -\ 10bx & +\ 4cx \end{array}$$

The first term of the multiplicand being +, the product is +. The second term being — and the multiplier +, the sign of the product is —.

Example: Multiply $a - 2b - 7$ by 2

Solution:

$$\begin{array}{rrr} a & -\ 2b & -\ 7 \\ 2 & & \\ \hline 2a & -\ 4b & -\ 14 \end{array}$$

DIVISION.

To divide a polynomial by a whole number.

RULE (6). *Divide the co-efficient of each term of the polynomial by the divisor, remembering that like signs in the divisor and dividend give + in the product, and that unlike signs give —.*

Write after each new co-efficient the letters contained in the corresponding term of the dividend.

Example: Divide 16ab + 8c by 2

Solution: $2 \mid 16ab + 8c$

$8ab + 4c$ Ans.

Example: Divide x + 10 by 2⅓.

Solution: $2\frac{1}{3} = \frac{7}{3}$

$$\frac{x + 10}{2\frac{1}{3}} = x + 10 \text{ multiplied by } \frac{3}{7}$$

$$\begin{array}{r|l} & x + 10 \\ & 3 \\ \hline 7 & 3x + 30 \\ \hline & \frac{3}{7}x + 4\frac{2}{7} \end{array}$$ Ans.

(*To be Continued*)

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. There is a general demand for knowledge on the quadruplex, duplex, etc., and to aid in the acquirement of such knowledge we are extending our help to students by asking questions on these subjects in each issue of our journal, so that they may be encouraged in their studies by answering them. We use as our textbook Maver and Davis' "The Quadruplex," and students should have a copy of this book at hand in order to be able to give the answers. The questions are progressive and a careful reading of the book on the points under inquiry unfolds the answers. This method of acquiring technical knowledge is a fascinating one.]

REPEATERS (*Concluded*)

In what cases is the repeating device not used?

For what purpose is one-half of a Toye repeater used in main offices?

What is the advantage of the Downer arrangement over the Toye?

In managing the Downer repeater what precautions should be taken to obtain the best results?

How should the strength of the local batteries be tested?

What may be the cause of the writing on the neutral relay being repeated back on the transmitter?

How is the trouble located?

What other forms of repeaters have been invented, and what are their functions?

What does the octuplex repeater, invented by Mr. Edwards, accomplish?

What is the feature of the multiple repeater invented by Mr. Davis?

New Books.

Practical Telephone Handbook and Guide to Telephonic Exchange. By T. S. Baldwin.

This book contains chapters on the use of the telephone, line construction, line materials, locating and correction of faults in lines and instruments, besides much other information of value to promoters, builders and managers of rural telephone lines. It is written in popular language and covers the field of telephony very thoroughly. The book is well illustrated. Price $1.00 per copy.

Operators' Wireless Telegraph and Telephone Hand Book. By Victor H. Laughter.

A complete treatise on the construction and operation of the wireless telegraph and telephone, including the rules of naval stations, codes, abbreviations, etc. The principal systems of wireless telegraphy are described and altogether this book will be found an excellent aid in the study of the art and practice of wireless telegraphy and telephony. It is profusely illustrated with views and diagrams of instruments, etc. Price $1.00 per copy.

Vest Pocket Electrical Dictionary. A practical hand book of reference containing definitions of electrical terms and phrases in use in every branch of electrical science. It is especially valuable to telegraphers and telephonists, and will be found a great aid in understanding electrical apparatus and applications of electricity in general. Price 50 cents per copy.

"Modern American Telephony in All Its Branches," edited by Arthur Bessey Smith. A very complete and up-to-date work on the subject of telephony. It has over 800 pages and nearly 600 illustrations. Price, $2.00 per copy.

Electrician's Operating and Testing Manual. By H. C. Hortsman and V. H. Tousley.

This work gives practical instructions for the management, operation and testing of the more important electrical devices now in use. It deals principally with electrical machinery and apparatus and contains much information of general value to the student of telegraphy and telephony. It is free from higher mathematics and is written in plain, easily-understood language. Liberally illustrated and substantially bound in flexible leather. Price $1.50 per copy.

These books and any others on electrical and kindred subjects, published in America or in foreign countries, may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway Company's telegraph at Montreal, Que., in remitting to cover his subscription for another year, writes: "I am continually urging on the various members of our staff the advantages which might accrue to them in subscribing to the AGE to keep posted. I really consider that men in the telegraph business must read TELEGRAPH AND TELEPHONE AGE in order to keep up to date in their work."

IMPORTANT TELEGRAPH AND TELEPHONE HAPPENINGS IN 1911.

Following are summaries of the most important events of general interest that took place in the telegraphic and telephonic worlds during the year 1911. They are arranged by months, and this birdseye view of the progress of the year shows a remarkable amount of activity in both of these branches of electrical work.

JANUARY.

Loan Sharks.—The Western Union Telegraph Company inaugurated a plan to make financial loans without interest to its employes who may be in need of extra money, to be paid back in small monthly installments, the object being to get rid of the loan sharks.

Twenty-thousand Night Lettergrams in One Night.—In furtherance of their plans to secure the Panama-Pacific International Exposition in 1915, the citizens of San Francisco and other places in California and the Far West on January 23 sent about 20,000 night lettergrams to President Taft, urging him to favor their claims for the honor. The facilities of both the Western Union and Postal Telegraph-Cable Companies were taxed to the utmost.

Magnetic Club Election.—At the annual meeting of the Magnetic Club, held January 12, officers were elected.

Trial Telephone Service Illegal.—The New York Public Service Commission, Second District, notified all telephone corporations within its jurisdiction that the practice of offering trial service installations is regarded by the Commission as unlawful.

Receiver.—Judge Willson, at Philadelphia, appointed Mr. Charles E. Wilson receiver of the Continental Telephone and Telegraph Company under a bond of $100,000.

Girl Messengers in Indiana.—A bill was introduced in the Indiana legislature to prohibit the employment of girls as telegraph messengers in that State.

Montreal Telegraph Company.—The Montreal Telegraph Company held its annual meeting in Montreal, January 12.

Philadelphia Electrical Aid Society.—The twenty-third annual meeting of the Electrical Aid Society of Philadelphia was held January 10.

Serial Building Loan and Savings Institution.—At the annual election of the Serial Building Loan and Savings Institution, New York, January 17, officers and directors were elected. A dinner of the officers and directors of the institution, was held at the Astor House, January 27.

New York Public Service Commissions.—A bill was introduced in the New York Senate having for its purpose the abolition of the two existing Public Service commissions and the substitution of two corporation commissions. One of the proposed commissions is for New York City, the other commission for the territory outside New York City.

Western Union Pensions.—The Western Union Telegraph Company issued a circular letter January 23, regarding a proposed plan of pensioning employes of the company.

German Wireless Interests.—The German Operating Company for Wireless Telegraphy has been organized, with headquarters at Berlin, Germany. It is an amalgamation of all the German wireless interests and the Belgian Wireless Company of Brussels.

Wireless Institute Election.—At the meeting of the Wireless Institute held in New York, January 4, officers were elected.

Railway Telegraph Superintendents.—The quarterly meeting of the Western Division of the Association of Railway Telegraph Superintendents was held at St. Louis, Mo., January 26.

Annual Dinner of Commercial Cable Staff.—The tenth annual dinner of the staff of the Commercial Cable Company was held at New York, January 28.

New Office of Western Union at Seattle.—The new operating department of the Western Union Telegraph Company at Seattle was formally opened to the public on January 17.

Change in Value of International Volt.—On January 1 the Bureau of Standards at Washington adopted a new value for the electromotive force of the Weston normal cell.

American District Telegraph Company of New York.—The annual report of the American District Telegraph Company of New York for the calendar year of 1910 was issued.

New Atlanta Western Union Office.—The Western Union Telegraph Company moved into its new quarters in Atlanta, Ga., on January 28.

New York Telephone Earnings.—The report of the New York Telephone Company for the year ended December 31 showed revenue of $36,353,899, and expenses, including depreciation and taxes, amounting to $25,734,733, which left net earnings of $10,619,165.

Telephone Train-Dispatching Statistics.—According to the bulletin of the Interstate Commerce Commission, 41,717 miles of railway in the United States used the telephone train-dispatching system on January 1, and the telegraph was used on 175,211 miles.

FEBRUARY.

Mutual Investment Association.—The second annual meeting of the Mutual Investment Association, consisting of the employes of the Postal Telegraph-Cable Company, was held in New York, February 1.

Special Ocean Mail Service Ports.—The following ports were designated as forwarding stations for the Western Union Special Ocean Mail Service: New York, New Orleans, San Francisco, Seattle, Vancouver, St. John, N. B., and Halifax, N. S.

Dinner of Telephone Men.—The employes of the New York Telephone Company in the Westchester division held their first annual dinner in New Rochelle, N. Y., February 9.

Messenger Boy Law in New Jersey.—The New Jersey Senate passed a bill, making it a misdemeanor for telegraph companies or other employers to permit boys under eighteen years of age to deliver messages between 10 o'clock at night and 5 o'clock in the morning.

Western Union Award Upheld.—On February 20, Judge Colt, in the United States Circuit Court at Boston, confirmed the report of Mr. Everett W. Burdett as master in the suit of the Western Union Telegraph Company against the American Bell Telephone Company for an accounting on stocks received by the Bell Company as rentals and royalties for telephone licenses.

Telegraph Tolls Reduced.—The Western Union and Postal Telegraph-Cable companies notified the Public Service Commission that they would reduce telegraph rates from various points in the Adirondacks commencing June 1.

President Taft Signals to Honolulu.—Presi-Taft pressed a telegraph key in the White House, at Washington, at 12.30 a. m., February 22, thus transmitting an impulse over the Postal Telegraph-Cable Company's line to San Francisco, a distance of about 3,700 miles thence through the Commercial Pacific Cable Company's submarine cable to Honolulu, a distance of about 2,500 miles, where the telegraph circuit was connected with a clock in the hall in which the Elks were about to open their carnival. The transmitted signal automatically lighted up the clock at 7.30 p. m., February 21, Honolulu time.

Marconi English Patent Upheld.—The English patent granted to Mr. G. Marconi relating to the principle of tuning in wireless telegraphy was upheld by an English court in a decision rendered February 21.

Meeting of the Mackay Companies.—The annual meeting of the Mackay Companies was held in Boston, February 15.

American District Telegraph Co. of New Jersey.—At the annual meeting of the American District Telegraph Company of New Jersey held in Jersey City, February 14, Messrs. Theo. N. Vail, Newcomb Carlton, William H. Baker and H. B. Thayer were chosen directors.

No Case Against Canadian Managers.—The conviction registered against certain Canadian telegraph managers for violation of the Miller Act by transmitting betting information was quashed.

New Western Union Atlantic Cable.—The new Atlantic cable of the Western Union Telegraph Company from New York (Coney Island) to England, was opened for business February 17.

Commercial Association of the Western Union.—The Greater New York Commercial Association of the Western Union Telegraph Company was organized.

Telephone Wire Through St. Gothard Tunnel.—The Swiss Government authorized the establishment of a telephone wire through the St. Gothard tunnel, enabling Berlin and Frankfort to communicate with Milan and Rome.

Taxation in Michigan.—Judge Denison, of the United States District Court at Grand Rapids, Mich., rendered a decision upholding the constitutionality of a new law providing for the taxation of telephone and telegraph companies on an ad valorem basis.

MARCH.

Western Union Day-Letter Service.—On March 1 the Western Union Telegraph Company instituted the day-letter service.

Wireless Service to Ships at Sea.—Arrangements were made whereby wireless telegrams may be received at any postal telegraph office in England for transmission to ships at sea, when such vessels have passed beyond, or have not yet entered into, the radius of operation of the Postmaster-General's coastal station.

New York Telegraphers' Aid Society Election.—The annual election of the New York Telegraphers' Aid Society took place March 27.

Washington Meeting Railway Telegraph Superintendents.—The quarterly meeting of the Eastern Division of the Association of Railway Telegraph Superintendents was held in Washington, D. C., March 22.

Wireless Telephone Company Bankrupt.—Mr. Jesse Watson was appointed receiver of the Radio-Telephone Company of New Jersey in bankruptcy proceedings filed by creditors.

Conference on Electrical Rules Disbanded.—The National Conference on Standard Electrical Rules was formally disbanded in New York on March 24.

Telepost Company Closing Offices.—The Telepost Company closed some of its way offices between Boston, Mass., and Portland, Me., because it did not pay to keep them open.

Interstate Commerce Commission Decision.—The Interstate Commerce Commission on March 20 issued rules and regulations for telegraph and telephone companies as common carriers.

Corporation Tax Law Constitutional.—The United States Supreme Court on March 13, in a decision affirmed the constitutionality of the corporation tax law imposing a tax of one per cent. on all earnings of corporations showing a net profit of over $5,000 per year.

Day-Letter Service on Texas Postal Lines.—The Postal Telegraph-Cable Company of Texas adopted the 50-word day-letter service on its lines in Texas, Arkansas, Oklahoma, Louisiana, including Joplin, Mo., and Arkansas City and Mulvane, Kan.

Meeting of Commercial News Department Officials.—Representatives of the Commercial News Department, Eastern Division of the Western Union Telegraph Company, met in New York on March 22.

Western Union Managers Meeting.—A meeting of Western Union managers in the Western section of New York state was held at Syracuse, N. Y., March 23.

United States Military Telegraph Corps.—The bill introduced in Congress purposing to place the military telegraphers on an equal footing, as to pensions and homestead rights, with those who served in other arms of the service during the Civil War, failed of consideration in common with 30,000 other bills.

Annual Meeting of American Telephone and Telegraph Company.—At the annual meeting of the American Telephone and Telegraph Company, held in New York March 28, the retiring board of directors was re-elected. The retiring officers were also re-elected.

Telegrams by Telephone.—On March 1, arrangements became effective between the Western Union Telegraph Company and the New York Telephone Company which enabled subscribers and patrons of the New York Telephone Company's system to telephone their telegrams, night letters, day letters and cable messages to Western Union offices for transmission and have the charges billed on their telephone bills.

APRIL.

German-Brazil Cable Opened for Business.—The new German cable from Emden, Germany, to Pernambuco, Brazil, by way of Monrovia, Liberia, was formally opened for business April 1.

Dinner of the Morse Electric Club.—The annual dinner of the Morse Electric Club of New York was held at the Hotel Savoy, April 6.

Prompt Transmission of Telegrams. — The United States Supreme Court has upheld as constitutional the statute of the State of Virginia prescribing a penalty upon telegraph companies for failure to transmit promptly messages filed with them.

Bell Telephone Changes.—Five of the associated companies in the middle west of the American Telephone and Telegraph Company were placed under one executive head. The companies concerned were the Michigan State Telephone Company, the Cleveland Telephone Company, the Central Union Telephone Company, the Chicago Telephone Company and the Wisconsin Telephone Company.

Telephone Bill Vetoed in Nebraska.—Governor Aldrich of Nebraska on April 12 vetoed the bill providing for placing all telephone companies in the State under the control of the State Railway Commission.

Banquet of Postal Telegraph Club of Atlanta.—The Postal Telegraph Club of Atlanta, Ga., held its second annual banquet on April 22.

Associated Press Telephone Service.—About thirty papers are receiving the Associated Press service by telephone, varying from 1,000 to 5,000 words and transmitted at regular intervals during the day or night.

Magnetic Club Spring Dinner.—The spring dinner of the Magnetic Club was held at the St. Denis Hotel, New York, April 26.

Society of Wireless Telegraph Engineers.—Officers of the Society of Wireless Telegraph Engineers were elected at the convention held in Boston.

Postal Conference.—The general superintendents of the Eastern, Western and Southern divisions were in conference with the general manager, Mr. E. J. Nally, in New York.

Annual Meeting of The Associated Press.—The annual meeting of the Associated Press was held in New York, April 25 and 26.

Philadelphia Electrical Aid Society.—The Electrical Aid Society of the City of Philadelphia held its eleventh annual entertainment on April 26.

MAY.

To Supply Typewriters.—The Western Union Telegraph Company announced that it had under consideration a plan to furnish typewriters as part of the regular equipment of offices.

Appeal to General Manager.—The general manager of the Western Union Telegraph Company invited employes to communicate with him when they have just cause for complaint of arbitrariness, discrimination, prejudice, etc.

Atlantic & Pacific Telegraph Company.—At the annual meeting of the Atlantic & Pacific Telegraph Company held in New York, the directors and officers were elected.

New England Telephone and Telegraph Annual Meeting.—At the annual meeting of the New England Telephone & Telegraph Company May 1, directors and officers were elected.

Reduction of Cable Tolls.—Postmaster-General Hon. H. Samuel announced in the British House of Commons on May 18 that he had arranged with the cable companies for a reduction of 50 per cent. on all non-code cable messages liable to be deferred not longer than twenty-four hours.

Paris-Vienna Telephone.—The telephone line between Paris and Vienna was opened for public business.

O. R. T. Convention.—The biennial convention of the Order of Railway Telegraphers was held at Toronto, Ont., May 8-17.

Hours-of-Service Law Upheld.—The United States Supreme Court on May 29 rendered a decision upholding the constitutionality of the 'Hours-of-service law for railroad employes" in the test suit instituted by the Baltimore and Ohio Railroad Company.

Wireless Officials Convicted.—A verdict of guilty of misuse of the United States mails in a scheme to defraud was returned by the jury on May 29 against Col. C. C. Wilson, president of the United Wireless Telegraph Company, New York; W. A. Diboll, treasurer; F. X. Butler, counsel; G. W. Parker, western sales agent, and W. W. Tompkins of the eastern office. Wilson was sentenced to three years in the penitentiary, Parker and Butler to two years each and Tompkins and Diboll one year each. Mr. S. S. Bogart, vice-president of the company, was sentenced to pay a fine of $2,500.

JUNE.

Taxing Commercial Cable Company in Newfoundland.—The Supreme Court of Newfoundland gave judgment in favor of the Newfoundland government in its action against the Commercial Cable Company for $16,000 yearly as landing taxes.

Continental Telegraph Company Purchased.—The Chicago, Milwaukee & Puget Sound Railway Company acquired the rights and property of the Continental Telegraph Company in North and South Dakota, Montana, Idaho and Washington.

Reduction of Telephone Rates Ordered.—The New York Public Service Commission, second district, has ordered the New York Telephone Company to make reductions in telephone charges in New York City.

Cable Station at Far Rockaway.—A plot at Far Rockaway, L. I., N. Y., was purchased by the Postal Telegraph-Cable Company. The company proposes to erect extensive buildings on the property, to be used as a receiving and transmitting station for its transatlantic cable service.

Receivers Appointed for United Wireless Company.—Messrs. Sidney Harris and Robert E. Dowling were appointed by Supreme Court Justice Cohalan as receivers for the United Wireless Telegraph Company, New York.

Conference of Pittsburgh District Managers.—A conference of district commercial managers and managers of the third district, Eastern Division, Western Union Telegraph Company, was held at Pittsburgh, Pa., June 22.

Extending Canadian Government Telegraph Lines.—The Dominion Parliament voted to build new telegraph lines and reconstruct existing lines in the northwest section of Canada.

New Telephone Stock.—At a meeting in Boston on June 20 of the directors of the American Telephone and Telegraph Company it was voted to authorize an issue of approximately $50,000,000 of new stock.

Convention of Railway Telegraph Superintendents.—The annual convention of the Association of Railway Telegraph Superintendents was held at Boston, Mass., June 26-30.

Railway Telegraph and Telephone Appliance Association.—The Railway Telegraph and Telephone Appliance Association held its annual meeting at Boston, June 27, and elected officers.

Conference of Great North Western Officials.—A conference of the principal officials and local managers of the Great North Western Telegraph Company was held at Toronto, Ont., on June 27 and 28.

Coronation Telegrams.—Press telegrams dispatched from London to the provinces and foreign countries on Coronation Day amounted to 847,000 words. On the following day, that of the Royal Progress, 370,000 words were dispatched.

JULY.

Annual Outing of French Telegraph Cable Company's Employes.—The fifth annual outing of the French Telegraph Cable Company's employes in New York was held on July 2, at College Point, L. I., N. Y.

Morse Electric Club Outing.—The summer outing of the Morse Electric Club was held at College Point, L. I., N. Y., July 8.

Contracts Signed.—The Western Union Telegraph Company and the Postal Telegraph-Cable Company of Texas signed contracts for the exchange of business.

Interstate Commerce Commission Decision.—The Interstate Commerce Commission at Washington has ruled that it has no jurisdiction over claims or damages due to alleged errors in the transmission of telegrams.

Texas Telegraph and Telephone Company Sold.—The Texas Telegraph and Telephone Company sold its 500 miles of toll lines and other physical property to the Southwestern Telegraph and Telephone Company.

AUGUST.

Turin Telegraph Tournament.—The international telegraph tournament organized in connection with the International Exposition of Labor and Manufactures, was held in Turin, Italy, August 22-26.

Age Limit Bill Vetoed.—Governor Dix of New York vetoed a bill providing that a man employed by a railroad company in the operation of telegraph, telephone or signal system shall be 21 years old and have had one year's experience.

Around the World in Sixteen and One-half Minutes.—On Sunday evening, August 20, the "New York Times" sent a telegraph message addressed to itself, around the world in order to ascertain the speed of a commercial dispatch on such a journey under normal conditions. The message was sent from the "Times" telegraph room at 7 o'clock, and at 7:16:30 it was received at the same place.

United Wireless Declared Bankrupt.—The United Wireless Telegraph Company was declared bankrupt in the United States District Court at Portland, Me., and Mr. Seldon Bacon of New York was appointed general receiver.

Mackay Company Incorporated.—The Mackay Telegraph and Cable Company was incorporated in Arkansas, with a capital stock of $10,000. The incorporators are F. W. Conger, C. T. Coffman and J. C. Marshall.

SEPTEMBER.

Convention of Municipal Electricians.—The sixteenth annual convention of the International Association of Municipal Electricians was held at Atlantic City, N. J., September 12, 13, 14 and 15.

Reunion of Old Timers.—The thirtieth annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps was held at Atlantic City, N. J., September 5, 6 and 7.

Great Northwestern Election.—The annual general meeting of the shareholders of the Great Northwestern Telegraph Company was held at Toronto, Ont., September 27.

Cable Leases Approved.—At meetings of the stockholders of the Anglo-American Cable Company and the Direct United States Cable Company in London, September 29, the agreements to lease their lines to the Western Union Telegraph Company for a period of ninety-nine years was unanimously approved.

Railroads May Send Money by Telegraph.—The Interstate Commerce Commission issued an order allowing railroads to send money by telegraph to buy tickets.

OCTOBER.

Western Union Incorporations.—The Western Union Telegraph Company of Illinois was incorporated with a capital stock of $25,000. The incorporators are Roy O. West, William Rothmann and Thomas G. Deering. The Western Union Telegraph Company of Indiana has also been incorporated, with a capital of $10,000.

Western Union Annual Meeting.—The annual meeting of the stockholders of the Western Union Telegraph Company was held in New York, October 11.

Western Union Conferences.—A meeting of representative officials of the Western Union Telegraph Company was held at the Hotel Walton, Philadelphia, October 19. On October 10 a conference of the district commercial managers and managers of the third district, Eastern Division, of the Western Union Telegraph Company, was held at Pittsburgh, Pa. A conference of traffic superintendents and traffic chiefs of the large offices in the first, third, fourth and fifth districts of the Eastern Division was held at 195 Broadway, New York, on October 24 and 25.

Telegraph Monument.—The design submitted by Signor G. Romagnoli, of Bologna, Italy, for the International Telegraph Union Monument, to be erected at Berne, Switzerland, to commemorate the founding of the Union, was selected by the international jury.

NOVEMBER.

Telephone Pioneers.—The "Telephone Pioneers of America," organized an association at Boston, November 2.

Abolishes Delivery Charges.—The Western Union Telegraph Company abolished message delivery charges within city limits in all cities where such charges have been made heretofore.

Uniform Telephone Accounting.—The New York Public Service Commission, Second District, prescribed a uniform system of accounts for telephone corporations in the State of New York, to go into effect January 1, 1912.

New Building at 195 Broadway.—Announcement was made that plans are being prepared for the erection of a twenty-six story modern building on the site of the present structure at 195 Broadway, New York, to cost $3,000,000.

Annual Meeting of T. M. B. A.—The forty-fifth annual meeting of the Telegraphers' Mutual Benefit Association was held at 195 Broadway, New York, November 15.

Fall Dinner of the Magnetic Club.—The Magnetic Club held its fall dinner at the St. Denis Hotel, New York, November 15. It entertained as guests officers and members of the executive committee of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps and the out-of-town delegates to the annual meeting of the Telegraphers' Mutual Benefit Association.

Proposed Monument to James D. Reid.—At the fall dinner of the Magnetic Club in New York, November 15, president C. P. Bruch suggested the erection of a monument on the grave of the late James Douglas Reid, in Rochester.

Entertainment of the New York Telegraphers' Aid Society.—The annual entertainment of the New York Telegraphers' Aid Society was held in New York, November 21.

Conference in Alabama.—A conference of the managers of the larger Western Union offices in Alabama was held in Birmingham, November 17.

Boston Western Union Conference.—The second annual conference of the heads of the commercial department of the Western Union Telegraph Company in and around Boston, was held in that city November 22.

Western Union Conference in the South.—A conference of division officials and district managers was held in Atlanta, Ga., November 21, 22 and 23.

Railway Telegraph Superintendents.—A joint meeting of the eastern and western divisions of the Association of Railway Telegraph Superintendents was held in Chicago, November 23 and 24.

DECEMBER.

Reducing Telephone Rates in New York.—The new telephone tolls between Manhattan and Brooklyn boroughs, New York City, went into effect December 1.

Boston Meeting of Managers.—On December 6 a meeting of the office managers of the fifth district Eastern Division of the Western Union Telegraph Company, was held in Boston.

Deferred Cable Service Introduced by the Western Union.—Two new forms of trans-Atlantic cable service were instituted by the Western Union Telegraph Company on December 6. They are known as cable letters and week-end letters, and a deferred press service was also put into effect.

Turner Monument Dedication Postponed.—Owing to the lateness of the season it was decided to postpone the dedication exercises of the Turner monument until the end of April or the first part of May next year.

The Development and Present Composition of the Western Union Telegraph Company.*

BY E. Y. GALLAHER, AUDITOR OF THE WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

Considerable progress has already been made in the operating alliance between the telegraph and telephone industries, in conformity with the policy as expressed by President Vail in his annual report for the American Telephone and Telegraph Company for the year ended December 31, 1910.

On November 30 last, the Western Union Telegraph Company was handling telegrams telephoned over the lines of twenty-four associated Bell companies. The observance of the same routine for telegrams telephoned has also been arranged with a number of railroad companies. In addition to this, approximately one hundred fifty joint offices have been established with the associated Bell companies, principally in the territories of the New England, the Southern New England, and the New York Telephone companies.

A special joint committee was recently appointed, composed of members drawn from the American Telephone and Telegraph Company, the New York Telephone Company and the Western Union Telegraph Company, representing the plant, traffic and commercial departments. The activities of this committee are directed toward experimenting in the territory of the Hudson Division of the New York Telephone Company south of Essex County in respect to the establishment of joint offices, and they have been given sufficient authority and financial assistance to carry out the scheme.

It occurred to me that in view of the contemplated extension of the relations between the telephone companies and the Western Union Company, it would be of interest to you to know something relative to the composition of the telegraph company and its plans from an accounting point of view.

ORIGIN AND DEVELOPMENT OF THE WESTERN UNION TELEGRAPH COMPANY.

The origin of the Western Union Telegraph Company is found in the organization, in 1851, of the New York and Mississippi Valley Telegraph Printing Company, with a main office at Rochester, N. Y., and a capital of $360,000, for the purpose of building a line of two wires from Buffalo to St. Louis. The capital stock was later reduced to $170,000, and only one wire erected instead of two, and this between Buffalo and Louisville.

In 1854, the company was opposed by two rival telegraph systems operating in the five states north of the Ohio River, and serious dissensions respecting rules, methods and rates were of constant occurrence.

Between 1851 and 1856 the New York and Mississippi Valley Telegraph Printing Company absorbed six other companies, and these changes had a decided tendency in effecting harmonious operating arrangements. The name of the New York and Mississippi Valley Telegraph Printing Company was changed to The Western Union Telegraph Company in 1856, and the first dividend was paid in 1857, about which time the entire telegraph interests of the country were divided in six systems, including the Western Union system.

In 1861 the Western Union extended its lines to the Pacific Coast and in 1866 the general office was moved from Rochester to New York, and practically all competitors were absorbed, giving the Western Union control of the telegraph situation, with 75,000 miles of wire. The United States Government seized what lines it required during the Civil War and at its close settled the company's damage claims by turning over the additional lines it had built, this adjustment resulting advantageously to the Western Union Company.

On July 24, 1866, Congress passed an act to the effect that any telegraph company then organized could have the right to construct and operate telegraph lines over any portion of the public domain of the United States and along military or post roads in the United States, and over and under navigable streams or waters, if such lines did not interfere with navigation or ordinary travel. In exchange for these privileges, the telegraph companies were obligated to transmit messages on account of Government business at rates to be annually fixed by the Postmaster General, such business to have priority over all other business. It was also provided that the government could at any time purchase all telegraph lines and property, the value of which would be determined by arbitrators.

In accordance with Section 4 of the act, the Western Union, in 1867, filed a written acceptance of the same with the Postmaster General.

The Supreme Court of the United States has decided that telephone companies do not come within the provisions of this act, as they are not telegraph companies, because, as the telephone industry was not in existence at the time, Congress could not have considered it. On the other hand, State courts are generally unanimous in holding that telephone companies are also telegraph companies and therefore entitled to place their lines along the post roads, etc. The marked advantage to the telegraph companies in the act of 1866 is that streets in any city are considered as post roads, so we have the right of entering to place our wires either above or underground.

Since the organization of the company under the name of The Western Union Telegraph Company, many telegraph holding companies have been absorbed or controlled, either by outright purchase, perpetual leases, or by leases of the plants for long periods, such as ninety-nine years, etc.

These holding companies had numerous subsidiary companies; and accountants who examined the books informed me that altogether, including the subsidiary companies, there were approximately four hundred taken in, but this figure is somewhat in excess of that accepted by the company's older officers.

In 1882 the Western Union leased the two ocean cables of the American Telegraph and Cable Com-

*Paper read before the Telephone and Telegraph Society of New England, Boston, Mass., December 5.

pany for a period of fifty years, and, until a year ago, a pooling arrangement existed between the Anglo American Telegraph Company, the Direct United States Cable Company and the Western Union, lessee, in respect to ocean cable traffic.

It has been the company's policy to extend its business by erecting lines along railroad rights of way, this being accomplished by contracting for the interchange of services, and, at the present time, we have something like three hundred live railroad contracts. In effect these contracts provide for the furnishing of telegraph service to railroads, either limited or unlimited, or on a half-rate basis, and, in return, the railroads allow the Western Union transportation for men and material, both on and off line, and the agreements generally include the sharing of cost relative to repairs, reconstruction and construction of lines, and the maintenance of offices and payment of joint employes.

INVESTIGATION OF COMPANY IN 1910.

It was deemed advisable, early in 1910, to have a thorough examination made of Western Union affairs by outside accountants. This investigation was directed into every branch of the company's business, except the operating; the accountants, with their force of men, being located at 195 Broadway for more than a year.

The investigation of the accountants did not include the preparation of a system of accounts and their observations along that line were only of a general nature. The main purpose in view was to present a balance sheet as of a certain date, showing the company's true financial condition, and a revenue and expense account for the year to submit to the stockholders. Concurrently with this investigation the plant records were carefully perused by a firm of outside engineers and various inquiries set on foot with the object of classifying the Western Union plant and arriving at its true value, thus affording a basis for the accountants to set up a figure representing, as nearly as possible, the actual value of the company's plant.

The balance sheet submitted by the accountants included as plant not only that constructed by the Western Union Company, but also the properties of about two hundred and forty other telegraph companies which had been merged in the system, these companies being controlled either by ownership or perpetual lease, and all outstanding liabilities to minority stockholders or bondholders were set up as part of the Western Union's capital liabilities.

REMARKS ON BALANCE SHEET OF 1911.

The total property account of the Western Union on June 30, 1911, the end of the last fiscal year, including real estate, amounted to $138,700,000. The company owns a valuable site and office building in New York and also an office building and site in the business center of Chicago. In addition to this, it has property in Chicago upon which a storehouse is located. These parcels of real estate are the most valuable the company has, but it also owns fourteen other pieces of property whereon are storehouses, pole yards, marine observatories and stations for cable business.

Under the caption "Other Securities Owned," in the balance sheet, are grouped the securities of telegraph, cable and other allied companies operated under term leases. Our agreements with these companies vary in the returns guaranteed on their capital stocks and, in some cases, we are obliged to maintain their corporate identities, and in others not. They number eight in all, and a conservative value of their securities owned is approximately $6,300,000.

The company also has shares in telegraph and cable allied companies which are not leased, these companies being ten in number, and the market value of their securities about $4,900,000.

Among the companies under term leases is the Gold and Stock Telegraph Company, of which the Western Union owns substantial control. This company, in turn, had when it was leased numerous investments of its own, among which was stock of the Metropolitan Telephone Company, the present New York Telephone Company. This stock, together with shares of the New York Telephone Company, which belonged to the Western Union Company, was sold in September, 1909, to the American Telephone and Telegraph Company for $24,300,000, and $11,060,000 of this sum, representing the interest of the Gold and Stock Company in the sale, was set up on the balance sheet under the heading "Deferred Non-interest Bearing Liability."

A large increase in the value of the New York Telephone Company stock had, of course, taken place between the time of its acquisition by the Gold and Stock Company and the Western Union, which was near the beginning of the telephone industry, and the date of the sale. Some flurry was created at the time in the value of the Gold and Stock shares when it became known that the company was interested in the sale of this stock to the American Telephone and Telegraph Company to the extent of over eleven millions of dollars, but after it was realized that this amount was not payable until 1981, seventy years from now, and that the present value of the eleven millions of dollars was only about two hundred thousand dollars, and also that the Western Union Company would participate in the distribution to the extent of its stock interest, the price subsided to the old level.

In order that the Western Union Company may have actual marketable assets on hand in 1981 to meet the deferred liability, the Executive Committee instructed that the sum of $32,600 shall be set aside and invested on the first of July of each year.

On June 30, 1911, the Western Union Company owned 204,400 miles of poles, 573,600 miles of copper wire, 913,750 miles of iron wire, with a total of 1,408,700 miles of wire and cable, and was operating 24,926 offices, of which 3,760 were independent offices, including branches. The company had some 46,000 employes, of whom 31,800 were entirely on the pay-roll of the Western Union, the remainder being for the most part joint employes with railroad companies.

The total assets were valued at $175,860,000 and the surplus was over $10,100,000. The total earnings for the last fiscal year were $35,478,000 and the net profits, before deducting interest on bonds and dividends, were $7,100,100, the sum of $2,380,000 being carried to surplus.

Practically all telegraph business in the United States is conducted by the Western Union Company and the Postal Telegraph-Cable Company and, of this business, the Western Union handles much the larger proportion.

(To be continued.)

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(81) Q. What are the highest frequencies used in wireless telegraphy? W. A. T.

A. The United States Government has a special type high-frequency alternator in the research laboratory at Washington which has a range of frequencies of from 20,000 to 100,000 cycles per second. The rotor of this machine revolves at a speed of 20,000 revolutions per minute to generate electric waves of 100,000 cycles per second. Although the output of the machine is only 2 kw., it requires a 10-hp. motor to operate it, the air friction or adhesion of the rotor being so great.

(82) Q. Am I correct in understanding that the capacity of a storage battery decreases as the rate of discharge increases? I am advised that a battery that will furnish ten amperes for ten hours will furnish twenty amperes for only four hours, the battery receiving the same amount of charge in both cases. This is not in accordance with articles I have read on the subject. R. S. V.

A. A storage battery decreases in efficiency when it is discharged at a higher rate than the rate prescribed by the manufacturer, which is usually on the eight-hour discharge basis. A forty-ampere-hour cell, for instance, will give five amperes most efficiently for eight hours, but it will not give ten amperes in four hours, but much less, perhaps not more than eight amperes. The more rapid the rate of discharge the less the efficiency of the cell. The cause for this does not seem to be fully understood, but the losses are probably represented largely in the heat generated. Apart from this, there is great danger of damaging the plates when the cell is discharged at a rate exceeding the normal.

(83) Q. Will you please give me some information regarding the blanket insurance policy taken out by the Commercial Cable Company in favor of its employes? C. R. W.

A. Prior to the year 1905 the Commercial Cable Company had all its employes insured in the New York Life Insurance Company under the endowment plan, paying one-half of the premium, the employe paying the other half. The object was to make some provision for employes or their families in the event of death or retirement from the service. As fast as the policies mature, the proceeds are invested on behalf of the owners, in first-class securities, and held by the company until such time as they retire from the service or die, whereupon such securities are turned over to the owner or his beneficiaries. In 1905 the company also introduced a pension plan for its employes under which they receive a pension based on length of service.

(84) Q. Can you give me the sizes of wires ordinarily used expressed in vulgar fractions? H. G.

A. We assume that you desire to have the sizes expressed in practical quantities, that is, in fractions that are in every day and common use. This cannot be done, but the actual values can be approximated. Thus, for instance, the diameter of No. 0000 wire is equal to $\frac{1}{2}$ inch; No. $1 = \frac{1}{3}$ inch; No. $2 = \frac{1}{4}$ inch; No. $4 = 1/5$ inch; No. $8 = \frac{1}{8}$ inch; No. $10 = 1/10$ inch; No. $12 = 2/25$ inch. It must be remembered that all of these values are only approximate.

Standard Oil Telegraph Lines.

In the separation of the Standard Oil Company into component parts in compliance with the decision of the United States Supreme Court, a novel situation was developed as regards the company's telegraph system. The telegraph lines run along the pipe lines of the company and hereafter will be divided into four component parts, the telegraph divisions being made to correspond with the pipe line divisions.

The company had no wires of its own in New York City, but leased several loops from the Western Union and Postal companies from its offices through the telegraph companies' offices to its private wires at Bayonne, N. J.

Over a thousand operators have been employed on the private wire system, but there will be no great change in the conditions of employment. They will hereafter work for one company, instead of for an amalgamated system. Some of the men as a result of the new order of things will have to change their places of residence. Few or none of the operators will be out of employment on account of the change.

The breaking up of the private wire system into separate divisions will compel the company to use commercial wires for its interstate business. The private system will hereafter be used strictly for pipe line business. The atmosphere is by no means clear, however.

The reorganization of the Standard Oil Company's telegraph system has given rise to some wild and grotesque reports. From the West comes the statement that the company with its present system as a nucleus is going to establish a great telegraph system that would crush the Western Union and wipe the Postal Company out of existence.

Mr. C. E. Bagley, superintendent Postal Telegraph-Cable Co., Philadelphia, Pa., in renewing his subscription for another year writes: "I have been a subscriber to the Age since the time of its first issue. It is a most welcome visitor."

Obituary.

A. G. Hancock, a military telegrapher, died in Chicago, November 29.

Edward H. Wade, aged 38, of the Western Union force at Buffalo, N. Y., died November 29.

Clyde Crandall, wireless operator on the United States battleship *Utah*, died recently of typhoid fever.

Julian S. Eves, aged 61, of the Western Union Telegraph Company at Philadelphia, died in that city December 6.

Thos. J. Stant, aged 70, formerly an operator at Fairmount, Kan., died at Bonners Springs, Kan., December 12.

F. E. Fitzgibbons, operator for the Elmira *Advertiser*, Elmira, N. Y., died at that place December 24.

William H. Dale, formerly of the Great North Western Telegraph Company, died at Petrolia, Ont., at the age of 65 years.

Daniel Carroll Hemingray, secretary and treasurer of the Hemingray Glass Company, Covington, Ky., died on December 14.

W. C. Burrows an old time telegrapher and at one time manager of the El Paso, Tex., Postal office died at that place recently.

Frank L. Gilman, aged 53 years, a former telegrapher in Eastern cities and ex-postmaster at Laconia, N. H., died in the latter place recently.

William W. Burhans, aged 67, repeater chief of the Western Union Telegraph Company, Washington, D. C., and one of the founders of the Telegrapher's Mutual Benefit Association and a United States Military telegrapher during the civil war, died in Washington, December 13.

Mrs. Kate P. Bruch, widow of Captain Samuel Bruch and mother of Mr. Charles P. Bruch, third vice-president of the Postal Telegraph-Cable Company, New York, and of Mr. Edward B. Bruch, died at Clinton, N. J., in the afternoon of Christmas day. The funeral services were held in Canton, Ohio, where the remains were buried beside those of her husband in West Lawn Cemetery. Mrs. Bruch was highly esteemed by her many friends for her lovable, Christian character and her death will be regretted by all who knew her.

Four Deaths at New Orleans. — Within one week four members of the staff of the Western Union Telegraph office at New Orleans, La., died. They were M. S. Molony, aged 41 years, assistant manager, who died November 30; James B. Mobley, aged 62, traffic chief, died December 8; A. J. Roberts, receiving clerk, died December 4, and J. E. Elliott, manager of the cotton quotation department, died December 7. Mr. Molony was in the Western Union service for twenty-five years. Mr. Mobley was born in Allenton, Ala., and had been in the employ of the Western Union Company in New Orleans for thirty-five years.

The Late George H. Stapely.

George H. Stapely, whose death in Chicago was announced in these columns December 16, was one of the oldest and best known brokerage men in the country and leaves an estate estimated at more than a million dollars. He was born near Guelph, Ontario, forty-six years ago, and after working as an operator for the Dominion and Montreal Telegraph companies, went to Chicago in 1880. He afterwards became identified with the commission and brokerage business, and went to Cincinnati, Ohio, about 1894, where he continued to reside. Entering the employ of the O'Dell Commission Company, he rose until he became the firm's active manager and finally a partner. Later he established a business under his own name. The sudden deaths of four members of the O'Dell Company since the firm failed, is a strange coincidence. They were W. J. O'Dell, Thomas Shay, William C. Dudlev and, lastly, George H. Stapely, and they all became wealthy in the brokerage business. The late Albert S. Ayres, who was at the head of the firm's telegraph department is also dead; so the ill-luck that preceded and followed the failure has about run its course. Messrs. Dudlev and Gorman were former operators.

New Edition of Maver's Telegraphy.

Advance copies of Maver's "American Telegraphy and Encyclopedia of the Telegraph," to be known as the 1912 edition, will be ready for delivery during the coming holidays. This edition besides embodying everything of modern value in telegraph engineering and practice of the previous editions will contain fully illustrated descriptions of the new Western Union and the Postal quadruplexes, the Jones' phantoplex, the d'Humy and the Creed re-perforators, the latest improvement in fire alarm telegraph boxes, etc.

This work is used as a text-book and as a book of reference in many of the largest universities and in the large telegraph and telephone offices in this country. It contains within its covers a complete elementary treatise on electricity and magnetism, primary and storage batteries, line construction, etc. The beginner may successfully pursue his studies of these subjects by means of this book. The book is written in simple English and is practically without mathematics. No ambitious student in the telegraph or telephone ranks can afford to be without it. This work will be sent to any address, carrying charges prepaid, on receipt of price, $5.00, by Telegraph and Telephone Age, 253 Broadway, New York.

Physiological Effects of Telephone Work.— English medical experts who have been investigating the effect of telephone work on the operators have issued a report stating that no evidence was found of injury of any of the special senses. No complaint was made of impaired hearing.

The Eiffel Tower Wireless Station.

Some interesting facts concerning the wireless station at the Eiffel tower in Paris, are given in the London "Electrical Engineer."

All the rooms for the apparatus used at the station are underground in order that the Champ de Mars may not be interfered with. There are three transmitting stations, two of which work with intermittent chargings which are ready for use in from one to two minutes. The first transmitting station is intended for small distances only, and mainly for communication with the French coasts and Algiers. It works with ten kilowatts. The transformer, resonator, spark inductor and condensers are perfectly damped with felt insulators. The second transmitting station, which is the largest if not the most modern in use, requires forty kilowatts and is fed by an alternating current of forty-two periods and 220 volts. The condenser group has a capacity of 0.7 microfarad, and consists of seven Moscicki tubes arranged in cascade. They are designed for a maximum voltage of 120,000, but 90,000 is not exceeded in normal work. The antenna is excited by a shunt. The two zinc cylinders of the exciter are full and are about ten inches in diameter and twenty inches long. Each of them is fixed on an opaline plate and one can be altered in position to permit regulation of the length of the spark. Both are rotated by an asynchronous motor. The average length of spark is about 1.5 inch.

For this equipment the antenna is a galvanized steel cable weighing 2.5 tons and 0.28 inch in diameter. Each of the six wires is 460 yards long, and is fixed at the summit of the tower by four special insulators. The earthing consists of zinc bands, having a total surface of 720 square yards. The antenna resistance is thirteen ohms, and the normal working current forty-six amperes.

The third transmitting station works with singing sparks and requires ten kilowatts with an alternating current of 600 cycles.

The spark length is about two-thirds of an inch and the current in the antenna about sixty amperes.

Besides its special military service, the Eiffel tower is employed in sending time signals and weather reports to ships within 2,500 miles distance, and also to facilitate geographical measurements.

New York Western Union Conferences.

A conference of district commercial and traffic superintendents was held at 195 Broadway, New York, on December 20, the topic for consideration and discussion being "Handling Business by Telephone." Those present were Messrs. A. G. Saylor, general superintendent; E. M. Mulford, division commercial superintendent; J. A. Hill, division traffic superintendent; M. C. Allen, division plant superintendent, all of New York; C. F. Ames, district commercial superintendent, and L. D. Wilbourn, district traffic superintendent, Boston; A. C. Terry, district commercial superintendent and W. J. Dodge, district traffic superintendent, Pittsburg, Pa.; J. W. Reed, district commercial superintendent and J. M. Creamer, district traffic superintendent, Philadelphia, Pa., and W. A. Sawyer, district commercial superintendent and Herbert Smith, district traffic superintendent, New York.

The Commercial Managers' Association of the Western Union Telegraph Company of Greater New York, held its fall meeting and dinner at the Broadway Central Hotel, on Saturday afternoon and evening, December 16.

The afternoon meeting was attended by all the district commercial managers, solicitors and local managers, at which very important matters pertaining to the commercial work in the district were discussed. Over 140 persons connected with the commercial department were present at the dinner and Mr. Newcomb Carlton, vice-president of the company, was the guest of honor.

A paper was read by Mr. John Simmonds, solicitor, who outlined the methods which he employs in inducing patrons to use the Western Union service. He was followed by Mr. F. C. Dowd, solicitor, who spoke of his work during the exploitation of the Night and Day Letters. Mr. A. Simon, solicitor, spoke of the future of the solicitor. Mr. J. W. McMahon, district commercial manager, read a paper on "Salesmanship as applied to the telegraph company," and Miss Amelia M. Prime, presented a paper relating some of the experiences that she has had in her years of service as a manager, and her efforts in soliciting telegraph business. Addresses were also made by Mr. S. M. Williams of the publicity department, Mr. J. F. Nathan, commercial superintendent, Mr. E. M. Mulford, division commercial superintendent and Mr. A. C. Kaufman, commercial agent of the eastern division.

Mr. Carlton in the course of his remarks stated that he had attended a great many dinners and had listened to many after-dinner speeches, but that at none had he heard such entertaining and instructive talk. He complimented the association very highly and said that he would convey to President Vail, at the first opportunity, the good impressions that he had gained from his intercourse with those present.

Mr. P. J. Casey, president of the association, acted as toastmaster and introduced the speakers in his customary versatile manner.

Municipal Electricians.

Police Telegraph for Binghamton.—A police telegraph system has been recommended for Binghamton, N. Y.

Brooklyn's Fire Alarm System Assailed.—The National Board of Fire Underwriters, which has been examining the fire alarm system in Brooklyn, N. Y., reports that it is "dangerously unreliable and inadequate," and has been "extended and maintained without any well-defined plan, and maintenance in the past has been poor."

Modern Fire Alarm Station.—The fire alarm and police telegraph headquarters at Oakland, Cal., are housed in a handsome fireproof structure erected especially for the purpose, and the equipment is complete and modern in every detail. The equipment includes a 100 local 20 trunk private exchange telephone switchboard (utilized to half its capacity at present), a large storage battery plant, etc.

Radio-Telegraphy.

Telefunken Wireless Station on Long Island.—The Telefunken Wireless Telegraph Company is erecting a plant at West Sayville, L. I. A 480-foot tower is being built.

Coltano Wireless Station.—The Coltano, Italy, wireless station which was recently opened under the direction of Mr. Wm. Marconi, has an available power of 1000 kw. and a wave length of 1200 meters.

United Wireless Affairs.—Stockholders of the United Wireless Telegraph Company, now in the hands of receivers, held a meeting in New York, December 15, to devise ways and means to effect a reorganization. A committee was appointed to take the matter up.

Controlling Torpedoes by Wireless.—Mr. John Hays Hammond, Jr., son of the well-known mining engineer, has devised a means of wireless control of submarine torpedoes propelled by any power. He carried on experiments at Gloucester, Mass., all last summer.

Long Distance Wireless.—The naval wireless station at Newport, R. I., recently picked up messages sent by the Mare Island, Cal., station to the Key West, Fla., station. The wireless set at the Newport torpedo station is a Telefunken 5 kw. variometer set, and the one at Mare Island is exactly similar.

Wireless in Brazil Ordered Discontinued.—The Brazilian government has notified the American Amazon Wireless Telegraph and Telephone Company, which was licensed last April to operate its system in the Amazon country, that it must discontinue operations, on the ground that the Government at some future time might desire to operate a wireless system of its own.

First Violation of Wireless Ship Act.—The first prosecution for violation of the federal wireless ship act is pending in the United States District Court at Baltimore, Md. The steamer *Templemore* took a large number of Republican politicians across to England and Ireland some months ago and was not provided with wireless apparatus. The law requires that any steamer carrying more than fifty passengers and sailing more than 200 miles from the coast shall be provided with a wireless outfit.

Efficiency of "Earths" in Radio-Telegraphy.—In an article in *Electrical World*, Mr. Charles A. Culver gives an account of some experimental investigations of the variation in efficiency with the size and position of earth wires. He concludes that the disposition of the earth connection in arranging a system for radiating or intercepting electromagnetic waves is of prime importance. These preliminary tests were carried out across both land and water. While the results were not wholly concordant, the data appear to warrant a thorough and systematic investigation of the relative efficiency of various earth connections.

Wireless Distress Signals.—Mr. W. J. Bryan recently suggested that two wireless operators be employed on passenger steamers so that the service would be available at any time during the twenty-four hours. Mr. Louis W. Austin, of the United States Naval radio-telegraphic laboratory at Washington, D. C., suggests that the captains of steamers detail some one to wear the head telephones while the operator is off duty, and that the distress signal be made "S S S," for instance. Any one not familiar with the telegraphic code, could recognize the three dots repeated, and in this way distress signals would not be lost on account of the operator being off duty.

Wireless Control of Boats.

There was exhibited on the river Danube at Vienna, Austria, recently, a boat which was controlled by wireless from the bank, without any person being on board. The boat carried a storage battery which furnished the motive power, the "system" or invention consisting in the adaptation of wireless electric waves of different lengths to the control of the motive power, steering gear, and other mechanism.

The boat moved forward and back, turned right and left, described figures, was guided to definite points, rang bells, exhibited flags and lights, fired guns, etc., giving proof of effective control.

Long Distance Wireless.

In recent tests carried out in Washington, D. C., by Mr. L. W. Austin, for the purpose of determining the law of the variation of strength of signal with distance, he found that over salt water the electrical waves decrease in intensity in proportion to the distance, as found by Duddell and Taylor. In addition, they are subject to an absorption which varies with the wave-length. This is true in general for day transmission. The absorption at night is entirely irregular, varying from zero to the day value, but is on an average much less during the Winter than in Summer. Variations also appear to occur during the daytime, but these are probably in general small. The received antenna currents between two stations with salt water between are proportional to the product of the heights of the sending and receiving antennas and inversely proportional to the wave-length, provided the antenna resistances remain constant. The experiments recorded were carried on with flat-top antenna heights of from thirty feet to eighty feet and wave-lengths of from approximately 1,500 meters to 4,000 meters.

An account of the test is published in the Bulletin of the Bureau of Standards.

The Telephone.

Mr. Fred. G. Greber, assistant chief engineer of the Southwestern Telegraph and Telephone Company, Dallas, Tex., has been promoted to be general manager of the West Texas Telephone Company with headquarters at Brownwood.

Mr. Henry W. Pope, secretary of the Telephone Pioneers of America, New York, met with a painful injury in a subway train recently. His hip was badly sprained and he has been confined to his house for the past three weeks in consequence.

Mr. Howard T. Reneau, for several years with Nelson Morris & Co., at St. Louis and New York, and more recently with the Postal Telegraph-Cable Co. at Albuquerque, N. M., is now in charge of the American Telephone & Telegraph Company's repeating station at Albuquerque.

National Independent Telephone Convention.—The next annual convention of the National Independent Telephone Association will be held in Chicago, February 7, 8 and 9, 1912.

"The Wonderland of the Telephone."—Mr. William A. Dockery, of the New York Telephone Company, lectured on December 21 on "The Wonderland of the Telephone" in an East Orange, N. J., church.

"How to Use the Telephone."—This is the title of a neat booklet issued by the Southern Bell Telephone and Telegraph Company to its employes. It would be of benefit if instructions of this character were issued more generally to the public.

Postal Telephone Rates in California.—The Postal Telegraph-Cable Company announces a rate of 25 cents for a ten-minute telephone conversation between San Francisco and Sacramento, Cal. This is a large reduction on the present rates.

Telephone Amalgamation in San Francisco.—Legal steps have been taken looking to the merging of the Home Telephone Company of San Francisco, Cal., to the Pacific Telephone and Telegraph Company. The Home company operates an automatic system.

Governmental Telephony in Manitoba.—The operation of the Manitoba Government telephone system for the year 1911 will show a loss of nearly $150,000. The commissioners will recommend radical changes bearing upon the matter of rates. There are 200,000 telephone users in Manitoba.

Bell Telephone Stations for 1911.—It is stated that the American Telephone and Telegraph Company will make a gain in stations during 1911 of over 600,000 compared with 740,027 in 1910. It was estimated that the company would have 6,500,000 stations on December 31, of which 4,500,000 are Bell stations proper and 2,000,000 stations of connecting companies.

Sunset Telephone Company Buys Opposition Plant.—The Sunset Telephone and Telegraph Company on December 9 purchased, at a Federal court auction, the Home Telephone Company, which operated an automatic telephone system in Tacoma and Bellingham, Wash. The Home Company went into the hands of a receiver a year and a half ago and later into bankruptcy. The price paid was $550,000.

Conference of Telephone Traffic Superintendents.—Division superintendents of traffic for the Southwestern Telegraph and Telephone Company from various points in the Southern states met in conference in Houston, Tex., December 7, 8 and 9. Among those present were: L. M. Loring, of Little Rock; J. J. Trapp, of Fort Worth; R. E. Hart, of Houston, and D. M. Parkinson, of San Antonio. W. B. Kellogg is division superintendent in Dallas.

The New York City Telephone Directory.—The new telephone directory of the New York Telephone Company contains 760 pages and 275,000 names. Five hundred thousand copies were distributed throughout the whole of New York City. The paper used in this book is very thin and strong and is especiallv made for the purpose. A new type has been designed for this work and will be used for the first time in the next issue of the directory. The present printing plant turns out 20,000 completed books a day, but its capacity will be enlarged to 40,000 copies a day, and even at this speed it will require two weeks to print a single edition of the book. Thirty-three years ago the New York City telephone directory was a card containing 252 names.

Independent Telephone Companies in New York State Absorbed by the Bell Interest.—The New York Telephone Company has obtained a substantial control of the bonds and stocks of the following independent telephone companies in New York State: Commercial Union Telephone Company, operating at Troy, Glens Falls, Saratoga, Lake George and other important points; Albany Home Telephone Company and its subsidiary company, the West Shore Home Telephone Company operating at Catskill; the Cohoes-Waterford Home Telephone Company operating at Cohoes and Waterford; the Rensselaer Home Telephone Company operating at Rensselaer; the Schenectady Home Telephone Company, Schenectady; the Citizens Standard Telephone Company operating at Kingston and vicinity; the Dutchess County Telephone Company, Poughkeepsie; and the Independent Union Telephone Company, the toll line system connecting these plants. The total number of telephones involved is approximately 25,000, and several hundred miles of toll line. The price paid is in the neighborhood of $3,000,000.

Telephone Pioneers of America.

FRANK B. COOK.

It is seldom that we find a man who possesses in any marked degree the inventive genius and also a faculty for business; but in the well-known inventor, Mr. Frank B. Cook, we have that rare combination in the electrical field of a prolific inventor and a successful business man, one who has made a financial success manufacturing his own inventions.

Like many other telephone men he started his electrical career in the telegraph field, beginning

F. B. COOK, OF CHICAGO, ILL.

in 1876 as a line constructor and fitting up and wiring telegraph offices. He began his telephone career in 1878, setting up and testing telephone lines for Mr. William Kline, superintendent of telegraph of the Lake Shore and Michigan Southern Railway Company at Toledo, Ohio. He settled down to regular telephone work on June 15, 1879, in the employ of the Toledo Telephone Exchange Company, Toledo, Ohio, which company was later absorbed by the Central Union (Bell) Telephone Company.

Starting as foreman of construction he successively filled various positions until he became chief engineer having charge of all equipment and apparatus as well as construction work in a territory comprising some two hundred exchanges and distributed over the States of Ohio, Indiana, Illinois and Iowa.

In September, 1896, Mr. Cook resigned his position with the Central Union Telephone Company and moved to Chicago to engage in the manufacture of telephone apparatus for independent telephone companies, the apparatus manufactured being almost entirely of Mr. Cook's personal patents; he having invented some hundreds of devices, apparatus and circuits, many of which resulted in patents. But while his inventions are many and varied they hold closely to telephone protective apparatus, his protectors being used throughout the world.

To Mr. Cook alone with his untiring and indomitable energy is due the success of the large business which he personally owns; for, he started without capital and, in addition, has carried on the work without the assistance of outside capital.

Early Days of the Telephone in Albany.

In the early part of 1877 the first telephone line in Albany, says Mr. W. B. Eddy, of that city, was strung from the office of the Atlantic and Pacific Telegraph Company to Mr. Charles Sewall's house in Bath on the Hudson. In 1878 the first toll call was passed from the office of the Atlantic and Pacific Telegraph Company to S. K. Rupley at Poughkeepsie. Early in the same year the American District Telegraph Company, which had been furnishing Albanians messenger service, procured Bell instruments, with a franchise giving it the right to operate in thirteen counties comprising most of what is now the Hudson District, and formed the first telephone company. It opened the first exchange at No. 470 Broadway.

The first "Opposition" was begun in 1879 by the Commercial Telephone Company which used the Edison instruments and was under the direction of the Western Union Telegraph Company. The Commercial people opened an exchange at No. 558 Broadway in the American Express Building and conducted such a lively campaign against the American District Telegraph & Telephone Company that in 1880 the two consolidated. This was the only case in the United States where an opposition or Edison company absorbed the Bell interests. The Commercial Company, with A. B. Uline as manager, removed four hundred duplicate telephones and established the main office at 470 Broadway with branches on Washington Avenue and on South Pearl Street. It sublet the Hudson territory to different independent companies and did business in Albany with indifferent success until 1883 when it was taken over by the Bell people and became a part of the Hudson River Telephone Company.

Mr. Vail and Old Farmer Lawton.—While Mr. Theo. N. Vail was in Denver, Col., recently, he was met by "Old Farmer Lawton," the well-known old timer, who is an old friend of Mr. Vail. On his departure from the city Mr. Vail presented Mr. Lawton with a copy of "The History of the Telephone," in which Mr. Vail wrote: "To old farmer Lawton, from another old farmer, Theo. N. Vail."

Mr. W. H. Stansell, manager of the Postal Telegraph-Cable Company at Wilmington, N. C., in remitting to cover his subscription for another year, writes: "I cannot afford to miss a single number. For years I have read TELEGRAPH AND TELEPHONE AGE from cover to cover with much interest and helpfulness. The course of instruction in the elements of technical telegraphy alone, is worth many times the price of the paper."

The Postal Automatic.

BY DONALD McNICOL, NEW YORK.

In the Wheatstone system of automatic telegraphy, messages are perforated in the Morse code on paper strip. This tape is then passed through a Wheatstone transmitter which is operated by means of an electric motor. The Wheatstone transmitter is practically a high speed polechanger operated mechanically instead of by means of a key circuit and Morse operator. The preparation of the transmitting tape is accomplished by means of three-key mallet punches which may be operated by any telegrapher after a little practice. If the Wheatstone transmitter is run at slow speed the signals may be read as easily as hand sending; as the Morse is plain and beautiful. The speed over the line may be run up to two hundred words per minute depending upon the action of repeaters in circuits, the K R limitations of the line and the rapidity with which the polar relay will work satisfactorily. At the receiving end the signals are copied on a moving strip of tape by a Wheatstone recorder similar in construction to our call circuit registers; but of course capable of infinitely greater speed and more accurate reproduction. The received tape is then passed to copyists who understand the Morse code and who copy the message on the regular telegraph form by means of typewriters. Messages received by wire at any office for relaying to points beyond may be copied as above stated or the received tape may be passed to a Morse operator who transmits by hand directly from the received tape. If the message is to be forwarded from the relay office by automatic, the received tape must be translated and typewritten and then the message repunched on transmitting Wheatstone tape and sent over the line at high speed.

The Postal automatic system is identical with the Wheatstone in so far as concerns the preparation of the transmitting tape and the transmission of the signals from sending end, but the reception of the high speed signals is accomplished in an entirely different manner. The Morse signals are received by an electro-magnetic punch, or reperforator, which, instead of marking the dots and dashes of the letters on the receiving tape with ink as in the Wheatstone system, perforates the characters in a continuously moving strip of paper tape so that the received tape resembles the transmitting tape inasmuch as the Morse signals appear thereon in a series of perforations. The improvement in this method as compared with Wheatstone recorder reception is that the received tape may be passed through a local reproducer and the messages copied by ear from an ordinary sounder. These reproducers are motor-driven and are under the control of the reproducing operator so that the speed of reproduction may be regulated to accord with the ability of the operator to copy. At his convenience the tape may be stopped, pulled back and run through again in order to confirm doubtful words, so that in practice the reproducing operator is copying from a sender over whom he has absolute control in the matter of speed and of repetition. Moreover, with this system messages received at relay offices for points beyond which are equipped with automatic apparatus, may be relayed automatically, simply by passing the received tape through an automatic transmitter similar to the reproducer. In this case the reproducer operates the regular duplex polechanger in the same way as it operates the sounder for local reproduction.

The accompanying diagram shows the wiring of the reperforator circuits. Information regarding the construction of and operation of Wheatstone sending tape perforators and transmitters applies equally to this system.

The operation of the receiving punch (or reperforator) is shown theoretically in the illustration. It will be observed that the main line polar relay instead of operating a reading sounder as is customary in ordinary duplex work, operates

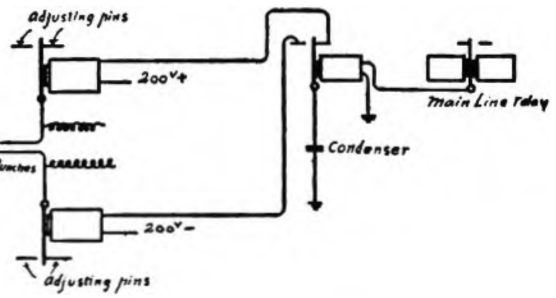

DIAGRAM OF AUTOMATIC PERFORATOR.

an extra polechanger the armature of which is grounded through a condenser. Two pair of magnets in the punch have circuits leading through their windings from a two-hundred-volt battery of each polarity. These magnets control the movements of two armatures which on their free ends are equipped with steel punches about $\frac{1}{16}$ of an inch in diameter and one inch long which, when the magnets are energized, travel through holes in a die plate and perforate holes in a strip of tape which is being drawn through a slot and past the holes in the die plate. The tape is moved continuously by means of a tape transmission and take-up gear operated by an electric motor the speed of which is regulated by a rheostat. A closed key or marking current from the distant station closes the home polar relay which in turn closes the polechanger shown, thus permitting the condenser to discharge and momentarily energize one pair of magnets. This magnetization draws the armature toward the electro-magnet thus forcing a punch through the paper strip. As the distant key opens and a spacing current is sent to line the home main line polar relay opens, thus opening the extra polechanger local circuit which permits the retractile spring of the same to pull its armature into contact with the back stop thus allowing the opposite battery pole momentarily to energize the other magnet of the punch, forcing the other steel punch through the moving band of paper tape. The resultant holes appearing in the tape form the Morse characters. The punches should be adjusted to travel forward just far enough to go through the paper and make a clean round hole, and backward just far enough to clear the face of the die plate. In view of the fact that the tape is continuously passing through a slot in front of the punches, the act of punching the holes must be accomplished by extremely rapid movement of the steel punches so that there will be no tendency to tear the tape. The speed at which these punches move forward and backward in response to the operation of the extra polechanger is regulated by having the capacity of the two 3 m. f. condensers just right and by adjusting the tension of the strong retractile spring attached to the armature lever of the punch so that when the punches are travelling the required distance to and fro, the action is very rapid and not "draggy."

It is evident that the tape being perforated is stopped each time that either the upper or lower punch is in the act of perforating a hole and as each punch is operated many times per second it is necessary so to adjust the tape-moving mechanism that these momentary stoppages are compensated for by "slip" in that part of the gear which pulls the tape through the slot.

The instruments have been designed to do this satisfactorily and it has been found that attendants can, with little practice, learn the correct adjustment. The present method of taking care of the received tape coming from the reperforator is the same as that used in caring for the original transmission tape as turned out by the Wheatstone perforator; that is, by rolling it up by hand as it comes from the receiver.

The receiver when in operation requires constant attention and it is quite convenient to take care of the received tape in the manner referred to. The received tape may be parceled out in units of one message, two messages or in any number required by traffic conditions, as the receiver attendant very quickly learns to read the tape and is able to follow the wording as perforated thereon. The end of each message is signified by a paragraph sign (----) or by a succession of letters (a) without spaces between them.

The code used is the Morse alphabet except that the letter L is changed from long dash (—) to one dot and three dashes (. ---). The received tape is passed to the reproducing operators in whatever size bundles the traffic demands and by them is run through local reproducing machines at a speed to suit the convenience of the operator. The operation of the reproducers is quite simple and may be learned by any operator in an hour or two.

Report of Old Timers' Reunion.

The printed volume of proceedings of the Atlantic City reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, September 5, 6 and 7, has been distributed among the members. It contains 120 pages including many illustrations and is printed on fine coated paper the work having been done by the James Kempster Printing Company, New York.

Considerable taste is displayed in the get-up of this volume, and it will form a very attractive addition to its predecessors. The design of the front cover is very neat, and on the back cover is an embossed reproduction of the badge used at the reunion which is artistically executed.

Among the many illustrations are several Atlantic City views, and one of the bronze tablet for the Turner monument, also the bronze tablet of the United States Military Telegraph Corps unveiled at Pittsburgh, Pa., April 1 last. The frontispiece consists of an excellent picture of Col. W. B. Wilson, president of the Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps, Holmesburg, Philadelphia, Pa. Mr. David Homer Bates, the secretary of the Society of the U. S. Military Telegraph Corps, who has done so much active work in its behalf, is also represented among the many pictures.

The book was gotten up by Mr. F. J. Scherrer, secretary of the Old Time Telegraphers' and Historical Association and reflects great credit upon his taste and judgment.

Speed of a Telegraphic Cable Message.—Mr. J. Rymer-Jones, of the Silvertown Telegraph Works, London, England, has issued a pamphlet describing his method of calculating the speed of a telegraphic message received through a submarine cable, using either the syphon recorder or Morse signals in international, American or other alphabets. It is highly analytical in character and a valuable addition to the subject. The working value of a cable is estimated by the number of words which can be sent through it per minute, of such legibility that an ordinarily skilled operator can readily decipher them, and the specification, therefore, generally provides for a suitable weight of conductor and insulator to convey so many standard words of five, seven, or ten letters per minute.

The determination of the speed of cables therefore is of the highest importance, and this excellent pamphlet gives a great wealth of detail as to how this can best be done. The pamphlet contains various charts and diagrams explanatory of the text. The price of this pamphlet is $2.00 per copy. Copies may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Mr. W. C. Hirchert, manager of the Erie Railway interests at Salamanca, N. Y., writes: "I certainly want to keep in touch with the good things like TELEGRAPH AND TELEPHONE AGE as long as I can afford it." Mr. Hirchert has been a subscriber to this paper for twenty-five years.

The Railroad.

Mr. A. R. Kendall, train dispatcher for the Boston & Maine Railroad at Concord, N. H., has resigned to go into the insurance business. He is succeeded by Mr. Frank L. Ward of the chief train dispatcher's office at Boston.

Mr. Charles McDonald, station agent for the Boston & Maine Railroad at Hudson, Mass., has accepted the position of chief train dispatcher and train master of a railroad in Porto Rico.

The Union Station at White River Junction, Vt., in which the Western Union Telegraph office was located, was recently destroyed by fire. This was one of the largest relay offices north of Boston. Mr. Morris Walsh is the manager of the office.

Violating the Nine-hour Law.—The Cleveland, Cincinnati, St. Louis & Chicago Railroad Company has been adjudged guilty of violating the law fixing the working hours of railroad telegraphers at nine hours out of twenty-four. United States Judge Hollister rendered a decision to this effect at Columbus, Ohio, on December 12.

No Wireless Tests on Pennsylvania Railroad.—Newspaper reports were recently published to the effect that the Pennsylvania Railroad Company had been making tests of a wireless telegraph system on its line between Harrisburg and Altoona. Mr. J. C. Johnson, superintendent of telegraph of this road, states that there is no truth in the reports, that no such tests have been made by his company.

Telephone Train Dispatching.—The Chesapeake & Ohio Railway, Mr. C. W. Bradley, superintendent of telegraph, which has had for some time more than 200 Gill selectors in service in telephone train dispatching has now ordered from the United States Electric Company of New York, fifty-two additional selectors for a farther extension of its circuits. The Central Vermont Railway, Mr. M. Magiff, superintendent of telegraph, also a user of Gill selectors, has recently received thirty-one additional selective station outfits from the United States Electric Company, with automatic sending keys for the dispatcher's station. Another repeat order for Gill selector equipment recently delivered was from the New Iberia & Northern Railroad, in extension of its circuits.

The Turner Monument Fund.

The bronze tablet for the Turner Monument, which is to be unveiled at Harriman (Turner), N. Y., next spring, has been placed on exhibition in the window of the Gorham Manufacturing Company's New York establishment at the corner of Fifth Avenue and Thirty-sixth Street. An opportunity for several weeks will thus be afforded for the inspection of this excellent piece of bronze work before it is affixed to the face of the monument. Subscriptions toward the fund created to defray the cost of the monument, etc., are still coming in through the efforts of committeeman Mr. David Homer Bates, and many railroad presidents are now subscribing ten dollars each.

The contributions received up to date toward the monument fund are as follows: Previously acknowledged, $1,726.99; J. E. Childs, New York, $10; W. C. Humstone, New York, $10; E. W. McKenna, Chicago, Ill., $10; W. F. Weithrec, Denver, Col., $10; John J. Ghegan, New York, $10. Total, $1,776.99.

Close of Our Subscription Contest.

It is with great pleasure that we express our appreciation of the extraordinary efforts put forth by some of our agents in the subscription contest, and our only regret is that all of them could not win the prizes. The interest taken in the matter by every one concerned was considerable, and those who failed to win a prize have the satisfaction of knowing that they fought in a noble cause.

The contestants were kept posted each week as to their standing and according to the conditions the competition closed at 3 p. m., December 21, and checks were mailed to the winners of the prizes on the same afternoon. The successful contestants were:

First prize, $50. Won by Mr. B. I. Gable, of the Western Union Telegraph Company, Pittsburg, Pa., amount of subscriptions, $150; second prize, $25, Mr. E. C. Dodge, Western Union, Chicago, subscriptions, $126.13. As Mr. H. H. Dengler, of the Postal Company, Chicago, sent in business to the amount of $125.27, and was so close to Mr. Dodge's record, we decided to make his third prize equal in amount to that awarded to Mr. Dodge, viz.: $25. Fourth prize, $5, to Mr. W. W. Umsted, of the Western Union Company, Omaha, Neb., amount of business, $96.75; fifth prize, $5, to Mr. C. W. Alexander, Western Union company, Kansas City, Mo., amount of business, $48. As Mr. C. F. Bartlett, of the Postal company, St. Louis, Mo., sent in business to the amount of $47.80, we decided, on account of his being so close to Mr. Alexander's record, to award to him a sixth prize, $5.

Artificial Rubber.

Artificial rubber is said to have been produced from soja oil by two German chemists. This oil is prepared from the soja bean which is grown in China and has many valuable qualities. To obtain the artificial rubber, the oil is mixed with half its weight of nitric acid so as to give an emulsion, and this is heated to the boiling point of water. At the end of the heating there is produced a very uniform spongy mass. This is washed with water and then dissolved in five per cent ammonia, from which it is precipitated by a dilute acid. The precipitate is then washed, pressed and dried at fifty degrees centigrade. The result of these operations is an elastic substance resembling rubber and it is claimed that it can be vulcanized in the same way as natural rubber.

The Reid Monument.

The proposition to establish a fund for the erection of a monument over the grave of the late James D. Reid at Rochester, N. Y., is meeting with favor and matters are gradually assuming shape.

As announced in our issue for December 16 representatives of two telegraph societies have been named to appear for their respective organizations on the general committee which it is proposed to form for the purpose of carrying the work forward. Since that announcement another society has appointed delegates, viz.: the Postal Club of Atlanta, Ga., which will be represented by Messrs. G. H. Usher and W. C. Daviet.

The present stone on the grave is a plain flat slab, which lies horizontally. On it are engraved the words: "In Loving Memory of James Douglas Reid. Born in Edinburgh, Scotland, Mar. 22, 1819. Died in New York, April 28, 1901.

"He Giveth His Beloveth Sleep.
"Also in Memory of His Wife Nancy Elton Reid
Joined Her Husband Oct. 17, 1907.
"Life Is Eternal."

President C. P. Bruch of the Magnetic Club, New York, who originated the proposition, has invited the following telegraph organizations to co-operate in the movement to raise the necessary funds and erect a suitable memorial: Telegraphers' Mutual Benefit Association, Serial Building Loan and Savings Institution, Old Time Telegraphers and Historical Association, Society of the United States Military Telegraph Corps, New York Telegraphers' Aid Society, Gold and Stock Life Insurance Association, The Morse Club, New York, Association of Railway Telegraph Superintendents, Magnetic Club of Atlanta, Ga.

Representatives of the three societies so far appointed are: Society of the United States Military Telegraph Corps, D. H. Bates and C. A. Tinker; New York Telegraphers' Aid Society, T. M. Brennan and R. J. Marrin; Postal Club of Atlanta, G. H. Usher and W. C. Daviet.

When the remaining societies have appointed two of their members to represent them on the general committee a meeting of that body will be held to organize and arrange for the work.

U. S. Military Telegraph Pension Measure.

Mr. John Horn, retired, formerly of New York, and now a resident of Longueuil, Quebec, in a letter to Secretary David Homer Bates of the Society of the United States Military Telegraph Corps, on the subject of military telegrapher's pensions, writes:

"Referring to your campaign to secure pension rights for the survivors of the United States Military Telegraph Corps, so long unpatriotically delayed, as an old time telegrapher resident in the United States during the civil war, I know of their modest but heroic services; and the fact that some were Canadians whom I knew personally, including J. W. Pitfield of Nova Scotia, Frank Drummond of Quebec, Ed. Conway of Montreal, also A. J. Bosquet, and others long since deceased, makes me feel interested, and I sincerely hope that Congress at its present session will do full justice. That grand old man, of whom I never tire thinking, President Lincoln, spent much of the last four years of his life at the side of the telegraph operators in the War Department. Had he lived he would not have countenanced such gross injustice to these youthful telegraphers."

Mr. Bates states that telegraph operators all over the country will confer a great favor on their old military telegraph comrades by circulating petitions addressed to their congressmen asking for immediate favorable action on the Taylor bill now in the invalid pensions committee of the House of Representatives, as an act of long-delayed justice to the military telegraph operators, only about 200 of whom are now living, who served in the civil war. A considerable percentage of the membership of the corps were captured by the enemy and languished in confederate prisons for months, many of them dying there.

Operators who circulate these petitions are requested to have them signed by as many persons as possible and mail them direct to Congress before February 1. The bill is known as "Bill H. R. 2920. Granting pensions to military telegraphers."

President Col. William Bender Wilson, of the Society of the United States Military Telegraph Corps, suggests that every telegraph office throughout the country might be made a centre for the circulation of petitions to the Senate and House of Representatives to take favorable action on the Taylor measure, the petitions to be forwarded direct to Washington before February 1. The campaign to secure pension rights for the members of the United States Military Telegraph Corps is under the management of Mr. A. A. Zion, of Indianapolis, Ind., and is making great progress. It is nation wide, reaching to all influential sources, and the early reports coming in point to success.

North American Telegraph Co. Building New Lines.—The North American Telegraph Company is stringing eight additional wires on the new line of the Chicago division of the Milwaukee, St. Paul & Sault Ste. Marie Railroad, between St. Paul and Minneapolis.

Bound Volumes of the Age for 1911.—Orders for bound volumes of TELEGRAPH AND TELEPHONE AGE for 1911 will now be received. The price per volume will be $3.50, charges collect. This volume is of special value and interest to telegraph and telephone men as it contains a complete record of the important happenings in one of the most eventful years in the history of the telegraph and the telephone.

New Book on Telephony.

A new book entitled "Modern American Telephony in All Its Branches," edited by Arthur Bessey Smith, is now ready for delivery. It contains over 800 pages and nearly 600 illustrations, and is the most complete and up-to-date work on the subject. The price is $2.00 per copy. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

New Building in Toronto for Canadian Pacific Railway.

The accompanying illustration is of the new office building now being erected at the corner of King and Yonge streets in Toronto, Ont., by the Canadian Pacific Railway Company for the accommodation of the various departments.

The new building will be sixteen stories high and fireproof throughout with a skeleton of steel girders and columns re-inforced with concrete. On the corner there will be a double entrance so arranged that it will give a diagonal passage between the two streets. It is expected that the building will be ready for occupation in about a year.

The railway ticket office, the steamship ticket office, the commercial telegraph receiving office and the Dominion Express office will occupy most of the ground floor. The fourteenth and fifteenth floors will be occupied by the commercial telegraph department.

The receiving office of the latter department will be open to the public at all hours. The fourteenth floor will be occupied by the superintendent and staff, and by the bookkeeping department, the operating room occupying the whole of the fifteenth floor, which, when completed, will be fully up to date in every particular in matter of equipment, facilities, and comfort of the operating staff.

Following is a list of the telegraph staff:

Superintendent's office — William Marshall, superintendent; F. C. Roberston, inspector; E. A. Speer, superintendent of construction; P. G. Galbraith, chief clerk; A. J. Mason, accountant; C. W. Maltby, stenographer.

Local manager's office — H. A. Shambrook, local manager; G. A. C. Phillips, chief clerk; W. C. T. Dobson, cashier; G. Paton, accountant; W. A. Ezard, chief day delivery clerk; M. Hart, night delivery clerk.

The staff of clerks in the receiving and delivery department number some thirty-five in all and the messenger staff numbers from sixty-five to seventy-five.

Operating department—H. J. Lillie, chief operator; J. D. Smith, assistant chief operator; E. McSweeny, night chief; M. J. Bayley, wire chief; C. T. Barber, traffic chief; J. R. Christie, all-night chief; C. W. MacDonald and W. Smith, assistant night chiefs; J. Clandinan, loop chief.

In addition to these there are eighty-one regular operators and ten check clerks on the staff.

Direct wires are worked with Montreal, Winnipeg, New York, Chicago, Buffalo, Detroit, Cobalt, Porcupine and many other cities and towns. The company also maintains telegraph branches at Toronto on the floors of the Toronto Stock Exchange, the Standard and Dominion Mining Exchanges, and the Grain Exchanges, furnishing direct wires thereto.

Interesting Telephone Exhibit at Kansas City.

The Bell Telephone Company made an interesting exhibit at the National Business Show held at Kansas City, November 20 to 25. It faced the entrance to the hall and on entering it presented the effect of a stage setting. The scene depicted was one of hauling telephone poles out of the northern pineries during winter. The forest, as well as the figures shown, was life size and stood out in bold relief, and with concealed lights in the rear, made a very attractive scene. This display occupied a space fifty-three feet in width, twenty-five feet high and a depth of twelve feet, being elevated eight feet above the main floor.

The main floor space, in which a switchboard was located connecting the various business displays, also a number of desk telephones to which the public had free access, was enclosed by a fence of white enameled cross arms supported by insulators. The telephone poles used were also enameled and supported standard cable and copper wires.

Mr. Val B. Mintun, Kansas City manager of the Missouri and Kansas Telephone Company, under whose direction the display was arranged, received many favorable comments from the visitors who attended the exhibition.

Dispensing With the Repeating Sounder.

Mr. D. B. Grandy of the American Telephone and Telegraph Company, St. Louis, Mo., referring to the working of quadruplexes without the use of repeating sounders, states that "from the numerous articles on the subject, it might be inferred that working a quadruplex without a repeating sounder on the neutral side, by reversing the transmitter points, were something new. As a matter of fact it has been done frequently on circuits of moderate length.

"When I left Boston in 1880," he continues, "the Boston-New York quadruplex had been worked that way for several years."

The Relief Fund of the New York Telegraphers' Aid Society.

BY R. J. MARRIN, PRESIDENT.

The recent entertainment and reception of the New York Telegraphers' Aid Society, was a brilliant success and it was a pleasure to see such large numbers in attendance. This speaks volumes for the support the society is receiving from the rank and file; also from the officials of the two leading telegraph companies.

The expenses involved in such an undertaking is very large for one evening's performance. Notwithstanding the fact that the affair is conducted in behalf of charity, everything must be paid for in cash. This year the disbursements amounted to $686.42, but it is a satisfaction to know, that, when the curtain went up, the financial officers were able to meet all obligations from the receipts that had been received. In connection with the income we are pleased to mention that president Theo. N. Vail, of the Western Union Telegraph Company, and president C. H. Mackay, of the Postal Telegraph-Cable Company, make substantial contributions each year to the relief fund and their welcome donations are of great assistance. The society through its officers, besides expressing their gratitude in the customary manner, reserves two choice private boxes which are at the disposal of the contributors.

Volumes could be written of the aid that has been extended through the medium of the New York Telegraphers' Aid Society. The work is carried on so quietly, yet, systematically that little is heard of this feature outside of the executive committee meetings, when chairman Edwin F. Howell, makes full statements of all disbursements of the relief fund and the matter is then thoroughly discussed.

In glancing over the books for a period of less than two years, some significant items appear. The burial of two poor telegraphers, and paying in part of the funeral bill of two others, relieving the distress of one hundred and twenty-two persons, securing the services of clergymen for burial services; arranging and conducting funerals, physicians' and nurses' services, buying medicine and necessaries for the sick room, invalid chairs, paying premiums on life insurance policies, visiting the insane in institutions, assisting invalids with transportation, and performing many services with more than a monetary value, for instance visiting the sick and looking after the dead. The good that this society is doing is not generally realized, but from what has been just stated some idea may be had of the labor of love for their unfortunate fellow-operators which the officers of the society are called upon to perform.

T. M. B. A. Assessment.—Assessment 533 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of G. H. Frech at Red Bank, N. J.; W. V. Connell at Mayhew, Miss.; Olive L. Wood at San Diego, Cal.; H. W. Gillespie at Winthrop, Mass. and J. J. Kennedy at New York.

LETTERS FROM OUR AGENTS.

New York Western Union.

A. E. Hynds has resigned his position with the Commercial News Department, and is now working the private wire for The Corn Products Refining Company, New York.

Herbert H. Akers, also formerly with the Commercial News Department, is now located at Nashville, Tenn.

Philadelphia, Postal.

Mr. J. J. Whallen, manager of the New York office, was a recent visitor on business connected with the company. J. J. O'Neill, chief clerk to Mr. C. E. Bagley, district superintendent, has resigned to go with the Standard Underground Cable Company. Mr. Wm. V. Madden has been appointed to succeed Mr. O'Neill. Mr. James O'Neill, night receiving clerk, has resigned to go with the government in the Postoffice department at Washington. A new office has been opened at sixty-first Street and Woodland Avenue, and is in charge of Mr. William Greene, formerly of this office. Mr. C. Troeller has been appointed manager of the Atlantic City, N. J., office, vice Mr. W. M. Phillips, resigned.

PHILADELPHIA WESTERN UNION.

John C. McCarthy, for many years service clerk in this office, died on December 15.

Mr. Horace A. Shinn has just rounded out his fortieth consecutive year in this office and is hearty and well. He has charge of the Philadelphia baseball park during the Summer months.

Mr. C. B. Wood has recovered from his illness which lasted four months, and is again back at the office looking well.

Quite a few of the operators have taken advantage of the slight falling off in business to avail themselves of the opportunity and have gone to Jacksonville, Atlanta and other Southern points.

PITTSBURG, WESTERN UNION:

Theodore E. Moreland, repeater chief in this office, and a veteran military telegrapher, who has undergone a painful operation to save his right arm, is convalescing and expects to resume his duties in the repeating department in a few days.

Wm. J. Gilson, aged 59 years, repeater chief in this office, died December 13. Mr. Gilson was in the company's employ in this city since 1872.

RENO, NEV., WESTERN UNION.

Ever since the Comstock days, when fortunes were made and lost almost daily, Reno, Nev., has been an important relay office for both overland and local circuits terminating at San Francisco. Little is known of Reno in a telegraph way, although it is telegraphically historic. At the time of the Fitzsimmons-Corbett pugilistic contest at Carson, Nev., in the early '90s, something like 680,000 words of press matter passed through the Western Union office at Reno during the twenty-four hours on the day of the fight. With the limited facilities at this early date this was quite a task. Almost as much press matter was successfully handled from the Reno office at the time of the Jeffries-Johnson contest in July, 1910.

Repeatered at the Reno office at the present day are found such circuits as the San Francisco-New York, San Francisco-Chicago, Wheatstone and Morse duplexes, San Francisco-Denver, San Francisco-Salt Lake printer, several leased circuits and wires penetrating the rich gold fields of Nevada.

The office is ably handled by Mr. E. D. Edwards, chief operator, assisted by Messrs. E. P. Hearn, O. L. Holloway and W. C. McCormick. Mr. G. L. Morgan handles the commercial end, and the Western Union office is one of the attractions of the city's business section.

Mr. Edwards is an expert electrician and is liberal with his electrical knowledge, to the extent that he is willing to spend his leisure time in imparting to his employes the knowledge he has gained through years of study and experience with electricity and electrical apparatus. Mr. Edwards holds a weekly class in electricity for the benefit of his employes and, while they are at present only in the primary stages, they are making good progress.

A certificate of membership in the Telegrapher's Mutual Benefit Association, 195 Broadway, New York, affording protection for the family and dependents in the amounts 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.

An Interesting Letter.—Mr. A. L. Suesman, of Oak Bluffs, Mass., has facsimiles of an interesting letter from General Thomas T. Eckert to Fred Catlin. A copy may be obtained by sending four cents in stamps to Mr. Suesman.

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. 2. NEW YORK, JANUARY 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The New Telephone Jack Switchboard.

PART I.

What we may say concerning telephone jacks and the new type of Morse switchboard is intended particularly for the information of Morse operators, especially wire chiefs and those who may be called upon to handle such apparatus after the old springjack and strap-bar type of switchboard has been discarded and the new standard equipment introduced. Already several of our large offices have begun modernizing, and it will not be long before others will follow, hence it is well to look ahead.

Incidentally now is a good time for ambitious operators to place themselves in a state of preparedness for promotion by becoming more or less familiar with the new arrangement. If they do this they will start almost even with every one else, for even the wire chiefs will have to study the situation as something entirely new; not that it is harder, but because the change is radical. As there is considerable curiosity displayed on the part of many concerning the construction and operation of the new switchboard, we will give a brief description of it for their information.

In the first place, there are no wedges, pegs, discs or vertical brass bars in any part of the board. Instead, the face of the board is filled with telephone jacks mounted in porcelain panels, each of which, about 8 inches by 5¼ inches in dimensions, has a capacity for sixteen jacks. Ten of these panels placed side by side in one section provides 160 jacks. This does not mean that 160 wires can be placed in one section, since each wire must be equipped with several jacks in series, as will be shown later, in order to patch, test and cut in loops, and other apparatus. As the main wires are placed side by side in horizontal rows, it is evident that forty is about the limit for one section. The jacks used in series with the line jack are taken from the vertical row above the wire jack in different rows of similar panels.

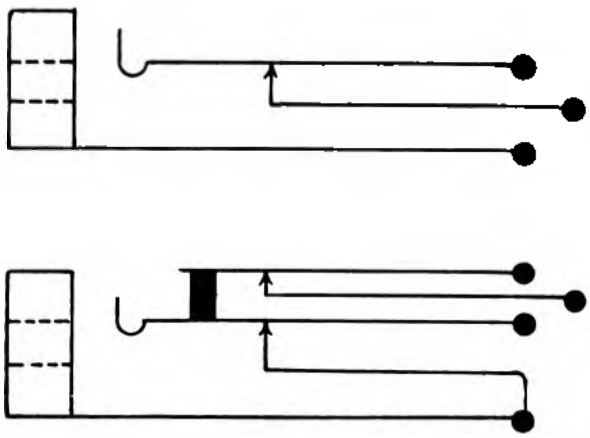
The face of the board is made up, as a rule, in the following order, although for a smaller number of circuits and requirements it may be altered if so desired. The bottom row consists of ten panels, each containing sixteen jacks in four rows; above this panel a steel bar panel about three inches wide extends horizontally across the board. This bar constitutes the mounting for the Morse signal drop. Then come three or four more rows of jack panels like that on the bottom if that many are required. If not needed, one row may be filled with blank panels. On the top face of the frame the battery lamp panels are placed. Each panel 8 inches by 5¼ inches in dimensions, contains six Edison base sockets for holding the battery resistance lamps.

Normally there is not a cord in the board except those belonging to the test sets on the shelf. When a desk, loop, or other apparatus is cut in, it is done by means of detached cords of various lengths and construction, having plugs at each end. The advantage derived by using detached cords is that the method minimizes the number occupying space; the day man is not encumbered by the cords for night or idle apparatus, nor is the night man by the day connections.

Telephone jacks are superior to springjacks in many ways; they are not so liable to become defective, for one thing, and they are particularly adapted for preventing mistakes. For instance, it will be impossible for any one to reverse the sending and the receiving sides of a loop, as often happens when a wedge is used. The plug can only go in one way and that is the right way.

Again, the telephone jack offers a ready means of avoiding delays due to the opening of the local circuits of multiplex apparatus when a grounded loop has been removed and the operator or attendant does not promptly turn the switches. By means of jacks, specially constructed, the cutting in or off of a duplex loop makes no difference whatsoever to anyone concerned, as dummy grounds are automatically substituted for the loop removed by the operation of removal.

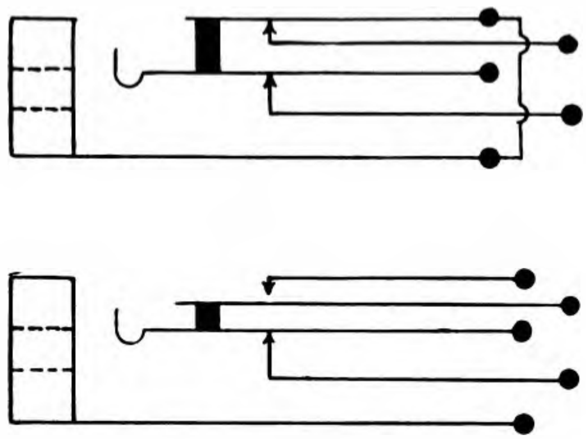
As previously stated, telephone jacks are not all constructed alike. A jack suitable for a linewire or a loop would not do for an office loop at all. Nor would either of the two mentioned be used for multiple trunk circuits. Then there is a fourth type used principally in concentration units which in like manner would not be available for any of the



FIGS. 1 AND 2.—TELEPHONE JACK SWITCHBOARD.

above circuits; hence it would be advisable to acquire an early knowledge of the construction and purpose of each type mentioned in the specification instruction papers.

The principal types used, and which will be sufficient to begin with, are: Type WE200A (Fig. 1). A two-conductor jack, with a circuit closing spring, when no plug is inserted, called the "normal con-



FIGS. 3 AND 4.—TELEPHONE JACK SWITCHBOARD.

tact." The jack has three terminal lugs. This jack will be used principally in main and loop switchboards for in- and out-circuits, such as a single wire, loop, desk, etc.

Type WE 201A (Fig. 2) is used principally in the concentrated unit system. Its purpose is to open the signal lamp circuit when the operator inserts the plug belonging to his Morse relay. It has four terminal lugs.

Type WE202A (Fig. 3) is used in connection with "office loops" for multiplex sets. It has four spring blades and four terminal lugs, two of which are each connected to a resistance unit of a value equal to that of a duplex loop, and which open or close simultaneously according to whether a loop is inserted in the jack or removed.

Type WE203A (Fig. 4) is used in multiple trunk circuits and also has four springs and four terminal lugs, but, as shown in the illustration, the springs are differently arranged.

There are a few other types used, but a study of these will show the importance of looking up the others when they are described.

In the next installment of this article we shall illustrate a number of circuits and groups of jacks that constitute the wiring and general make-up of the switchboard for practical operation.

(To be continued.)

Recent Telegraph and Telephone Patents.

ISSUED DECEMBER 19, 1911.

1,011,925. Telegraphy. To P. B. Delany, South Orange, N. J.

1,012,066. Indicator for Telephone Switching Apparatus. To H. W. Dunbar, Newark, N. J.

1,012,217. Microphone. To G. A. Nussbaum, London, England.

1,012,231. Telegraphy. To M. O. Anthony, Englewood, N. J.

1,012,456. Radio-Telephony. To G. Seibt, Berlin, Germany.

1,012,496. Wireless Receiving Electric System. To C. Wirth, Nuremberg, Germany.

ISSUED DECEMBER 26, 1911.

1,012,699. Telephone System. To A. F. Paige, Philadelphia, Pa.

1,012,793. Telephone-Service Metering System and Apparatus. To G. Babcock, Rochester, N. Y.

1,012,854. Sound Intensifier for Telephones. To W. Hoppie, Ogden, Utah.

1,012,865. Burglar and Fire Alarm and Telephone System. To A. Köhler, Chicago, Ill.

1,012,906. Telegraph Key. To G. S. Perry, Dupont, Ga.

1,012,919. Antiseptic Telephone Mouthpiece. To I. S. Rosenblatt, San Francisco, Cal.

Western Union Conference in Helena, Mont.—A conference of Western Union managers of the principal offices in Utah, Idaho and Montana was held recently in Helena, Mont. Among those present were Mr. U. G. Life, district commercial superintendent, and E. C. Labadie, district traffic superintendent, Salt Lake City, Utah, and the following managers: A. J. Knight, Salt Lake City; J. M. Carnahan, Missoula, Mont.; L. S. Wild, Butte, Mont.; W. Taylor, Helena, Mont.; G. H. Hackett, Boise, Mont. Incidentally Miss Bertha Tomlinson, secretary for superintendent Life, who made a stenographic report of the conference proceedings, was presented with a toilet set.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. Reynolds, auditor, recently visited Philadelphia, Baltimore and Washington on company business.

Mr. D. H. Gage, Jr., of the electrical engineer's department, was in Philadelphia recently on company business.

Mr. F. W. Daly, manager of the office at 1775 Broadway, New York, has resigned and is succeeded by Mr. L. Schwartz, formerly manager at 441 Broadway.

Mr. W. A. Sterner, manager at Jamestown, N. Y., gave his messenger boys a dinner at his home on New Year's day. The boys appeared in brand-new uniforms, and after the dinner were entertained with a magic lantern.

Mr. P. J. Mackin, manager of the Springfield, Mass., office was a recent executive office visitor on company business. Mr. Mackin entertained his messenger boys at his home New Year's eve, with a collation and music, each of the boys contributing something either in vocal or instrumental lines.

Mr. F. J. McKenna has been appointed manager of the Postal Telegraph Cable Company at East Liberty, Pittsburgh, Pa., vice F. L. McGowan, resigned. Mr. McKenna was for a number of years assistant to the manager and inspector for the Western Union Telegraph Company at Pittsburgh. He is a man of exceptional ability and assumes his new position with a large experience.

Mr. T. P. Wheeler, a veteran St. Louis, Mo., telegrapher, who retired from the service of the Postal Telegraph-Cable Company eight months ago has so much improved in health that he has returned to the service in the St. Louis office.

John Heyer, aged 43 years, formerly an operator at 253 Broadway, and latterly employed in a broker's office, died in Brooklyn January 5.

This company has opened an office in the Vanderbilt Hotel, corner Thirty-third street and Fourth Avenue, New York. Miss M. A. Goodwin is in charge of the office.

Magnetic Club Election.—The annual meeting of the Magnetic Club was held at 253 Broadway, New York, January 11, and the present officers were re-elected, as follows: C. P. Bruch, president; M. R. Cockey, B. M. Downs, T. L. Cuyler, Jr., E. B. Pillsbury, first, second, third and fourth vice-presidents respectively; W. B. Dunn, secretary; J. J. Cardona, treasurer.

Mr. J. F. Skirrow was elected to the board of governors in place of Mr. Isaac Smith.

Past-presidents W. J. Dealy, E. H. Johnson and W. H. Baker were elected honorary members.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of this company and of the American Telephone & Telegraph Company, was elected an honorary member of the Morse Club at the meeting of January 10.

As a result of the recent trip to Chicago of Mr. C. H. Murphy, general superintendent of time service, New York, certain changes and improvements have been made in the service in that city. Mr. F. W. Brainerd, formerly a district manager in Chicago, is now manager of the time service in the Western Division.

Mr. F. H. Lamb, special agent of this company at Los Angeles, Cal., has been transferred to San Francisco, where he will fill a like position. Mr. Lamb was formerly and for many years district superintendent at San Francisco.

H. N. Tannenbaum has been appointed assistant general purchasing agent of this company, with headquarters at New York.

Mr. R. O. Holton has been appointed manager of the Selma, Ala., office, vice R. L. Smith.

Mr. W. V. Duke, manager of the Evansville, Ind., office of this company, has been appointed special agent for the company. He has been in the employ of the Western Union Company for forty years.

Mr. B. M. Gosselin, quadruplex chief, Chicago, was a recent New York visitor on business connected with the service.

Every employe of this company received a letter signed by president Theo. N. Vail as a token of appreciation of the officers of the company of the efforts of the employes and extending the compliments of the holiday season.

Mr. W. R. Edmondson, recently appointed manager of the Jacksonville, Fla., office of this company has spent all his life in the South. He was born in Nashville, Tenn., January 9, 1883, and began his telegraphic career December 6, 1899, entering the service of the Louisville & Nashville Terminal Company in Nashville. He afterwards became district manager for the Western Union Company in the State of Mississippi, with headquarters at Jackson. The two companies named are the only ones he has held positions with.

Mr. Bailey H. Arter, whose appointment as manager of the Texarkana, Tex., Western Union office was announced in these columns December 16, 1911, was born in Cairo, Ill., April 8, 1886, and has been in the telegraph service since 1899. He has worked for both the Western Union and Postal companies at various places, also on western railroads. Mr. Arter has had considerable experience in fitting up offices and installing apparatus. He occupied a position in the Western Union St. Louis office when he received his latest appointment.

Morse Electric Club.—The annual meeting of the Morse Electric Club was held at 195 Broadway, New York, January 10, and the present officers were re-elected as follows: President, J. B. Van Every; vice-presidents, Belvidere Brooks and W. J. Dealy; secretary, Frank J. Scherrer; treasurer, R. J. Murphy; P. J. Casey and J. A. Hill, directors for three years. The regular dinner will be held at the Savoy Hotel, New York, on Saturday evening, February 17.

The Telephone.

Telephone Elections and Appointments.

Mr. Frank H. Bethell, of New York, has been elected vice-president of the New York Telephone Company and president of the Bell Telephone Company of Pennsylvania, the Delaware and Atlantic Telegraph and Telephone Company, the Diamond State Telephone Company, the Chesapeake and Potomac Telephone Company, and the Central District and Printing Telegraph Company, succeeding Mr. Union N. Bethell, who was appointed chairman of the Boards of Directors of these companies. Mr. F. H. Bethell is a vice-president of the Telephone Pioneers of America.

Mr. H. F. Thurber, vice-president of the New York Telephone Company, was elected vice-president of the same companies in the place of Mr. F. H. Bethell. Mr. Thurber resigned his position as general manager of the New York Telephone Company, which place has been filled by the promotion of Mr. J. A. Stewart, superintendent of plant. Mr. G. C. Allen succeeds Mr. Stewart as superintendent of plant.

Mr. M. H. Buehler, a telephone pioneer and for many years general manager of the Central District and Printing Telegraph Company, was appointed second vice-president and general manager of the Chesapeake and Potomac Telephone Company. His headquarters will be in Baltimore.

Mr. W. T. Gentry, president of the Southern Bell Telephone & Telegraph Company, Atlanta, Ga., was a recent New York visitor.

Mr. U. N. Bethell, president of the New York Telephone Company, New York, has the sympathy of his many friends in the telegraph and telephone fields in the death of his daughter, Marjorie, at Montclair, N. J., January 5. Miss Bethell was seventeen years of age.

Automatic Telephony in France.—The French Government has been testing an automatic telephone system at Lyons and, according to a Paris dispatch, all makers of automatic apparatus—national and foreign—will be invited to bid on the installation of an automatic service.

Automatic Telephone System Discontinued.—The use of the automatic telephone system by the Home Telephone Company exchanges in Tacoma and Bellingham, Wash., which company was recently purchased by the American Telephone and Telegraph Company, has been discontinued.

Examinations of Telephone Employes.—Examinations were held recently at the various district offices of the New England Telephone and Telegraph Company of the male employes of the commercial department on subjects pertaining to the conduct of the business. These examinations are held for the purpose of ascertaining the fitness and efficiency of the employes in dealing with the public.

New England Telephone and Telegraph Society.—At the meeting of the Boston Plant Chapter of the Telephone and Telegraph Society of New England, held January 9, the subject of discussion was "The Line Order Routine." Leaders in the discussion were Mr. F. R. Starkey, assistant division superintendent of plant, Boston and Southern Massachusetts divisions; Mr. Philip Harvey, special agent for the general superintendent of plant; Mr. George L. Call, district wire chief, Newton suburban district; Mr. Charles F. Barker, district foreman, Somerville suburban district.

Advertising by Telephone.—The distribution of advertising hand-bills having been prohibited in Paris enterprising canvassers are turning to the telephone to stimulate their trade. They call up some one and inform him or her that the best place in Paris to buy shoes, or whatever may be the article offered for sale, is so-and-so's establishment on such a street. The Parisians are greatly annoyed and disgusted.

Free Instruction in Telegraphy for Telephone Employes.—Any employe of the Bell Telephone Company of Pennsylvania and Associated Companies, who so desires, may receive free instruction in telegraphy at any of the Western Union Company's telegraph schools. These schools are now maintained at Philadelphia, Baltimore and Washington, and one in Pittsburgh is planned; but employes of the telephone company may obtain the same course of instruction by applying to any of the managers of the Western Union's independent offices.

Telephone Pioneers.

The following corresponding secretaries for the Telephone Pioneers of America have been appointed by Secretary H. W. Pope, New York: Mr. Wm. J. Maiden of the Chicago Telephone Company, Chicago, for the Central Group telephone companies; Mr. H. W. Ballard, Denver, Col., for the Mountain States Telephone Companies' territory, and Mr. Geo. W. Foster, Dallas, Tex., for the Southwestern Telephone Company territory.

Personal.

Among the honors conferred by King George of England on the occasion of his visit to India was that of M. V. O. (fourth class) upon Mr. Ivor C. Thomas, director of the Indian government telegraph department.

Mr. Donald Murray, of London, England, inventor of the Murray printing telegraph systems, was married in New York to Miss Patricia Cosgrave on January 5. Mr. Murray's many friends extend their heartiest congratulations. He is in the United States on business in connection with his inventions.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange January 10:

Amer. Telep. and Teleg. Co.	138½
Mackay Companies	78
" " pfd.	69
Western Union Tel. Co.	80½

Reductions in Cable Rates.

Following is a copy of a circular issued by the Commercial Cable Company signed by Mr. Geo. G. Ward, vice-president and general manager, announcing an important reduction of the Atlantic cable rate.

"(1) On and after January 1, 1912, the company will transmit, subject to the conditions of acceptance, messages written in plain language at a reduction of fifty per cent. from the charges for an ordinary message.

"(2) The message must be written in French or in the language of the country of origin or in the language of the country of destination. The sender must declare which of these languages is used. The sender must write before the address, and pay the charge on one word, for the letters LCF, LCO or LCD according to his declaration. This is a European government stipulation.

"(3) The message must have an address and a text. A signature is optional with the sender but the company will not be able to make unpaid enquiries about the senders of unsigned messages.

"(4) The address may be a cable address. House and street numbers may be expressed in figures.

"(5) The text must be written entirely in plain language without figures, commercial marks, groups of letters, abbreviations or mutilations. Numbers, except in the address, must be written in words. Genuine words spelled according to established usage, with not more than fifteen letters, will be charged as single words.

"(6) Messages written in the manner prescribed will be counted and charged according to the international regulations.

"(7) The messages will not be subject to artificial delay in transmission or delivery. Their transmission will only be delayed until ranking messages have been despatched and not more than twenty-four hours.

"Until further notice, only messages for Great Britain and Ireland can be transmitted at the reduced rate but we hope to announce extensions to other countries shortly."

The following announcements were made on December 28, 1911, by the Commercial Cable and Postal Telegraph-Cable Companies and the German Atlantic Cable Company with reference to cable rates to France and Germany:

"On and after January 1, 1912 (subject to the conditions prescribed in a recent circular for messages to Great Britain and Ireland) messages written in plain language of the country of origin or of destination (English or French), without figures, commercial marks, groups of letters, abbreviations, mutilations or combinations will be accepted for transmission to France at one-half the ordinary charges.

"On and after January 1, 1912 (subject to the conditions prescribed in a recent circular for messages to Great Britain and Ireland) messages written in plain language of the country of origin or of destination or in French, without figures, commercial marks, groups of letters, abbreviations, mutilations or combinations will be accepted for transmission to Germany at one-half the ordinary charges."

Postmaster-General Samuel of England, on December 30, 1911, announced that in addition to the deferred cable services between the United States and Great Britain, recently introduced, other European countries have come into the agreement. Germany, France, including Algeria, and Portugal announced their assent to the deferred service system. Messages from the United States and Canada may be sent to these countries at one-half the present rates, subject to the priority in transmission of the fast full rate messages.

A large number of British Colonial points are included in this reduction. They include Sierra Leone, Southern Rhodesia, Aden in Arabia, Ascension Island, Bathurst in British Africa, British North Borneo, Ceylon, Cocos Island, Cyprus, East Africa, Uganda, Gold Coast, India, Burma, Labuan Island, Northern Nigeria, Southern Nigeria, Perim Island, St. Helena, Somaliland, South African Union, Straits Settlements, Malay States and Zanzibar.

The Cable.

Mr. B. H. Reynolds, superintendent of the Central & South American Telegraph Company, New York, has the sympathy of his many friends in the death of his mother.

Cable for Mexican Telegraph Company.—The steamer "Iona" arrived at New York recently with 28½ miles of cable of the intermediate type for the Mexican Telegraph Company. This cable was manufactured by the India Rubber, Gutta Percha and Telegraph Works, London, England, and is for use in repairs to cables of the Mexican company in the Atlantic ocean and Gulf of Mexico. The cable was transferred into the tanks of the company's steamer "Relay" at New York, and the "Relay" cleared for the Gulf of Mexico on January 4 to effect some cable repairs.

Milwaukee Messengers.—The messenger boys of the Western Union Telegraph Company at Milwaukee, Wis., are given free instruction in telegraphy by a competent teacher, and several of them have qualified for service. The boys are also prepared for duties in the book-keeping, checking and telephone departments. Mr. J. J. O'Keefe, assistant manager, states that several of the boys have bank accounts. Three of the night messengers of the Postal Company in Milwaukee attend school in the day time, and four of the Western Union boys are earning their way through school by working as messengers.

The Cable-Rate Situation.

The following statement on the cable-rate situation was given out on January 5 by Mr. Theo. N. Vail, president of the Western Union Telegraph Company:

"It is said that intercommunication is civilization. The sole object of the Western Union is to improve the efficiency of its service and develop new services for intercommunication to meet the ever-growing business and social requirements, and its business motto is: 'We believe that the future development of the wire system in the United States will afford facilities for the annihilation of both time and distance by the general use of electrical transmission for written or personal communication, and will afford electrical communication of every kind of intelligence from every one at every place to every one at every other place. It will be comprehensive, universal.'

"To maintain as nearly as possible this universal telegraph service the Western Union has over 1,700,000 miles of wire connecting 25,000 regular Western Union offices; several thousand other points are connected by telephone. One of the peculiar burdens of maintaining a universal system is that of the 25,000 Western Union offices, three-fourths have less than $25 per month gross and only 10% of them over $100 per month gross. Each of these offices is and must be kept open at the expense of the whole if such a system is to be maintained. The Western Union has also an operating control of eight transatlantic cables.

"The whole business of electrical transmission of intelligence has been built up on the one idea of expedition. Expedition has been the essence of 90% of the cable and telegraph business. Expedition in intercommunication is an ever-growing necessity, but is costly. Business is confined to a few hours of the day and has rush periods in those few hours. Expedition, therefore, results in idle facilities. Anything which would interfere with existing business would be destructive and of no permanent benefit to the public.

"All talk about 'telegraph or cable war' or 'cut rates' is absurd. Not a single old rate has been cut or old service disturbed, nor will they be so long as the revenue is needed for the legitimate purposes of the company. The day of destructive competition is past. Competition should be aggressive but constructive and must be along legitimate and profitable lines.

"Bankrupt utilities cannot give the public acceptable service. Every innovation as to rates or services has been made by the Western Union after thorough study and deliberation, the purpose being the introduction of new and popular forms of business upon the theory that nothing in the way of a deferred business would be acceptable at any price where expedition was desirable. The use of highly elaborated codes for cable messages makes the cost per word of the actual translated message cheaper per word than any possible charge that could be made for plain language messages. The code or cipher is a business necessity.

"To claim that any telegraph or cable company is not a deferred message company is begging the question. The great trunk lines of railroad might as well say: 'We are not a freight line; we are a limited express line.' In the railroad business the deferred, i. e., the freight business, generally pays the bills and makes the dividends. The civilized countries are spending millions for fast and still faster trains and steamers to shorten the time of transit of all kinds of intercommunication. Why not use the idle telegraph and cable facilities for all business which could not stand the rate for expedition, but which would stand a moderate charge for something better than mail service?

"Negotiations to these ends were commenced two years ago, in the spring of 1910. It was, then, in the spring of 1910, that all the present innovations in cable rates which have recently been promulgated were decided upon, to be put into effect as soon as negotiations were completed and conditions right. The public announcement of the results of these negotiations was made by the postmaster-general in the English House of Commons December 5, 1911, in the following language: 'I have been in correspondence with the Western Union Telegraph Company of the United States in connection with the leasing by that company of the cables of the Anglo-American Telegraph Company and of the Direct United States Company. I am glad to be able to announce that, in view of this fact, the three companies referred to, i. e., the Western Union, Anglo-American and Direct United States, have consented to accept press messages which are not of an urgent character and which may be postponed to the more urgent traffic, at one-half of the present rates. I am in communication with the Commercial Cable Company also on this question. The Western Union Company proposes also, of its own initiative, to establish at once for the use of the public a system of so-called night-letters and week-end letters between this country and places in Canada and the United States.'

"It is not the purpose of the Western Union to rest content with what has been done. The night and day telegraph letters, and the deferred half-rate cable message, daily and week-end cable messages, are but the beginning of new services which will be within popular reach, and which will revolutionize business and social intercommunication."

The Deadly Hat-Pin.—A young woman operator in a Western town stuck her own hat-pin in her own eye while adjusting her hat. Women operators should have better sense. Hat-pins are made to injure other people with and not for performing surgical operations.

Appointments in Canadian Pacific Telegraph Service.—The following appointments in the Canadian Pacific Railway Company's telegraph service have been officially announced: Mr. W. J. Camp, electrical engineer, to be assistant manager of telegraphs with headquarters at Montreal; Mr. F. J. Mahon, superintendent at St. Johns, N. B., as superintendent of the eastern division with headquarters at Montreal; Mr. J. Fletcher, superintendent at Vancouver, B. C., as superintendent of traffic with headquarters at Montreal; Mr. D. H. Bowen to be assistant superintendent of the Ontario division; Mr. John Tait to be assistant to the general superintendent with headquarters at Winnipeg; Mr. John McMillan, superintendent at Calgary, to be superintendent on the Manitoba division with headquarters at Winnipeg; Mr. R. N. Young to be superintendent on the Saskatchewan division with headquarters at Moose Jaw; Mr. Donald Coons to be superintendent on the Alberta division with headquarters at Calgary; Mr. J. F. Richardson of Montreal to be superintendent of the British Columbia division with headquarters at Vancouver. Mr. S. J. Baker has been appointed acting inspector of telegraphs, Saskatchewan division with headquarters at Saskatoon.

Mr. John A. Wisely, chief operator at Halifax, N. S., for the Canadian Pacific Railway Telegraphs, has been appointed manager of the office, vice Mr. W. M. Godsoe, promoted to be district superintendent. Mr. Herbert Godsoe, night chief, has been promoted to be chief operator, vice J. A. Wisely, and Frank Bowes succeeds Mr. Godsoe as night chief.

Obituary.

G. M. Huntington, aged 79, an old-time and military telegrapher, died in New York December 28. In our issue for December 16, 1911, we published a letter from Mr. Huntington in which he gave an account of his experiences on the Erie Railroad and some interesting reminiscences of Charles Minot, general superintendent of that road, who sent the first telegraphic train order.

The Late Mrs. Kate P. Bruch.

In our issue for January 1 we published a brief notice of the death of Mrs. Kate P. Bruch, widow of Captain Samuel Bruch and mother of Mr. Charles P. Bruch, third vice-president of the Postal Telegraph-Cable Company, New York. Her death brings back to memory many past events. Her husband, Captain Samuel Bruch, was one of the most distinguished officials of the United States Military Telegraph Corps during the Civil War. At the outbreak of the war he was working in the Louisville, Ky., telegraph office, and during the summer of 1861 acted as censor for the Government over all telegrams for the South. Mr. Bruch afterwards became assistant to Anson Stager, manager of military telegraph in General McClellan's department, and at the same time was made general manager of the Southwestern Telegraph Company. In August, 1862, he was commissioned by the United States Government as captain and assistant quartermaster.

Captain Bruch died in Memphis, Tenn., March 31, 1865, and a monument was erected to his memory in the cemetery at Canton, Ohio, in which town he was born in 1831. This memorial was provided by the officers and employes of the United States Military Telegraph Corps, Military Division of the Mississippi.

Mrs. Bruch died at Clinton, N. J., the early home of her parents, where she had many friends, and was buried in her former home town, Canton, Ohio, beside the remains of her husband. At both the Clinton, N. J., and Canton, Ohio, services there were distinguished gatherings, including several prominent telegraph officials. Mrs. Thomas A. Edison attended the funeral services at Clinton.

Mrs. Bruch's lovable character won her many friends all through life, and she enjoyed the highest esteem in the various communities in which she had lived. She had an active mind and was prominent in church affairs.

Radio-Telegraphy.

High Speed Wireless Telegraphy.—Experiments with high-speed telegraphy on the Poulsen system have taken place between the Cullercoats station, near Newcastle-on-Tyne, England, and a Danish steamer at a distance of 496 miles. It is said to have been found possible to transmit up to 200 words per minute.

Wireless Station on Block Island.—The Massie Wireless Telegraph Company has erected a station on Block Island, R. I., in order to furnish a medium of communication with New Shoreham, cable communication with the main land having been interrupted. Messages will be sent to the Point Judith station, and thence distributed by telephone and telegraph.

London Radio-Telegraphic Conference.

We are informed by Major W. A. J. O'Meara, engineer-in-chief of the General Post Office, London, England, that the programme for the radiotelegraphic conference which is to be held in London June 4 has not yet been prepared. It will not be ready for a month or two yet, he states.

This conference will probably be the most important ever held in connection with radio-telegraphy, as many matters of international interest and of a pressing nature will be presented for consideration. All the civilized nations will be represented and several delegates from the United States will be in attendance, representing the various government departments concerned in wireless telegraphy. Since the United States is not a contracting party to the Berlin treaty, the representatives from this country will not be able to take direct part in the proceedings.

It is more than likely that the action of the London conference will be ratified by the United States, as the atmosphere in this country in wireless telegraphy is much clearer now than formerly, and the opposition to the ratification legislation will probably not be of a serious nature.

Telephone Pioneers of America.

P. K. HIGGINS.

One of the most "long distance" members of the Telephone Pioneers of America who attended the recent Boston convention was Mr. Pedro Kerr Higgins, who came all the way from Oklahoma to take part in the proceedings of the first meeting which took place at Boston, November 2, 1911.

Mr. Higgins, who is assistant to the president of the Pioneer Telephone & Telegraph Company of Oklahoma, has had a very extensive experience in the telephone business. He was born in Glasgow, Scotland, and entered the telephone service in that city in 1881. He filled the positions of night operator, inspector and chief test clerk for Scotland for the National Telephone Company in

P. KERR HIGGINS,
Assistant to President Pioneer Telephone and Telegraph Co., Oklahoma (1881).

Glasgow, and afterwards went to Chili, South America, as electrical engineer for the West Coast and The Chili Telephone Company. His technical education was received under such noted instructors as Sir William Thomson (Lord Kelvin), Henry Drummond and Andrew Jamieson, all of Scotland. Later he came to the United States and accepted a position with the Central Union Telephone Company as cable expert at Chicago, and afterwards as chief inspector at Indianapolis, Ind.

Mr. Higgins next went to Los Angeles, Cal., as superintendent of equipment for the Home Telephone Company, and afterwards accepted the position of general manager of the United States Long Distance Company in California. During his connection with the Pioneer Telephone & Telegraph Company of Oklahoma Mr. Higgins has filled the positions of superintendent of construction, general traffic superintendent and general superintendent, being at the present time assistant to the president.

Mr. Higgins made many friends in the East during his visit in connection with the Boston convention.

Rural Telephones in England.

It is no new thing that the isolation of many English country homes is a source of danger to them, says the London *Standard*. There are thousands of charming mansions, abounding in historical interest and housing valuable libraries and works of art, hidden away in extensive parks without any means of rapid communication with the outer world.

The telephone, in spite of its progress within the towns, is still unknown to them; and this although every year instances occur of the destruction by fire of one of them, through the lack of this safeguard. To resort to messengers on foot, horseback, or even motor car in the event of fire or robbery is not only courting disaster through delay, but means a reduction in the staff of persons available for home duty. Yet there are many who persist in taking all the old-time risks. The development of the telephone in rural districts is hopelessly behind that in the towns.

Much of this reluctance to adopt an undoubted boon and safeguard is due to ignorance. The facilities afforded by the telephone, apart from those of ordinary conversation with friends at a distance, are not generally known; neither have many people the slightest idea of the cost of installation. While it is unreasonable to expect instant and extraordinary developments from the transfer of the National Telephone Company's system to the Post Office on January 1, there is little doubt that some efforts will be made to popularize the use of the telephone in rural districts. The offer to farmers made early in the autumn by the Postmaster-General, although belated in comparison with similar developments in the United States, was but a prelude to further progress.

Damage to Underground Cables by White Ants.—Wide-spread depredations effected by white ants (termites) to state telephone cables are reported from Adelaide, Australia. The occurrence of crosses between the circuits in a lead-sheathed cable, drawn into earthenware ducts, led to the withdrawal of the cable, when it was found that the sheathing had been partly eaten away in places for several inches, nearly the full thickness of the lead, and in many parts the ants had eaten right through the metal. In Sydney, some time ago, it was reported that electric light cables were being attacked by the ants, and that, where the city tramway cables were laid on the solid system, the white ants got through the bitumen compound, and then attacked the lead sheathing, finally eating into the insulation of the high-tension cables, and breakdowns were caused as a result. The authorities decided that it was necessary to provide poison for the termites, and the bitumen in which the cables were laid was loaded with half an ounce of arsenious oxide per cubic foot of bitumen.

An Interesting Document of Professor Morse.

The insight possessed by Professor S. F. B. Morse in the early days of the telegraph as to the possible uses of his invention was truly remarkable, and it seems all the more so when we consider that his predictions and plans were announced so early in the history of the telegraph —practically concurrently with its birth.

Mr. Edward Lind Morse, of Stockbridge, Mass., son of Professor Morse, has furnished us with a copy of a manuscript, written by his father, without date, showing that Professor Morse foresaw the applicability of the telegraph to military and railroad purposes. The article is as follows:

"On September 10, 1838, a telegraph instrument constructed in the United States on the same principles, but slightly modified to make it portable, was exhibited to the Academy of Sciences in Paris, and explained by M. Arago at the session of that date. An account of this exhibition is recorded in the *Compte Rendus.*

"A week or two after I exhibited at my lodgings, in connection with this instrument, my railroad telegraph, an application of signals by sound, for which I took out letters patent in Paris, and, at the same time, I communicated to the Minister of War, General Bernard, my plans for a military telegraph with which he was much pleased. I dined with him by invitation, and in the evening, repairing with him to his billiard room, while the rest of the guests were amusing themselves with the game, I gave him a general description of my plan. He listened with deep attention while I advocated its use on the battlefield, and gave him my reasons for believing that the army first using the facilities of the electric telegraph for military purposes would be sure of victory. He replied to me, after my answering many of his questions:

"'Be reticent,' said he, 'on this subject for the present. I will send an officer of high rank to see and converse with you on the matter tomorrow.'

"The next day I was visited by an old Marshal of France, whose name has escaped my memory. Conversing by an interpreter, the Rev. E. N. Kirk of Boston, I found it difficult to make the Marshal understand its practicability or its importance. The dominant idea in the Marshal's mind, which he opposed to the project, was that it involved an increase of the material of the army, for I proposed the addition of two or more light wagons, each containing in a small box the telegraph instruments and a reel of fine insulated wire to be kept in readiness at the headquarters on the field. I proposed that, when required, the wagons with the corps of operators, two or three persons, at a rapid rate should reel off the wire to the right, the centre and the left of the army, as near to these parts of the army as practicable or convenient, and thus instantaneous notice of the condition of the whole army, and of the enemy's movements, would be given at headquarters.

"To all this explanation of my plan was opposed the constant objection that it involved the increase of the material of the army. The Hon. Marshal seemed to consider that the great object to be gained by an improvement was a decrease of this material; an example of this economy which he illustrated by the case of the substitution of the leather drinking cup for the tin cup hung to the soldier's knapsack, an improvement which enabled the soldier to put his cup into his vest pocket. For this improvement, if I remember right, he said the inventor, who was a common soldier, received at the hands of the Emperor Napoleon I the cross of the Legion of Honor.

"So set was the good Marshal in his repugnance to any increase to the material of the army that, after a few moments' thought, I rebutted his position by putting to him the following case:

"'M. Marshal,' I said, 'you are investing a fortress, on the capture of which depends the success of your campaign; you have 10,000 men; on making your calculations of the chances of taking it by assault, you find that with the addition of 5,000 more troops you could accomplish its capture. You have it in your power, by a simple order, to obtain from the government these 5,000 men. In this case what would you do?'

"He replied without hesitation: 'I should order the 5,000 of course.'

"'But,' I rejoined, 'the material of the army would be greatly increased by such an order.'

"He comprehended the case, and, laughing heartily, abandoned the objection, but took refuge in the general skepticism of that day on the practicability of an electric telegraph. He did not believe it could ever be put in practice. This was an argument I could not then repel. Time alone could vindicate my opinion, and time has shown both its practicability and its utility."

Automatic Telephony.—The number of localities now served by automatic telephones in the United States is 131; of these 30 have fewer than 100 stations, 94 more than 100 and six have the following numbers: San Francisco, Cal., 16,500; Los Angeles and Oakland, Cal., 24,000 and 8,000, respectively; Grand Rapids, Mich., 11,000; Columbus, Ohio, 14,000, and Portland, Ore., 12,000. An automatic system at Chicago is under construction. On the Continent of Europe the automatic system is in use in the following cities: Hildesheim, Altenburg and Munich, in Germany, and at Graz and Cracow, in Austria. At Amsterdam, Holland, a semi-automatic system is in course of installation. At Munich the Bavarian postal authorities intend gradually to transform the existing manual offices, so that in a few years' time the automatic system alone will be used to serve the 20,000 or 30,000 stations. In Austria it is intended to substitute the semi-automatic system for the manual in the central offices at Vienna. In England the system is being tentatively tried by the Post Office.

Reminiscences of Professor Morse.

BY HENRY A. REED, NEW YORK.

My first experience in telegraphy was in the Summer of 1849 at the village of Carmel, about sixty miles north of New York City and thirty miles southeast of Poughkeepsie. There were very few messages from or to Carmel. The office was opened and maintained mainly as a repair station, and the operator looked after trouble between White Plains, twenty-six miles north of New York City and Stormville, sixteen miles south of Poughkeepsie. Troubles were not infrequent. The line was built of two small copper wires, which, being soft, stretched in hot weather like molasses candy, and, being drawn up in Summer, they snapped as would the candy when contracted by the Winter's cold.

Quite small poles sufficed for the light copper wire, but when it was replaced by No. 9 iron wire the extra weight gave much trouble. Most of the lines at that time resembled more the single private telephone lines in our country districts than the substantial structures now in use.

In order to cover the southern section the Carmel operator had to drive six miles to Croton Falls and there take a train, watching from the back platform for the trouble. If it was discovered he got off at the next station and, with his repair outfit, footed it back, sometimes three or four miles.

As the drive of six miles made it difficult to catch trains, which were few and far between, the company decided to move the office from Carmel to the railroad station at Croton Falls. I made that change and in March, 1850, I opened at Croton Falls the first telegraph office on the Harlem Railroad. Few people at that time had an idea of the use of the new invention. The first day after the Croton Falls office was opened a lady arrived from New York without her trunk. The station agent got a description of the trunk and promised to send a letter down by the next train and get the trunk the next day. The telegraph was at his service free, but he did not think of it. However, I telegraphed a description of the trunk to the baggage master at White and Center Streets, New York, and it came up that evening.

After getting the Croton Falls office working I left it in charge of Mr. Stephen Lawrence who had learned the art from me, and on July 1, 1850, I went to Hudson, N. Y., which place I reached by Hudson River Railroad to Poughkeepsie and thence by day boat. The trains at that time did not run above Poughkeepsie, and the following Winter, 1850-1, the northern and western mails were carried from Poughkeepsie to Albany on the old style mail coaches, guarded by United States soldiers.

The following Summer, 1851, I saw the first train on the Hudson River Railroad pass Hudson on its way to Albany. In the Summer of 1851 I opened an office at Red Hook, twenty miles south, and at Valatie, fifteen miles north. At that time all offices between Croton Falls and Troy were on the post road. There were no lines on the Harlem above Croton Falls and none on the Hudson River road.

In the Summer of 1852 I left Hudson and came to New York as first assistant to Sam McGown, who soon after went to Australia and had charge of the telegraph and postal service of that country.

The New York, Albany & Buffalo Telegraph office was in the basement of No. 2½ Wall Street, New York, and occupied a room about 15 feet wide and 50 feet deep. The operators, three in number, occupied with their three registers the front window (the only window) and a space about 12 x 10 feet. Next, back, was the bookkeeper, Charles T. Chester, who soon after engaged in making electrical instruments. His section was about 12 x 5 feet. Next back of him were about six messenger boys occupying the same space, next a store room about 12 x 10 feet, and behind that a battery room with about 160 cells of Grove batteries with fumes that ought to have killed the whole lot. These details of New York's first office your readers may compare with the present equipments.

It was in this office in the fall of 1852 that I first met Professor Morse, a tall slim gentleman, sixty-one years old, with clean face, rather sharp but pleasant features and a very sweet smile. He handed me a message decorated with a skull in place of "D. H." directed to his wife in Poughkeepsie, and he waited until it was sent and "O. K." received.

New York did not agree with me. My nervous temperament needed more and better air than was to be had in that cramped office filled with acid fumes. In March, 1853, I was sent to the Poughkeepsie office, which was just a desk in the front part of the Wells, Butterfield & Co.'s express office.

Professor Morse's home, Locust Grove, was about two miles south of the village. There had been a line from Fishkill to Poughkeepsie with an office in the Morse homestead, with Augustus G. Davis, a cousin of Mrs. Morse, as operator, but the line had been abandoned and Davis had charge of the Poughkeepsie office for some time till he took Greeley's advice and went West to richer pastures, and later to Baltimore, where I think he is still engaged in the electrical manufacturing business.

The financial world was slow to appreciate the telegraph, but after a few lines were established and its usefulness was apparent, there was a great demand for lines and capital was so interested that Morse's rights seemed sure to yield fortunes. With this prospect he purchased about 300 acres on the road south of Poughkeepsie, extending from that road to the Hudson River, overlooking the river valley and the extensive vineyards and fruit lands of Milton and Marlborough on the western side.

He built a handsome residence on the southern portion of the farm on the brink of the plateau some distance from the road, his entrance being through a large grove of very old locust trees. His western view was very extensive both up and down the river.

Professor Morse's visions of fortune were very soon obscured by clouds of infringement and his purse depleted by suits necessary to protect his patents. Under the strain he sold about two-thirds of his land, but was able to retain about 100 acres with his homestead until the clouds were cleared away, and to enjoy with his family and friends many years there of peace and plenty.

It is for abler hands than mine to write a history of Professor Morse and to show how a superior intelligence, untiring industry and indomitable energy inherited from an exceptional ancestry, together with a liberal education obtained by struggle, enabled him to attain a high place in art and science, and to be the first to invent a practical system of telegraphy. I will therefore confine myself to some personal experiences in my nearly twenty years of most friendly relations with him.

In looking over some letters from Professor Morse, I find one dated Thursday, November 30, 1854, from which we learn that in 1854 Thanksgiving was the last day of November, as it was in 1911.

The letter referred to was accompanied by a message to Amos Kendall, then in New York, asking Kendall to remain in New York until his (Morse's) arrival the next day, and as Thanksgiving day, being a holiday, and most telegraph offices were closed, he requested me to have that and other messages delivered as early Friday morning as possible. I was able to get them off Thursday afternoon.

In 1856 Professor Morse presented me with what I think was the first galvanometer used in this country for testing for faults, and it is now in the Smithsonian Institute at Washington, with other mementoes of early telegraphy.

For several years I had studied troubles and had in many instances been able to determine not only their nature, but very nearly the distance from my office. One day in the Summer of 1856 after completing my tests and giving directions to my repair man, telling him to get his kit and drive over the line south and that he would find a cross about ten miles from the office, I turned around and found Professor Morse standing behind me. He said: "What were you doing, Mr. Reed?" I told him that I was locating a cross. He had never heard of such a performance and was much interested in my explanation. The next day he brought me the little galvanometer which he had very recently brought from England, saying: "I think this will beat your fingers in measuring current." He was right and I never after used the finger and tongue method.

Professor Morse was very simple and democratic in his taste, but could play his part pretty well when in royal company. His portrait with his breast full of decorations was taken in Paris. On his return home he gave me a copy, saying: "What do you think of that, Mr. Reed?" I replied that I thought it very gay. "Well," he replied, "I do not enjoy such show and felt like a monkey when sitting for it, but you have to do such things on the other side."

Just after the civil war he took his family to Europe for a long stay and engaged a very successful teacher of Poughkeepsie as tutor to his children. I was in the stationery business at that time and had cards engraved for the tutor, John R. Leslie. Professor Morse happened into the store when Leslie called for his cards, and being shown one said to Leslie, who had just returned from the army: "What was your position in the army?" When Leslie replied, "Colonel," the professor said: "Mr. Reed, make a new plate, 'Col. John R. Leslie'; with that I can introduce him into the best society, but a plain name or 'Mr.' don't count over there."

When fortune first smiled on him he instituted a style of living in keeping with his position and prospects, including livery for his coachman. A few years later when war prices ruled and most people had to economize, we were speaking on the subject and the professor remarked: "Well, I sometimes think that one of my greatest mistakes was putting brass buttons on my coachman." Of course it was not the buttons alone, but the accessories which seemed burdensome for a while, but, with all his friends, I was much pleased that circumstances soon changed so that he was well able to continue the style to which his position entitled him.

In religion Professor Morse was a strong Presbyterian and his controversy with + John Archbishop Hughes on Roman catholicism showed him well versed in theology, but he was not accustomed to talk in meeting. Although a charming conversationalist he was not an after-dinner speaker unless he had time for preparation, and usually read from manuscript. In politics he was what was called a "Hunker Democrat," and when the civil war came on was considered a southern sympathizer. He did not wish for secession, but hoped for a compromise which would either retain slavery or pay for the slaves freed. He had many friends and some financial interests in the south and never favored what seemed to him abolition vagaries.

During the war he was much distressed by the heavy loss of life in Grant's campaigns and favored McClellan's tactics. He once said to me: "In war it is not so much the number killed as in position gained. It is like a game of chess, and now McClellan seems to have Lee checkmated." My reply was: "The trouble is that Lee don't seem to appreciate his position."

Professor Morse was very charitable, but methodical in his charities. A Hebrew tailor in Poughkeepsie was burned out and applied to Professor Morse for money to start again. The professor furnished him the amount asked for but took his note payable in installments.

In 1864 my business partner, getting the get-rich-quick fever, got swamped in Wall Street, and in order to save the business I had to buy his interest in the book store and did not have the funds. I could have obtained help from others, but Professor Morse volunteered to loan me the $3,000 required, accepting my note at 6%, interest payable quarterly, the principal to be paid in four years or in installments as convenient to me. I was able to cancel the note in two years, and I still keep it with the several personal endorsements in grateful remembrance.

In 1866 I gave up telegraphy and the office was removed from my store, but as long as Professor Morse lived he had a drawer in my store where the Poughkeepsie merchants sent packages for Locust Grove and the Morse carriage stopped for the contents of the drawer whenever in town.

My wife has now in an old herbarium a pressed rosebud presented to her by Professor Morse and a small bouquet presented by Mrs. Morse a few days after our marriage in 1859.

P. Kearney and the Collins Overland Line

Mr. Phil Patsy Kearney, a well-known old-time telegrapher, now engaged in the mineral industry at Crown King, Arizona, has had an interesting career. He was born in Ireland in 1847 and entered the telegraph service in this country in 1865, at Erie, Pa., where he was employed by General Anson Stager, general manager of the Western Union Telegraph Company, with headquarters at Cleveland, Ohio. He was one of the party sent out by the Western Union to Siberia on the enterprise known as the "Collins Overland Line," to connect America and Europe. The other members of the party who signed at the same time, and assembled at New York City were William Kelsey, Joseph Pierce, and John I. Sabin, and they left New York for San Francisco on the Pacific Mail Company's steamship "Costa Rica," via Panama.

"On arrival at San Francisco," Mr. Kearney says, "we went aboard the clipper ship 'Nightingale,' chartered by the Western Union Company, bound for Plover Bay, on the Asiatic side of Behring Straits, St. Michaels being on the American side.

"We arrived at Plover Bay in 1866 and were making ready for St. Michaels when a British bark arrived from Victoria, B. C., with the news of the successful laying and operation of the Atlantic cable.

"Our executive ordered us to return, and gave us instructions to notify the St. Michaels' party and the party on the Amoor River in Siberia, of which Mr. George Kennan, the well-known former telegrapher and noted writer, was a member.

"In August," Mr. Kearney continues, "we set sail for St. Michaels, and on reaching there delivered our instructions to the force in the interior.

"We then sailed for Petropaulovski, Kamchatka, where we delivered the instructions to the Kennan party, and then proceeded to San Francisco, reaching there on December 25, 1866."

After getting his discharge from the Collins Overland Service, Kearney received transportation from San Francisco by stage overland to St. Joseph, Mo., homeward bound.

On arrival at Denver, Col., he was intercepted and sent to Central City, Col., on relay duty, and from there he was ordered to Julesburg, then the western terminus of the Union Pacific Railroad. From Julesburg he went to Cheyenne, Wyo., where he opened the first Western Union line for business. Mr. Kearney remained in Cheyenne, and when the overland wires were abandoned at Denver, and Cheyenne was made the relay office between Omaha and Salt Lake City, he was placed on the relay force. He was on the night force in Chicago before and after the great fire, working the overland wire, and afterward returned to Cheyenne. Later he was detailed from the relay office at Corrine, Utah, to Promontory, Utah, to announce to the world the completion of the Union Pacific and Central Pacific railways.

Mr. Kearney was General George Crook's military telegrapher at Fort Whipple, Ariz., during the Apache campaign. After this service he spent sixteen years in the Ogden Western Union office, and then returned to Arizona, where he now resides.

An Example of Taste and Good Sense.

A correspondent of the *Railway Age Gazette* in discussing the issuing of circulars on "courtesy" by railway companies to their employes, refers to a circular of this character issued by Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company, New York, as "an excellent example of good sense, brevity and refined taste." The circular which is thus complimented is as follows:

"THE EMPLOYE IS THE COMPANY.

"It is a fact that the public regards the representatives 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."

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January 16, 1912.

Lower Cable Rates a Step in Progress.

It has been pointed out that the low-cost cable business will add another link to the chain of civilizing influences and aid in cementing the bonds of amity between the nations. The railway, the steamship, the telegraph, the cable and the telephone have indeed worked wonderful changes in the world. These agencies are breaking down obstacles of every kind that impede progress and are in effect amalgamating the nations of the world into one brotherhood. The millennium has not yet come, however, and there is much to be done before the time is ripe for it. Change from existing conditions means progress, and it is simply in the line of advancement that the cable companies have taken this step. The question of expediency is another matter; the times demanded this new service and the companies have met the situation.

All innovations disorganize the regular schedule more or less until they finally fall in line and become a part of the machinery of the world's activities. The low cable rates will no doubt develop a large business of a new class, and it will be interesting to note the practical effects of the new idea.

Economy in Small Things.

"Save the pennies and the pounds will take care of themselves" is a trite saying, and, while every one admits the truth of it, few practice it. The average person is wasteful, not only of his own property, but that of others, and this is particularly true as regards small things. There is no reason why one should destroy or waste a brick any more than tear down a house, or destroy a message blank any more than destroy a pole line. The principle is the same in both cases, and yet needless destruction is continually going on all over the country.

Many large industrial concerns, including telegraph and telephone companies, have taken up in earnest this matter of waste-prevention, and figures have been prepared showing the saving that results from the practice of economy in little things. The exhibit is indeed a surprising one, and the figures, we think, will have the effect of encouraging all fair-minded persons to practice economy in the use of his employer's property. This is an excellent habit to form and it is based on good reason.

Another "Youngest Operator."

When the newspapers run short of thrilling news they turn their attention to more commonplace subjects, and the telegraph messenger occasionally comes in for a share of the glory.

Some months ago a young messenger in Tarrytown, N. Y., achieved fame—newspaper fame—because he abandoned his bicycle in the delivery of messages asserting that it was not fast enough. Now the same youngster—he is 14 years of age so the newspapers state—is said to be night operator at Tarrytown, and, as usual, "is the youngest operator in the employ of the company."

We are constantly receiving clippings about the "youngest operator." The woods and towns are full of them. Any one not knowing the facts would get the impression that the telegraph business of the country is run by babes. It would be a reflection upon the telegraph companies to let such absurd notions pass unchallenged.

Occasionally we read of a young boy being able to run a locomotive, but no railroad company employs him in the capacity of an engineer. Much more than the ability to send and receive messages is required in an operator; he must have sound judgment and be prepared to act promptly in emergencies.

Age Limitations.

With legal restrictions and limitations on the one hand and rules of corporations on the other the range of a man's usefulness these days is much narrowed. In many of the States stringent laws exist prohibiting the employment of persons under twenty-one years of age in certain lines of work, railroad telegraphy for instance, and many railroads have set the maximum age at which a person may enter the service at thirty-five years. Thus it may happen that a railroad company cannot legally employ a person under the age of twenty-one and by its own rules reject an applicant for a position who is over thirty-five years of age. Logically this limits a man's useful life to fourteen years.

The telegraph companies are also affected by the legal restrictions in many of the States, for they are prohibited from employing messengers under a certain age in night service, and although, as far as we are aware, their rules do not prohibit the employment of persons well advanced in years in any branch of the service, the tendency is to favor the younger men, which of course is very natural from a business standpoint.

The legal limitations must naturally have a tendency to discourage a young man who has ambitions to enter a vocation which may happen to be so restricted and drive him into some other line of work where he can find immediate employment.

Many of the railroad companies have pension schemes for the benefit of their employes and the officials advance the argument that it would be manifestly unfair to their employes who entered the service at the earlier ages to place on an equal footing with them those who are taken on at an age approaching the maximum limitation. It is right and proper that there should be reasonable restrictions placed upon the employment of young persons at too early an age, but it is an open question as to the wisdom of denying a man the opportunity to earn a living simply because he has reached the age of thirty-five years. So long as he is capable of filling the position he should be given the opportunity to do so whether he be thirty-five, forty-five or fifty-five years of age.

Holiday Greetings.

With deep appreciation and pleasure were acknowledge the receipt of holiday greetings from Mr. H. C. Wilson, in charge of government telegraphs and telephones, Jamaica, B. W. I.; Commercial Cable Company, New York; Mr. S. M. English, general manager of the Postal Telegraph-Cable Company of Texas, Dallas, Tex.; Mr. H. A. Tuttle, president of the North American Telegraph Company, Minneapolis, Minn.; Mr. W. J. Lloyd, division traffic superintendent, Western Union Telegraph Company, Chicago, Ill.; Mr. Earl W. Miller, chief operator, Postal Telegraph-Cable Company, Philadelphia, Pa.; Mr. W. C. Carswell, manager, Western Union Telegraph Company, Topeka, Kan.; Central Executive Association Irish Post-Office Clerks, Dublin, Ireland; "The San Francisco Western Union Force;" Mr. H. D. Rogers, retired old timer, Boston, Mass.; Mr. J. Frank Howell, broker, New York; Mr. J. D. McLelland, Houston, Tex.; Mr. T. W. Goulding, European general manager of the Western Union Telegraph Company, London, England; Mr. E. J. Nally, vice-president and general manager Postal Telegraph-Cable Company, New York; Mr. G. K. Heyer, general sales manager Western Electric Company, New York; Mr. J. B. Dillon, Western Union Telegraph Company, Dallas, Tex.; Mr. H. P. Trainor, electrical engineer of government telegraphs, Pretoria, South Africa; managing editor of the *South African Railway Magazine*, Johannesburg, South Africa; Samosuke Inada, of the Engineer's Section, Department of Communications, Tokyo, Japan.

The Origin of Public Utilities Commissions.—Mr. Arthur Stedman Hills, of the bureau of commission research, legal department, American Telephone & Telegraph Company, New York, delivered an address entitled "The Origin, Growth and Work of Public Utilities Commissions," before the Accountants' Theories and Talks Club, of the American Telephone & Telegraph Company, New York, November 15, 1911. The address has been reprinted in pamphlet form. Mr. Hills' investigations into the subject took him as far back as the year 1348, so it is evident that the public utilities commission idea is not new.

Electrical Instruments and Testing.

Every one connected with the telegraph and telephone service should know how to test lines and also be familiar with the instruments used in such work. It does not require much study to learn the mechanical operations of this important branch of the service, but of course a knowledge of electrical and mechanical principles involved in the design and construction of the instruments, and of the principles involved in measurements is the source of deep and never-ending pleasure to the ambitious student.

An excellent book on this subject, intended for the practical man, is "Electrical Instruments and Testing," by Norman H. Schneider, with new chapters on testing wires and cables and locating faults, written by Jesse Hargrave, division superintendent of the Postal Telegraph-Cable Company, Atlanta, Ga.

This work tells how to use the voltmeter, ohmmeter, ammeter, potentiometer, galvanometer, the Wheatstone bridge and standard portable sets. The apparatus described is modern and in universal use, and the tests are such as are required daily.

Mr. Hargrave carries the student step by step through the different methods of testing for faults, insulation and conductivity, cable faults, etc., and the simplest language possible is used. The formulas given are explained in the text preceding them, and examples are worked out in simple arithmetic.

This is one of the most practical and useful books on electrical testing instruments and testing that has been published and is fully illustrated with views and diagrams of instruments used in this line of work. Every one who desires to widen his knowledge on electrical matters should have a copy of this book in his library. Even if he never has the opportunity to make an actual test he will learn a great deal from the work that will improve his mind and general knowledge of things electric.

The price of this book is $1.00 and copies can be had of TELEGRAPH AND TELEPHONE AGE. 253 Broadway, New York. Any other book on telegraph, telephone or general electrical subjects can be obtained at the same place.

Course of Instruction in the Elements of Technical Telegraphy—VII.

(Copyrighted.)

(Continued from page 9, January 1.)

[We began in our issue for October 16 the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.

The mathematical section which is now running will carry the student through fractions, decimals, proportion, elementary algebra, etc.]

EQUATIONS.

An Equation is the algebraic expression of two equal quantities with the sign of equality placed between them. Thus, $x = a + b$ is an equation in which x is equal to the sum of a and b.

By the definition every equation is composed of two parts, connected by the equality sign =.

The part on the left of the sign is called the first member; that on the right, the second member. Each member may be composed of one or more terms. Thus, in the equation $x = a + b$, x is the first member, and $a + b$ the second.

Equations usually consist of known and unknown quantities, that is of quantities whose values are given and of quantities whose values are not given but are to be found. Thus, in $x + 6 = 14$, 6 and 14 are known quantities, and x is the unknown.

If equal quantities be added to both members of an equation, the equality of the members will not be destroyed.

If equal quantities be subtracted from both members of an equation the equality will not be destroyed.

If both members of an equation be multiplied or divided by the same number, the equality will not be destroyed.

TRANSFORMATION OF EQUATIONS.

The transformation of an equation consists in changing its form without changing the equality of its members. A common transformation is made by transposing certain terms from one member to the other, for which we have the following rule:

RULE (7). ***Any term may be transposed from either member of an equation to the other if its sign be changed.***

Example 1. In the equation $3x + 5 = 12$ transpose the + 5 to the second member.

Solution. Changing the sign to —, and placing in second member.

$$3x = 12 - 5. \quad \text{Ans.}$$

Example 2. In the equation $3x - 5 = 12$ transpose the — 5 to the second member.

Solution. Changing the sign to + and placing in second member.

$$3x = 12 + 5. \quad \text{Ans.}$$

To solve a simple equation apply the following rules.

RULE (8) (a.) *Clear the equation of fractions by multiplying both members by the denominator of the fraction containing the unknown quantity.*

(b). *Transpose the unknown terms to the first member, and the known terms to the second member.*

(c). *Combine the terms of the unknown quantity by adding or subtracting.*

(d). *Divide both members by the co-efficient of the unknown quantity*

Example 1. $\dfrac{x \times 25}{x + 25} = 20.$

The numerator of the fraction becomes 25x, the sign × being omitted.

$$\frac{25x}{x + 25} = 20.$$

If we multiply the numerator of a fraction by its denominator and divide we obtain a quotient that is equal to the numerator. $\frac{1}{2} \times 2 = 1$; $\frac{2}{3} \times 3 = 2$; so that applying Rule (8) a; $\dfrac{25x}{x + 25} \times x + 25 = 25x.$

Multiplying the second term by $x + 25$ we get $20x + 500$.

The equation is now $25x = 20x + 500$.

Applying rule 8, (b), we transpose the terms of the unknown quantity, or x, to the first member.

$$25x - 20x = 500.$$

Applying rule 8, (c), $5x = 500$.

Applying rule 8, (d), $x = 100$ Ans.

Example 2. $\dfrac{x \times 6}{x + 6} = 1\frac{1}{2}.$

By Rule (a) $6x = 1\frac{1}{2}x + 9.$

By Rule (b) $6x - 1\frac{1}{2}x = 9.$

By Rule (c) $4\frac{1}{2}x = 9.$

By Rule (d) $x = \frac{9}{1} \times \frac{2}{9} = \frac{18}{9} = 2.$

$x = 2$ Ans.

Example 3. Find the value of x in $\dfrac{x \times 10}{x + 10} = 8.$

Solution.

By Rule (a) $10x = 8x + 80.$

By Rule (b) $10x - 8x = 80.$

By Rule (c) $2x = 80.$

By Rule (d) $x = 40.$ Ans.

Example 3. Find the value of r in $\dfrac{15 \times r}{15 + r} = 6.$

Rule (a) $15r = 90 + 6r.$

Rule (b) $15r - 6r = 90.$

Rule (c) $9r = 90.$

Rule (d) $r = 10.$ Ans

QUESTION PAPER.

(1) Divide .004 by 400.
(2) Divide .0144 by .024
(3) Reduce .3125 to a common fraction.
(4) Express $\frac{6}{16}$ as a decimal.
(5) Find the product of .000492 × 4.1418.
(6) Find the sum of 1427.16, .244, .32, .032 and 10.0041.
(7) From 1.000014 take .00001.
(8) Find the value of R in
(a) 14 : R : : 6 : 2
(b) R : 24 : : 8 : 40
(c) 8 : 30 : : R : 20
(d) 4 : 6 : : 8 : R
(9) $\frac{100 \times 25}{100 + 25} = ?$
(10) $\frac{1}{25} + \frac{1}{45} + \frac{1}{75} = ?$
(11) Divide 1 by $\frac{23}{75}$
(12) Express as a decimal 1 ÷ 100.
(13) What is the effect of moving a decimal point three places to the left?
(14) Given a decimal .0321. If the point is changed three places to the right, thus, 032.1, what has been done?
(15) Find the value of R in the equation
$\frac{500 \times R}{500 + R} = 166\frac{2}{3}$
(16) Find the value of x in the equation
$\frac{x \times 5}{x + 5} = 3.75.$
(17) Multiply both terms of the equation
$\frac{E}{I} = R$, by I
(18) Find the least common denominator of 30, 25, 40, 1, 0.
(19) Find the sum of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{8}{6}$.
(20) Find the product of .00007 × 70000.
(21) Subtract $12\frac{1}{8}$ from 27.
(22) Subtract $1\frac{5}{8}$ from $\frac{57}{18}$.
(23) What are similar terms of a polynomial? Are 3ab and bc similar?
(24) If no sign is prefixed to an algebraic term what sign is understood?
(25) Reduce the polynomial — 9cb + 8ac + 15cb + 8ca + 9ac — 24cb to its simplest form.
(26)
(a) Find the sum of

7abc + 9ax
—3abc — 3ax

(b)
8x + 9acx + 13abc
—7x — 13acx + 14abc
—4x + 4acx — 20abc

(27)
(a) From 6ac — 5ab + c
Take 3ac + 3ab + 7c

(b) From 4ab — cd + 3a
Take 5ab — 2cd + 3a — 5b

(28)
(a) Multiply a + 3ab — c by 3x.
(b) Multiply 3a — 5b + 3c by x.
(29)
(a) Divide 2a — 3b by $2\frac{1}{3}$.
(b) Divide 3abc — c by .5.

New Book.

"Telephonology," by H. R. Van Deventer. A new edition of this well-known work has just been published and is now ready for delivery. It contains 600 pages and over 600 illustrations, and measures 6 x 9 inches.

"Telephonology" is a practical work and has little to say on the theory of the telephone, devoting itself to data and description, and giving just the material the practical man needs. It has been carefully compiled from many different sources, each section being prepared under the supervision of an expert in that particular line. Exceedingly simple circuit prints were made especially for this book, the descriptions and instructions which accompany each print being clear and free from mathematics and technical language. A complete index serves to locate instantly any subject.

Following is a partial list of the subjects covered by this book: Erection, Equipment and Maintenance of Telephone Exchanges, Line Instrument and Switchboard Troubles and Their Remedies. Apparatus, Line and Cable Testing. Instructions for Locating Line Troubles, Cable Faults and Their Remedies, Testing Apparatus, Switchboard Circuits, Magneto and Common Battery, Phantom Circuits, Composite Systems, Harmonic Party Lines, Combined Telegraph and Telephone, Automatic, Wireless, etc.

Chapter 15 describes the various composite systems.

Chapter 16 is devoted to Wireless Telephony.

Chapter 17 treats of railway or train dispatching systems and describes in detail the principal makes of equipment, the circuits, etc. This chapter will be found of particular interest and value to those interested in railway work.

All of the earlier chapters have been carefully revised, and a new chapter has been added describing new apparatus, circuits and inventions for 1911.

From a general perusal of this work it does not seem that anything concerning telephony has escaped the author's attention.

The price of this book is $4.00 per copy and copies are for sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

"Seagumite," New Insulating Substance. — A company has been formed in London to exploit a new insulating compound made from seaweed. According to a despatch from London, the new composition possesses special qualities as an electrical insulator, and will form a substitute for vulcanite. It is called "seagumite."

The Development and Present Composition of the Western Union Telegraph Company.

BY E. Y. GALLAHER, AUDITOR OF THE WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

(Concluded from page 18.)

CO-OPERATION WITH ALLIED COMPANIES.

For the purpose of promoting co-operation and conserving our interests in the allied companies not leased, it was decided to extend the supervision of the auditor of the Western Union Company. Accordingly, I was elected auditor of the American District Telegraph Company of New Jersey, the American District Telegraph Company of New York, the Stock Quotation Telegraph Company and the Philadelphia Local Telegraph Company.

The American District Telegraph Company of New Jersey is composed of a considerable number of other companies, organized to meet state requirements, and is also affiliated with a number of allied operating companies. The company formerly conducted a messenger business in all parts of the United States, with the exception of the city of New York, but this messenger business, together with the plant, was leased to the Western Union Company as of January 1, 1911, under an operating agreement. The American District Telegraph Company's activities are now directed toward the installation and operation of signal systems, that is, burglar alarms, night watches, sprinkler systems, etc., and it is thought there is a wide field for the development of the business. The company has thirteen independent offices and about one hundred joint offices with the Western Union Company, a total of one hundred and thirteen.

The American District Telegraph Company of New York restricts its operations to the city of New York, where it is engaged in the distribution of parcels, etc., for merchants, and conducts a messenger business with a call-box plant.

The Stock Quotation Telegraph Company owns a large office building at Beaver and Broad streets, New York, and is principally occupied in furnishing ticker service and the dissemination of news, its active operations being largely in the city of New York, though it has contracts with companies in Boston and elsewhere for the interchange of business.

The Philadelphia Local Telegraph Company is a small concern, located in the city of Philadelphia, and holds valuable franchise rights, the Western Union Company controlling all of its stock.

PRESENT ORGANIZATION OF WESTERN UNION COMPANY.

On January 1, 1910, the Western Union organization in the United States consisted of a president and general manager, a vice-president in charge of contracts, a vice-president in charge of cable business, a vice-president and auditor, the treasurer and the secretary. The country was divided in four divisions, at the head of each of which there was a general superintendent, and under these general superintendents district superintendents to the number of twenty-three.

State lines were not adhered to in the separation between the divisions, and the districts were mixed, both as regards state lines and the boundaries of each other. The duties of the general superintendent and his district superintendents combined plant, traffic and commercial functions. In addition to the territorial organization, the company was operated under line organization as distinct from a staff organization at headquarters.

In reorganizing the company, it was thought some of the divisions contained too much territory for adequate supervision, and, accordingly, two new divisions were created, making six in all, these being known as the Eastern, Western, Southern, Gulf, Mountain and Pacific. The office of general manager and president was separated and a general manager appointed.

The Eastern Division, with headquarters at New York, consists of six districts, and comprehends the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, West Virginia, the territory of New Brunswick, a part of Nova Scotia, and a portion of Canada between Lakes Huron, Ontario and Erie.

The functional organization has been reorganized by giving the general superintendent a division plant, a division traffic and a division commercial superintendent, and in each of the districts, except the second, there is a district plant, a district traffic and a district commercial superintendent; the second district, covering Jersey City, has only a district superintendent. The districts do not strictly follow state lines, but it is possible to block them out and show the lines of demarcation between them.

Following the district superintendents come the managers, who have nothing to do with plant, but combine traffic and commercial, and operate the Western Union offices open to the public. This arrangement is common to all divisions.

The Western division, with headquarters at Chicago, includes the states of North and South Dakota, Minnesota, Michigan, Wisconsin, Iowa, Illinois, Indiana, Ohio, Missouri and Arkansas.

This division is divided in seven districts and has the same organization as the Eastern division respecting division and district plant, traffic, and commercial superintendents, with the exception of the Chicago City district, which is supervised by a district commercial superintendent.

The boundaries of the districts, however, overlap one another to such an extent as to make it impossible to mark them on the map, some offices apparently logically within the territory of a district reporting to the superintendents of contiguous districts.

It is expected that this feature will be straightened out, as a number of reasons indicate the advantages of having districts that do not encroach on one another's territory and whose confines are within state lines.

The Southern division, with the general superintendent at Atlanta, is made up of the states of Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama and Mississippi, and has four districts.

It was not considered advisable to extend the full functional organization to this division, and the general superintendent has a division commercial and traffic superintendent, and a division plant superintendent.

In each one of the districts there is a district superintendent supervising traffic and commercial matters, and a district plant superintendent, and each district also has a commercial superintendent, who is under the supervision of the district superintendent.

The Gulf division is composed of three districts, and includes the states of Texas, Oklahoma and Louisiana; these three states constituting the three districts. The organization of the general superintendent's office, located at Dallas, Tex., consists of a division commercial and traffic superintendent and a division plant superintendent, and each district has a district superintendent and a commercial superintendent, the division plant superintendent looking out for plant matters in the entire division.

The Mountain division is made up of three districts, which include the states of Montana, Idaho, Wyoming, Utah, Nebraska, Kansas, Colorado and New Mexico. The districts in this division are by state lines and the organization comprehends, besides the general superintendent at Denver, a division commercial, a division traffic and a division plant superintendent, and each district has three superintendents for commercial, traffic and plant, respectively.

The Pacific division has three districts, and takes in the states of Washington, Oregon, Nevada, California and Arizona. One of these districts is by state lines, the other two are not; yet, owing to the fact that the dividing lines between the last mentioned districts are comparatively easy to follow, no difficulty should exist in administrative and accounting matters. The organization of the division, with the general superintendent at San Francisco, is a division commercial superintendent, a division traffic and a division plant superintendent, and in each district are superintendents for these three activities.

THE COMPANY'S CABLE INTERESTS.

As I said before, the Western Union Company is operating under lease two cables belonging to the American Telegraph and Cable Company. In addition, it operates, under lease, a cable of the International Ocean Telegraph Company, which connects the mainland at Florida with Cuba.

A proposed agreement was ratified at the last stockholders' meeting by which the Western Union Telegraph Company has leased, for a long term of years, the four cables belonging to the Anglo American Telegraph Company, and the cable belonging to the Direct United States Cable Company, under an operating arrangement.

The Western Union built a fine cable during the year 1910, the largest in capacity ever laid, which is known as the Bay Roberts cable, and this, together with those leased from the Anglo and Direct companies, will give control of eight ocean cables, not counting the International Ocean telegraph cable to Cuba.

The business which will thus be absorbed is a large one, and the plans of the accounting department are to establish a division auditor in charge of cables, and, for the sake of simplicity, to maintain an entirely separate set of books for the cable business, enabling the auditor to prepare a balance sheet and earnings report which can be combined with the Western Union land line statements. I understand the operating department is considering the creation of a distinct organization.

The company has for years had its own offices in London, Liverpool and Penzance, where cable business has been exchanged with the British Post Office cable companies and the Continent. It has also maintained joint offices with the Anglo and Direct companies in nine cities in Great Britain, and has agencies in Paris, Antwerp and Naples. Our new relations with the Anglo and Direct companies will, of course, soon increase our active interests abroad.

ACCOUNTING CONDITIONS AND ORGANIZATION.

The system of plant accounting which the telegraph company should have in respect to work reports for handling material, the preparation of payrolls, etc., is not dissimilar to that adopted by the telephone companies, but consideration will naturally have to be given to the provisions contained in the many railroad contracts.

A real distinction exists, however, in the commercial accounting in the field. Broadly speaking, the telephone companies' worries are confined to the recording of subscribers' exchange and toll business, this being generally concentrated for billing purposes at accounting centers. We find accounting centers in the Western Union Company in large cities, where branch offices report to main office: for example, at Chicago the billing is done from the main office, but this plan has not been put in effect in New York.

The principal difference, however, between the accounting arrangements of the telegraph company and those of the telephone companies is that the telegraph company has some 3,700 independent offices, including branches, and each one of these offices is practically a unit in itself, conducting its own charge accounts and paying its own expenses.

Then again the offices are engaged in transactions other than straight telegraph business; for example, each manager is obliged to keep separate in his accounts Western Union telegraph revenue; telegraph revenue from other lines; cable revenue; revenue from sub-rents; time service receipts; commercial news business, which is subdivided under several heads; money order business, for which he has to report principal, premiums and tolls; miscellaneous domestic revenue; messenger revenue; half-rate business, and messages sent under franks, of which there are a number of different kinds.

His disbursements, on the other side of the account, comprehend paid other lines, refunds, uncollectible messages, railroad companies' proportion of receipts, the regular expenses of the office, pay of messengers, rents paid in cash, rents paid in telegraphing, etc., and, in addition, he is obliged to keep distinct the account with the telephone offices, United States Government messages, and prepare his check report. These accounting duties, which I have just enumerated, give you only a brief sketch of the many duties required of the manager, for he is also the operating man.

In the telegraph company's business, where the accounting is of a complex nature, and also expensive, by reason of its being multiplied by the large number of offices, we have a problem to meet in the way of simplifying the manager's accounting duties. When I said that the accounts were complicated, I meant relatively so, in view of the fact that a manager is not primarily selected for his knowledge of accounts; he may be an excellent commercial man, or an adept in traffic matters.

Many changes have already been made in the accounting methods which would take a long time to explain and would bore you considerably to listen to. Suffice to say that by alterations in the organization, the Check Bureau and Free Message, or Message Settlement Bureau, were annexed by the auditor. The Accounting Department at New York has been subdivided into a division of receipts and a division of disbursements, and these into bureaus and sections, with necessary controlling accounts.

It was decided to divorce the auditing and accounting so far as possible from the supervision of the district superintendents, and, to this end, six division auditors, one for each division, were appointed and installed at the respective division headquarters and now report direct to the auditor at New York. The plan is that the Accounting Department will furnish periodical reports of operations for the administrative needs of general, division and district superintendents.

By organizing adequate staffs of traveling auditors under the supervision of the division auditors, it is expected that much assistance can be given the managers regarding the keeping of accounts, and that the rendering of reports will be improved, both as to time forwarded, and the shape in which they are sent in.

The division auditors are at present engaged in transferring the auditing of managers' accounts from the offices of district superintendents to their own offices, and this proceeding connotes the transference of employes, records, furniture and everything pertaining to the work.

The next step, so far as field accounting is concerned, will be changes in the methods of accounting now obtaining at managers' offices, and the preparation of a handbook for their guidance, the main objects being to make methods uniform and simple, and to establish the system of depositing receipts and making disbursements from advance accounts.

It is then contemplated for the division auditors to take over as much of the accounting work as possible from the district superintendents, which includes leased wire, pole license and plant accounting, and install plant records at division headquarters so that finally each division auditor will render monthly a balance sheet and earnings report for his division, and these statements will be combined with the head office figures in the auditor's department at New York, subject to interdivision transactions, thus arriving at statements for the entire Western Union Company.

The treasurer is considering appointing a division cashier for each division except the Eastern, at the headquarters of which he is himself located. When this plan, or one designed to afford the same facilities, is accomplished, each division will have the component factors to make it a unit in itself, subject to control exercised from New York.

About a year and a half ago we prepared a classification of accounts, but its issuance was held up pending the passage of the law which became effective August 17, 1910, vesting supervision over telegraph companies in the Interstate Commerce Commission. This action on the part of the federal authorities was followed almost immediately by similar laws from a number of the states, and conferences have been held with the Interstate Commerce Commission and the Public Service Commission relative to the promulgation by them of classifications of accounts for telegraph companies.

In view of the fact that it would take some time to install a classification of accounts for the Western Union Company, it was thought wise to hold the matter in abeyance until the Interstate Commerce Commission had issued its classification, which was received on November 29 last, with the statement that it would be operative January 1, 1912.

Fungus Growth on Rubber Insulation.—The *India Rubber World* refers to a fungus growth which sometimes appears on rubber insulation. This growth takes place sometimes, even when the insulated wires are inclosed in a conduit of enameled iron. The fungus growth, which destroys the insulation, is promoted by iron rust, which, with the consequent fungus growth, is impossible except where there is some moisture. The remedy therefore is to insure the dryness of the tube interior by blowing hot air through it, and then all future possibility of dampness must be prevented. If it is impossible under the circumstances to keep the inside of the tube dry a good quality of red lead paint is the best preventive of damp and fungi.

Panama Trip of Electrical Engineers.—Over one hundred members of the American Institute of Electrical Engineers will make a trip of inspection to the Panama Canal. The New York contingent will sail on the steamer "Almirante," January 17, and the steamer "Parismina" will sail from New Orleans, January 20, with those who prefer to take that route.

The Tribulations of A Military Telegraph Operator.

BY DERICK H. FITCH, OF CAZENOVIA, N. Y., MEMBER SOCIETY UNITED STATES MILITARY TELEGRAPH CORPS.

When General Price made his last raid to the North, in 1864, he was for a time in possession of the Missouri Pacific Railroad, east of Jefferson City. He cut all wires, hence communication with the state capital was suspended.

The only way to reach that point was to go on the North Missouri Railroad to Mexico, Mo., and then across the country. This caused a very unusual demand for transportation on the road where I was serving.

Someone at headquarters conceived the idea, that in order to save the capital, Gen. Pleasanton must go there and take command. About eleven o'clock one night I got orders to furnish transportation for him, and an escort of sixty cavalrymen.

It so happened that we had no cars south of the river suitable for horses. We had to get up steam on the ferryboat, take them across the river and to St. Louis, twenty miles.

His train consisted of two coaches for himself, his staff and escort, six cars for horses, and one or two for accountrements. When he got to St. Charles, it was daylight. As our boat could carry only two coaches, or four cars, at a trip, some time was consumed in getting the train across the river. The General was in a rage, called us all kinds of rebels and said the delay had been intentional.

Then he called for the conductor; said he wanted to give him his orders. I said, "General, it has been the custom here for train men to get their orders from me." He made no reply to this, but asked, "Are there any other trains on the road?"

I replied, "Yes, there are several." He said, "Telegraph and stop all of them." I said, "General, I cannot do that—some of them are as important as yours: if you let me guide yours as well as them, they will not be in your way."

Then he told his adjutant to arrest me, take me to the office and see that I telegraphed to stop all other trains. The adjutant, a harmless little fellow, called out half a dozen men armed with Colts revolving rifles. I was armed with a little bucket of milk for my breakfast. I was boarding in the office then, and had no use for sleeping apartments.

I said, "General, is your adjutant an operator?"

"No!"

"Then how can he tell what I telegraph when we get there?"

His rage was an improvement on what it had been. "Sir," he said, "will you obey my order?"

I said, "General, am I under arrest?"

"Yes, sir."

"Then I cannot. Army regulations do not permit me to do duty while under arrest."

The adjutant and the guard went into the cars. So far as I know, I am under arrest yet.

Then he ordered the conductor on to the rear platform and put a guard over him, and also a guard on the engine, and said, "Proceed!" Well, in order to prevent accident I made great haste then to obey his order and stop all trains within his range, except one, in charge of Conductor Ackert, which I thought I could move safely.

When we had any reckless running to be done, Engineer Vade Eans wanted to do it, and this morning we complied with his wish.

It was evident that he was in sympathy with the General's haste, for the way they passed telegraph stations made me shudder.

Warrenton, forty-two miles out, was passed in little more than an hour: nearly double the speed of our passenger trains, when we had any.

I judged that they could not possibly get to Wellsville before 11.30 a. m.; in fact, I doubted if they would get there at all, at the rate they had been going, with rolling stock and track unfit for such speed. So I gave the operator at Wellsville an order to stop and hold the train until that time unless Ackert's train had arrived, and gave Ackert until 11.30 a. m. to run there, which he could easily do.

Engineer Eans got in sight of Wellsville a few minutes after eleven, saw the signal, and blew the whistle for brakes.

"What is that for?" inquired the guard. "There is a signal to stop for orders," said Eans. "Never mind that; go ahead!" "All right," said Eans, "but you will soon know what that green flag is there for."

He did not leave Wellsville at forty miles per hour.

There was a curve a little way west of the station, and beyond there the track was straight and level for many miles.

The engineers of the two opposing trains saw each other in ample time to stop. When they came near together General Pleasanton ordered Ackert arrested and asked why he was in his way. Ackert showed him his orders.

"What time is it now?"

"Eleven ten," said Ackert.

Then he arrested the engineer; his orders were of course an exact copy of Ackert's. Then Pleasanton ordered them to back up.

Ackert, a native of Missouri, with some of the frontier grit, said, "No, sir: I have got orders which give me this track until eleven thirty; I have only three miles to run, and fifteen minutes yet to do it in, and I am going there or stay here."

Pleasanton went into his car and permitted his train to be backed up to Wellsville.

When "Old Pap" Price got near Jefferson City, he found that the officers there had made such provision for defence that he thought it prudent to "pass by on the other side," and was many miles away when Pleasanton got there: but the latter was in time to "assume command" and "capture" a few disabled cannon which Price had left behind.

When I next saw Eans I asked him if he was not afraid to run so without orders. He said he was, until after he passed the first telegraph station, and then he knew that if I could not give him a clear track, he would find signals to stop for orders, and he would have obeyed them in spite of his guard.

He would not have passed Wellsville if he had not a long straight track ahead. He wanted to show them what fools they were.

Major General Pleasanton's order to "proceed" did no harm. What would it have done if the telegraph line had failed?

Newark's First Telephone Exchange.

The *Sunday Call*, of Newark, N. J., for December 3 prints an interesting article on the first telephone exchange in that city. Mr. John J. Ghegan, president of J. H. Bunnell & Co., New York, was the manager of the exchange. It was established in 1878 and was under the protection of the Western Union Telegraph Company. Mr. Ghegan tells some interesting facts regarding his early experiences in the telephone business. One of his many duties was the soliciting of business. One Newark manufacturer well known for his enterprise laughed at the idea that the "scientific toy" could ever take its place among the business utilities.

"That's no good," he said to Mr. Ghegan. "You can't work that here."

Mr. Ghegan needed names for his list and he would never give up any prospective customer till every argument had been exhausted. This particular doubting Thomas listened good-humoredly enough while Mr. Ghegan set forth at length the particular reasons why the telephone was destined to play an indispensable part in the affairs of business.

"Well," said the manufacturer with a laugh, "you're a good talker anyhow. I'll tell you what I'll do. When you get a hundred names come to me. But you'll never get 'em."

"I got them all right," said Mr. Ghegan, "but before I did I had that man's name on the list."

"I guess the laugh's on me," he said, as he handed in his order for a telephone.

"In the early days of the telephone business in Newark," Mr. Ghegan said, "telephones were not listed by number. When you wanted the Murphy Varnish Company you called for the Murphy Varnish Company.

"You might suppose," said Mr. Ghegan, "that this was a rather unwieldly system. But when we decided to change to numbers there was an awful kick. I remember one eminently respectable old manufacturer got fairly blue in the face when he called for his place of business by name and the central insisted on the number of the telephone. I got the effect at my end and I heard about the scene at the other. We had a pretty tough time of it before we could get people to call for numbers. Our office had about 150 subscribers when we made the change."

Referring to his experiences in introducing the telephone in Mexico Mr. Ghegan says: "We discovered something about Mexican women. They had nothing to do, apparently, except to talk all day or listen all day. With such conditions there was no possibility of giving anything like an efficient service. It was a serious problem, but we solved it. We put in a push button on each side of the telephone. In order to use the line it was necessary to shove in one of the buttons. This grounded the line there and cut off service on the one side or the other of the place where the telephone was located, and when the women cut in to listen the talk would stop. It was a hardship for them, of course, for it deprived them of their chief source of amusement, but we were running a telephone company, not a long-distance entertainment bureau."

Mr. Ghegan, who is a member of the Telephone Pioneers of America distributed a reproduction of the first printed list of subscribers of the Newark exchange at the recent meeting of Pioneers in Boston.

Creating Business.*

BY H. L. CLARK, MANAGER WESTERN UNION TELEGRAPH OFFICE, MARIETTA, OHIO.

The company that renders good service, creates a demand for the service and advertising is one of the greatest creators of business.

In the telegraph business there is no better advertisement than a prompt, reliable service. A satisfied customer is a standing advertisement and a creator of business. Publicity and education are great factors toward creating business. When a new service is inaugurated it should be given all the publicity possible, and the public educated to use it.

The specialized blank is another good business creator, both for the customer and telegraph company as it acts as a salesman for the customer and creates business for the telegraph company. As this is an era of business-creating and new service, I wish to suggest another service which might appeal to the public and act as a sort of fill-in, although it might not be practicable. The same, no doubt, was said of the Day and Night Letter service before they were tested and found to fill a "long felt want." I suggest what might be called the "Mailogram," a five or ten word message, filed at any time before midnight at one-half the standard tolls for a ten word day message, no tolls less than fifteen cents, to be mailed at destination for delivery the following morning. This would be a compromise between the two services and answer the purpose for those who do not wish a long night letter and might be the means of creating a new field of business.

*From "Seventh District Blue Book."

Life of a Storage Battery.

BY FRANK M. EWING, ASSISTANT MANAGER TELEGRAPH DEPARTMENT, PENNSYLVANIA RAILROAD COMPANY, SOUTH WILLIAMSPORT, PA.

There is a great difference in opinion and experience regarding the life of a storage cell. The life of the cell depends very much upon how closely it is worked to its rated capacity as well as upon its mechanical construction. Some claim that when worked to an average of eighty per cent. of its full capacity it is safe to count on two years' service without any attention, except to occasionally add a little water to replace evaporation, while others assert that some storage batteries have been in use for over three years without other attention than to add water occasionally in order to keep the tops of the plates covered.

The quality of water used for storage cells is an important matter. In some localities the water is very injurious to the elements of storage cells, tending to shorten their life. It is essential that the acid and water be free from impurities, such as iron, arsenic and nitric or hydrochloric acid. In selecting sulphuric acid none but the sulphur or brimstone acid should be used; acid made from pyrites is liable to contain impurities, such as iron or arsenic. In places where pure water is not available only distilled or rain-water should be used.

Although storage batteries do not store electricity, they store energy by converting the kinetic energy of the electrical current into chemical potential energy, which is available as kinetic energy. The efficiency of the accumulator (or of any other means of storing or transforming energy) is the output divided by the input. This quotient is always less than one, as the accumulator is not a perfect storer of energy. There are certain losses in the transformation of kinetic electrical to potential chemical energy, and vice versa, besides the loss of the energy required to force the current through the cell, i. e., the loss due to the resistance of the plates and electrolyte.

I find from my experience in handling the Type E chloride accumulators which are used for telegraph and telephone work, that when they are not discharged at an excessive rate, nor to a lower electromotive force than 1.9 volts per cell, the positive plates last for about 1,200 or more discharges; while, if discharged each time below 1.8 volts per cell, or at an excessive rate, the life of the positive plates will not be more than 400 or 500 discharges. The negative plates, with good care, will usually outlast four or five sets of positive plates. The cells under my care last between four and five years, which is considerably longer life than is given in the various ratings, and only require the addition of sufficient water to replace evaporation and keep the tops of the plates covered at least ½ inch. Between the fourth and fifth year of service the positive plates become distorted which effect is known as buckling, and they crumble to pieces.

The cause of buckling seems to be the formation of sulphate in the plugs of active material which fill the spaces of the grids, thus causing the plugs to expand; lead having very little elasticity, the grid is forced out of shape. As usually constructed, the edges of the grid are heavier than the intermediate portion, so that the effect of the distortion is to bulge the plate in the center. If the plates are not discharged too far and too rapidly, the expansion of the active material is gradual, causing the grid to stretch evenly; this makes the plates "grow" or increase in area, sometimes as much as ten per cent.

Unless a battery is properly looked after, sulphating is liable to set in, and if allowed to proceed too far may cause much trouble. Lead sulphate is formed during each discharge of a cell, but this sulphate does no harm; in fact it is essential to the operation of the cell. However, under certain conditions a white insoluble sulphate may be formed, and it is this that causes the action known as sulphating. When a cell is sulphated, the plates, particularly the positive, become covered in spots with this white insoluble sulphate, which is difficult to remove. As the sulphate usually accumulates in patches, and as it prevents to a large extent chemical action on the active material underneath it, the capacity of the cell is reduced and the uneven action is liable to lead to buckling, unless the mechanical structure of the plate is such that buckling is practically impossible.

The most frequent causes of sulphating are overdischarging, strong specific gravity of the electrolyte, and allowing the battery to stand for a considerable length of time in a discharged condition. If a battery is looked after, as it should be, there will be no trouble from this source. If cells are repeatedly discharged below 1.7 volts, sulphating may be expected. At the end of a complete charge, a lodgment of white powder, that may easily be brushed off, will sometimes be noticed on top of the plates, provided the body of the plates are the proper color (positive, dark brown and negative, slate color). No attention need be paid to this powder as it is composed of particles from the plates thrown off by the gassing at the end of the charge. These particles become sulphated and of a light color while in suspension in the electrolyte.

In case white insoluble sulphate appears on the plates, the battery should be given a long continued charge at a low rate, somewhat below the normal eight-hour rate, until the cells give all the signs of a full charge and the plates have resumed their normal color. In case of badly sulphated cells, the color of the positive becomes lighter than normal and the negative considerably darker.

There are several kinds of treatment that will injure the cells. Among these is the habit, (which should never be permitted,) of connecting the terminals through a small resistance, or short wire, to see if the battery is in working order, or how much of a spark it will give. A current of great magnitude will flow for a moment and it will likely loosen the paste and cause sulphating in the cell. Either a voltmeter or an incandescent lamp of known voltage should be used to determine the condition of the battery.

A complete charge should exceed the previous discharge, in ampere hours, from twelve to fifteen per cent. The principal indications of a complete charge are:

(1) The voltage and specific gravity reach a maximum value, which value is not necessarily fixed; for example, the voltage at the end of a charge may be from 2.4 to 2.7 volts. In the battery under my care the specific gravity always stands at 1,200 degrees and falls to 1,190 degrees on discharge.

(2) The amount of gas given off at the plates also increases when the cells are fully charged. Nothing is gained after the plates commence to gas freely, and it has been my practice to cut the charging current off when this action takes place.

(3) The positive plates become a dark brown, and the negatives a light gray.

(4) With all the cells of the battery in normal condition, with pure electrolyte and no material lodged between the plates or sediment touching them at the bottom, the maximum voltage and specific gravity are reached when, with the charging current constant at the normal rate, there is no further increase in either during a period from one-quarter to one-half hour. For example, if the charge has been carried on for eight or ten hours with a gradual rise in the voltage and specific gravity during that time and with an additional one-half hour of charging there should be no further rise in either, then the charge is complete. When a storage cell has the electrolyte covered with paraffin oil, there may be at any time a thin white froth on top of the oil, but when this froth develops rapidly to a depth of one-quarter inch, the cells are charged sufficiently. Care should be taken to keep the plates immersed in the electrolyte more than half an inch above the top of the plates. A storage cell will not attain its maximum capacity until it has been subjected to from ten to fifteen discharges, but will have at first about three-fourths of its maximum.

In order to secure satisfactory operation of a storage battery each of the cells should be inspected at regular intervals. It has been my practice to inspect the cells every day and watch them carefully while they are being charged. The voltage of individual cells may become low, the electrolyte may not be of the proper specific gravity, or foreign substances may become lodged between the plates or in the bottom of the cell, and regular inspection is necessary to locate any such defects that may develop.

For the inspection of individual cells, a portable lamp should be used so that any tendency for an accumulation or lodgment of material between the plates can be at once seen. If the elements are in glass jars, an ordinary lamp with extension cord to attach to the electric service wires will be found most convenient; by holding the lamp behind the jars and looking through between the plates the condition of the cell can at once be determined. When examining a cell great care should be taken to look between all the plates, and any accumulation of material should be removed at once. A lighted match should never be used to examine cells as there is danger of igniting the gas thrown off while charging. There have been cases where explosions were caused with a lighted match. If there is an accumulation of sediment from the plates themselves, it may be pushed down to the bottom of the containing vessel by means of a stick of hard rubber or wood; if it is any foreign substance it should be removed from the cell. A metal rod should never be used for removing obstructions in a storage cell; it is sure to cause short circuits and do damage.

In addition to the examination of the cells with the lamp, an examination should be made near the end of each charge to see if all the cells are gassing equally and freely. If any of the cells show readings lower than normal and do not gas freely at the end of the charge they should be examined at once with a cell lamp to determine the cause of the falling off. Very likely it is due to short circuiting between the plates, caused either by a lodgment of material in the intervening space or else by an accumulation of sediment in the bottom of the cell.

The life of a storage battery is much longer when it is installed in glass jars on account of permitting the examination of the condition of the plates while the cells are in operation. A thorough inspection cannot be made while the cells are in operation when enclosed in hard rubber vessels and lead-lined wooden tanks. Of course glass jars cannot be used for automobiles or coach lighting on railways because they cannot withstand rough usage and constant jarring, which ability is of more importance than long life for this class of service.

During my nine years' experience in handling storage batteries only one trouble developed that I did not understand. After the cells were cleaned and put in commission again, I discovered that the negative plates would gas as much and freely on discharging as they did while charging. In a short time a large amount of black substance resembling crude rubber formed in the bottom of the cells, in about six or seven hours the battery would play out after giving it the regular charging rate. I could find no information upon a trouble of this nature and those who had experience in handling storage batteries were equally puzzled. They all suggested giving an over charge; the specific gravity was run up to 1,250—fifty degrees above normal, but the trouble still remained and was not removed until new negative plates were installed. The trouble was caused by the negative plates being exposed in the air too long while the battery was being cleaned, although the men were cautioned to keep the plates in a jar immersed in water while cleaning them. The plates had been in service six years when this occurred.

New Book on Telephony.

Modern American Telephony, In all its Branches. Edited by Arthur Bessey Smith. Published by Frederick J. Drake & Co., Chicago.

Telephony in all its branches is a large subject to cover in one volume, but the editor has succeeded very well in producing, in this case, a book that will be of particular interest to the student and the beginner in telephone work, as well as to the technical telephonist. It is very comprehensive and should meet with much favor among the classes of persons mentioned.

The scope of the book will be better appreciated by giving a list of the subjects of the chapters:

The Invention and the First Principles of the Telephone. The Installation, Operation, and Maintenance of Telephones; Including Electro-motive Force—Sound and Sound Waves. Induction, Strength and Direction of Induced Currents. Direct and Alternating Electrical Currents. Pressure, Resistance. Capacity. Magneto System—Transmitter. Magneto Generators. Batteries. Common Battery Systems. Power Plants for Common Battery Systems. Magneto Switchboards. Switchboard Installation. Multiple Switchboards. Common Battery Non-Multiple Exchanges without Central Office Connections. Test Boards, Distributing Boards, Testing Apparatus. Protective Devices. Measuring Instruments, The Wheatstone Bridge. Telephonic Troubles, How to Find and Remedy Them. Line Construction. Rural Line Construction. Electrical Conduit Construction. The Latest Automatic Systems. Wireless Telephony, etc., etc.

The book contains 790 pages and 470 illustrations, the diagrams being in the main clearly executed and helpful to a correct understanding of the subject they are intended to elucidate.

The chapter on wireless telephony will be found very timely. It gives a history of this branch of work and describes the various systems so far developed.

Automatic telephony, which is receiving much general attention at the present time, is also well presented and complete.

The book does not confine itself to a description of any one make of apparatus or any one system, but is universal, all practical systems coming within its attention. It is a good general review of the entire field of telephony and cannot fail to be of use to every one who has a desire to know things, whether he is in the telephone business or not, but it will be especially useful to the telephone man.

Copies of this book may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, at $2.00 per copy.

Industrial Democracy or Monopoly?

Mr. William W. Cook, general counsel and trustee for the Mackay Companies, New York, is the author of an article in *McClure's* for January under the title "Industrial Democracy or Monopoly? How American Railways Can Be Taken Over for the People Safely and Easily." It is a very comprehensive view of the railroad problem in relation to the public. "The railroad and corporation question," he states, "is still acute, as it has been for twenty years. Today it is intensified by the concentration of railroad power and bank power in the hands of Wall Street capitalists. It is a contest of political democracy with concentrated capital. The question is, Which shall control the nation?

"The American people," Mr. Cook continues, "believe in competition. But the trouble is that competition has been giving way in all directions. This is an age of consolidation, natural, irresistible and inevitable—consolidation of railroads and of all classes of industrial companies. Statutes may prohibit it and courts may denounce it, but it cannot be stopped any more than the tides. It is inevitable because it reduces cost, controls prices and makes more money. Great consolidations are here to stay."

Touching upon "Holding companies," Mr. Cook says: "The holding company, when properly used, is a lawful and very workable mode of organization. It is the latest, most useful and highest development of the corporation. And the corporation is a wonderful mechanism. The holding company is capable of infinite uses as well as great abuses. It is admirably adapted to the ownership and management of railroads, and, in fact, all great properties. It is my belief that this excellent instrument should be taken from the hands of Wall Street and placed in the hands of the people; that it be used for the formation of a new industrial democracy."

No Strike of English Operators.—Mr. Herbert Samuel, postmaster general of Great Britain, stated in the House of Commons recently that he did not think that there had been any probability of a strike of post-office officials. "Any uneasiness which may have existed," he said, "is already allayed."

In renewing thirty subscriptions going to chief train dispatchers and managers to that number of offices in the Southern Railway System, Mr. W. H. Potter, superintendent of telegraph, writes: "Your paper is very interesting and I believe the information contained therein has and will continue to be of considerable value, especially to those engaged in telegraph and telephone work. The series of articles you are now running on telegraph and telephone engineering promises to be of considerable value to those who will give the subject proper study."

Telephony and Wireless Telegraphy Before the Turin Electrical Congress.

At the recent international electrical congress held at Turin, Italy, Mr. Frank B. Jewett presented a paper in which he described long-distance telephony in America. He stated that about 2,000,000 wire-miles of long-distance telephone lines are in use. Of this total wire mileage about 80 per cent. is in the form of open-wire circuits, on 168,000 miles of pole line, and the remainder is in cable circuits, principally underground. In addition to the equipment used exclusively for long-distance business, the equipment for exchange service and for connecting individual subscribers with the toll system comprises about 9,700,000 miles of wire. Practically all of the open-wire mileage is in the form of hard-drawn copper metallic circuits, many of which are equipped with Pupin loading coils. The copper wire ranges in weight from about 102 pounds per wire-mile to 430 pounds per wire-mile, the most common size weighing approximately 173 pounds per wire-mile. Many of the open-wire circuits are arranged to secure a third talking circuit from two metallic circuits by the phantoming process. The arrangement of open-wire circuits for phantoming is being extended with great rapidity, and with the more intimate development of a combined commercial telegraph and telephone system the compositing and simplexing of total circuits for simultaneous telephone and telegraph operation is being generally applied to all long-distance lines. Whether the wires employed for long-distance circuits in cables are large or small, they are invariably equipped with Pupin loading coils. The same is almost invariably true of all cable circuits employed for bringing open-wire toll lines into cities, whenever the length of such cable circuits is sufficient to warrant the use of loading coils.

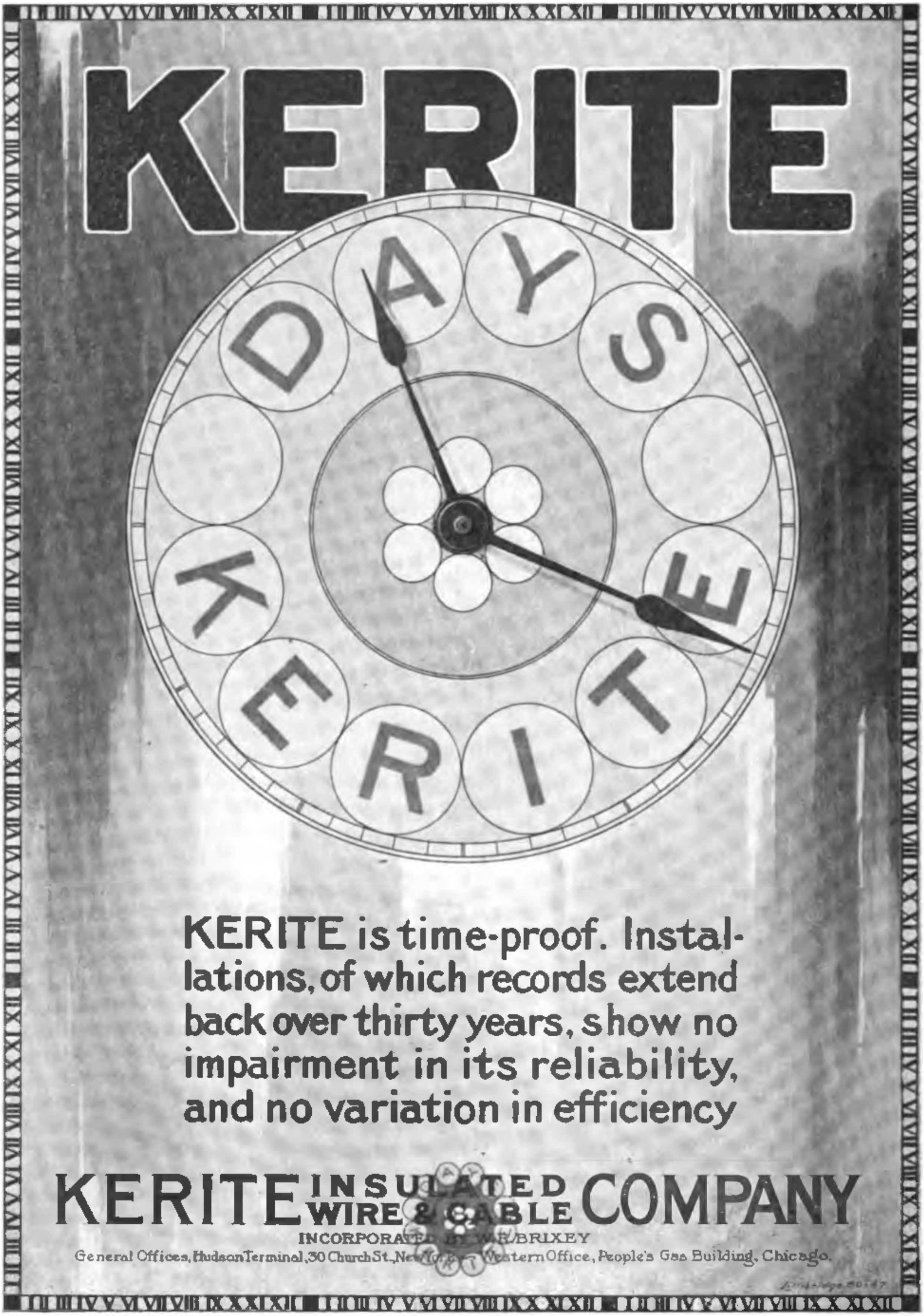
Prof. P. O. Pedersen briefly outlined the different methods employed or proposed for increasing the degree of secrecy in wireless communication. A method devised by Mr. M. A. N. Hovland, a Norwegian naval officer, provides for automatic transmission in secret characters, the sender and the receiver being arranged to translate automatically from the usual to the secret characters and *vice versa*. This system permits a comparatively high speed of transmission.

A paper by Mr. H. Milon dealt with the advisability of using automatic and semi-automatic telephones in large cities. He briefly described the mode of operation of the manual, the automatic and the semi-automatic, and then proceeded to a comparison of the three systems on the score of quality of service and economy of operation. The author stated that while all telephone experts are not in accord regarding the relative merits of these various systems, it is doubtless true that the future will see a continual improvement and simplification of the automatic systems, while the recruiting of good operators will in all probability become more and more difficult as social conditions improve.

A brief résumé of the present state of development of wireless telephony was given in a paper by Dr. Valdemar Poulsen. The inability to construct a microphone capable of handling comparatively large amounts of energy constitutes the only present limitation of transmission distance. With a suitable microphone it would be feasible with present apparatus to transmit wireless telephone messages over the same distances now employed in wireless telegraphy. One distinct advantage of wireless over ordinary telephony lies in the fact that the timbre of the voice is not changed with distance; therefore the use of suitable relays offers great practical possibilities. One of the disadvantages of wireless telephony is the inability to receive messages at a station simultaneously with the sending of messages from the same station. Indeed, an attempt to do so will probably result in the destruction of the microphone. In its present state of development wireless telephony may be used commercially for distances up to 100 km. (62 miles) or 200 km. (124 miles).

Telegrapher's Cramp.—As already announced in these columns, the British post-office authorities reported recently on their investigations into the causes of telegraphers' cramp. After giving some statistics as to the percentage of operators afflicted, the report goes on to say: "The arduous and exacting nature of a telegraphist's work was put forward as a cause of cramp by the Postal Telegraph Clerks' Association in their evidence before the Industrial Diseases Committee in 1908. To show the physical and mental strain of the work upon an operator, it was explained that in sending at the rate of twenty-five words a minute 22,500 clearly defined signals per hour had to be made. The figures were said to be not uncommon, though they amount to seventy-one messages an hour; and it was contended that so unnatural and continued a stress could result only in nervous and physical deterioration. To make matters worse, the Post Office was said to be urging the staff to a greater and greater output of work, and the increased pressure on the operators had resulted in an alarming increase in the number of cases of cramp." The recommendations of the committee are: The admission into the service of fewer unsuitable learners; the more uniform tuition, under close and careful watching, of those who are admitted; the more rigorous protection of young workers from conditions of undue stress; the steady substitution of mechanical forms of sending for the finer muscular movements demanded by the Morse instrument; and the discovery and use of fresh forms of variation and relief for operators.

Convention of Electrical Engineers.—The next annual convention of the American Institute of Electrical Engineers will be held at Boston, June 25-28, inclusive.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The Railroad.

Mr. C. S. Rhoads, superintendent of telegraph of the Big Four System at Indianapolis, Ind., was in Florida recently on a vacation and he reports finding delightful weather and having a good time.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., and Mrs. Williams announce the marriage of their daughter Alma to Mr. Eugene Norfleet Davis on December 28, 1911. Mr. and Mrs. Davis will reside in Aberdeen, Miss.

Mr. P. E. Clark, general superintendent of the Lackawanna Railroad, at Scranton, Pa., has been appointed assistant to the president of that road, and Mr. E. M. Rhine has been appointed general superintendent to succeed Mr. Clark. Both Messrs. Clark and Rhine were former telegraphers, Mr. Clark being in the military telegraph service during the Civil War.

Railway Signal Association.—The proceedings of the annual convention of the Railway Signal Association held at Colorado Springs, Col., October 10-12, 1911, have just been issued in book form. The volume contains 636 pages, and a vast amount of information of general interest to railway men. Mr. C. C. Rosenberg, Bethlehem, Pa., is secretary of this association.

Association of Railway Telegraph Superintendents.

The committee of arrangements for the next convention of the Association of Railway Telegraph Superintendents, which is to be held in New York June 24, expects to soon make an announcement as to the plans for the convention, headquarters, entertainment, etc. It is intended that the arrangements shall not lack in any detail, and the committee feels confident that the New York convention will be one of the most successful ever held by the association. Mr. L. S. Wells, electrical superintendent and superintendent of telegraph of the Long Island Railroad, New York, is the chairman of the committee of arrangements.

Mr. Wells will be absent from New York for a few weeks, during which time Mr. L. B. Foley, superintendent of telegraph of the Lackawanna Railroad, New York, will act as chairman of the entertainment committee.

Retirement of Superintendent E. A. Smith.

Mr. Edgar A. Smith, assistant superintendent of the Boston & Maine Railroad, Fitchburg Division, Boston, Mass., has been retired from active service by the company taking effect on January 1, and the authority of Mr. J. D. Tyter, assistant superintendent, has been extended to cover the entire Fitchburg Division.

Mr. Smith was one of the best-known and most popular railway telegraph superintendents in the country and is familiarly known as "Smith of Boston." He was manager of the Western Union office in Fitchburg, Mass., between 1868 and 1870, when he entered the service of the Fitchburg Railroad. He passed through several positions and finally became superintendent of telegraph in 1890, which position he held until the Fitchburg Railroad became part of the Boston & Maine system. During his varied experience Mr. Smith was a passenger conductor for some time, and E. A. Smith Division 146, Order of Railway Conductors, was named after him.

The Turner Monument Fund.

The bronze tablet for the Turner monument which is on exhibition in the window of the Gorham Manufacturing Company, Fifth Avenue, New York, has been inspected by a large number of telegraph people and the general opinion is that it is a model of artistic skill and an excellent example of bronze casting. All those who are interested in the monument project, and who can find it convenient to do so, are advised to go and see the tablet as it affords a good subject for study.

The remittance of $10 from Mr. J. J. Ghegan, acknowledged in our issue for January 1, was in addition to that gentleman's previous contribution of a like amount. This makes $20 in all received from Mr. Ghegan on this account.

The total amount received toward defraying the expenses of the monument is $1,776.99.

Mr. J. B. Taltavall, 253 Broadway, New York, is the treasurer of the fund and will be glad to receive subscriptions from those who have not yet contributed and who wish to be identified with this historical movement. Subscriptions are acknowledged in the columns of TELEGRAPH AND TELEPHONE AGE, and the funds are deposited in the Washington Trust Company, New York.

Telegraph and Telephone Facilities On Governors' Special Train.

The Western Governors' special train which covered the eastern states in December was fitted out in every way possible with telegraph and telephone facilities. While at Philadelphia three direct line telephones were installed on the train and a uniformed attendant looked after the local and out-of-town calls. A 30-foot pole had to be erected especially to connect the train with the nearest junction box.

Mr. C. A. Crane manager of the St. Paul, Minn., Western Union office was designated by commercial superintendent A. D. Bradley, Minneapolis, Minn., to represent the Western Union Telegraph Company on the special throughout the trip. The fact that the Governors and train management passed unanimous resolutions thanking the telegraph company for manager Crane's services, shows that his duties were fulfilled in an eminently satisfactory manner. A large amount of full paid message business was handled from the train as well as a large press file.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. There is a general demand for knowledge on the quadruplex, duplex, etc., and to aid in the acquirement of such knowledge we are extending our help to students by asking questions on these subjects in each issue of our journal, so that they may be encouraged in their studies by answering them. We use as our text-book Maver and Davis' "The Quadruplex," and students should have a copy of this book at hand in order to be able to give the answers. The questions are progressive and a careful reading of the book on the points under inquiry unfolds the answers. This method of acquiring technical knowledge is a fascinating one.]

THE WHEATSTONE AUTOMATIC.

In the Wheatstone system what is the function of the perforated paper?

Are the currents used in this system of one polarity or both polarities?

How are the lengths of the received characters governed?

Where are the two needles located with reference to the perforated tape?

How does the tape operate the pole changer?

If there are no perforations in the tape, does the pole changer operate?

What kind of a relay is used at the receiving station?

What governs the operation of the relay armature?

What instrument does the polar relay at the receiving end of the line control?

What causes the limitation of speed in the Wheatstone system?

What advantage is there in the comparatively slow speed of the Wheatstone system?

In what way does the operation of the Wheatstone system resemble hand (Morse) operation?

In sending a dot on a polar duplex or the polar side of a quadruplex, how many motions are made and how often is the polarity of the current changed?

In closing the key at the sending station, what action takes place in the distant polarized relay, and when the key is opened what is the effect upon the relay?

How many main pieces of apparatus does the Wheatstone system consist of?

What is the perforator?

Describe the construction of the perforator.

Why is the paper tape dipped in oil?

How is a dot represented by holes punched in the tape?

What does one perforation represent (see Fig. 52)?

How is a dash represented?

What is the purpose of the star-wheel in the perforator?

How is the punching done?

What punching-speed can an expert attain?

Why cannot a higher speed be made?

What is the character used to represent the letter L, and why was it necessary to change the Morse character for L?

Message Clip Stand.

The office of the engineer of equipment of the Western Union Telegraph Company, New York, has designed a message clip stand to hold received messages until they are picked up by the check clerk.

The clip holds the messages by means of its own weight, which insures easy ingress and egress, and at the same time prevents their blowing off the table.

The stand is constructed with a cast-iron base, into which is fitted a curved upright pipe, with a gravity clip at the top, and the whole is finished in black enamel.

The stand is intended to be placed on the table directly back of the typewriter drop on receiving positions only. This brings the clip in such a position that a message can be inserted directly into the clip with the same movement that draws it from the typewriter carrier.

It is equally convenient for pen receiving and affords a minimum of reach.

Earth Antennæ for Wireless Telegraphy.—Count Georg von Arco, in the course of a lecture delivered recently in Berlin, Germany, discussed the subject of wireless telegraphy. He stated that the question had for a long time remained undecided whether the distant effects were caused through the air or the earth, or through both media simultaneously. During the course of years experts became more of the opinion that the earth was largely concerned with the transmission. In order to obtain information on the matter, systematic experiments had been made during the past two years by Dr. Kiebitz, on behalf of the German postal authorities. It was found in this connection that electrical energy was transmitted for considerable distances through the earth, and that in the case of great distances sufficient energy could even be taken from the earth alone for the purpose of reception. Stimulated by these results, the Gesellschaft für Drahtlose Telegraphie had made numerous experiments in the past year, and had applied for various improvements in patents. The effects of the earth antennæ were sharply directed, and the antennæ in many respects showed advantages over air antennæ. In particular it was possible considerably to increase the security against interruptions by atmospheric discharges and by stations causing disturbances.—London *Electrical Review.*

The Serial Building Loan & Savings Institution, New York, has issued, in pamphlet form, the annual address of President A. G. Saylor. The address gives much interesting information regarding this worthy institution and incidentally dwells upon the importance of saving while young.

New Book on Telephony.

A new book entitled "Modern American Telephony in All Its Branches," edited by Arthur Bessey Smith, is now ready for delivery. It contains over 800 pages and nearly 600 illustrations, and is the most complete and up-to-date work on the subject. The price is $2.00 per copy. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Reminiscences of Charles Minot.

BY JOHN C. HARING, PIERMONT, N. Y.

The reminiscences published in your issue of December 16, 1911, of Charles Minot, to whose memory a monument is to be erected at Harriman (formerly Turner), N. Y., reminds me very vividly of the time when he was general superintendent of and I was a conductor on the Erie Railroad. When he desired to ride on the Eastern division and branches our train dispatcher, Mr. Henderson, or Wandel, would call me to run the train "wildcat" to any points Mr. Minot wished to go on an inspection trip.

Mr. Minot very much enjoyed a good story or a joke along with business. On one occasion he was at Port Jervis and asked me when I was going east. I told him I had orders to go as soon as we could make up the train, which would be an extra freight. My regular passenger run was on alternate days, and, whenever freight was running heavily, we would use the passenger engines for extra runs to Suffern and return. He said: "All right, I'll go with you." A short time before, orders had been issued to remove all seat cushions from the cabooses, which order had not been carried out in this particular caboose, but I had time to tell the crew that Mr. Minot would ride down with us. When he got in the caboose there were no cushions in sight. Mr. Minot was quite a portly man, and, while he was lying on the board locker, his stomach performed gymnastics. He stood it pretty well until we reached Turners. Before he got off, he complained about the caboose riding so hard and told me to ask Charley Cooper at Port Jervis to take it in shop for new springs, as it would wear out the conductors faster than he could provide them.

Mr. G. M. Huntington in his reminiscences states that Mr. Minot was not as particular as he should have been to obey his own rules. As an instance of this, when he found the caboose rode too hard, he said the brake had been used too much, which had flattened the wheels, and he said he thought he would take the brakes off entirely. When I replied that that would conflict with his instruction book, which stated plainly that the rear car on any train must be a good brake car, he said, "Well, I can easily change that!"

Mr. Minot had a way of his own to test his men to see if they knew their business, and had studied the instruction book, but he was universally liked.

Announcement.

Otto and Hugo Hoenack, sons of the late Paul Hoenack, with whom for the past twenty years they have been associated in the manufacture of electrical experimental and working apparatus, including telegraphy in all its branches, cable, multiplex, printing and automatic, also in telephony and general high class experimental work, wish to announce that the business will be carried on with the same high degree of expert mechanical efficiency as heretofore, under the name of Paul Hoenack, at 108 Park Row, New York.

T. M. B. A. Annual Report.—The published proceedings of the forty-fifth annual meeting of the Telegraphers' Mutual Benefit Association held in New York, November 15, 1911, are being distributed among the members. They are gotten up in the usual comprehensive form, and tables show the growth of the association by years since its organization. Mr. M. J. O'Leary, 195 Broadway, New York, secretary of the association, will be glad to furnish copies to anyone contemplating applying for membership.

Association of Broker Telegraphers.—The annual report of secretary Chester L. Hall of the Association of Broker Telegraphers of New York has been issued in pamphlet form. The primary object of this association is to secure for its members satisfactory positions at satisfactory remuneration, and, while the association confines its work principally to New York City, it is willing to help its members in other cities as far as it can.

Things to know about Telephone Systems.—The Kellogg Switchboard and Supply Company, Chicago, has issued a pamphlet entitled "Things Telephone Users Should Know About Telephone Systems and Service." The information it contains is well worth careful consideration.

Calendars for 1912.

We have received calendars for 1912 from Messrs. J. H. Bunnell & Co., The James Kempster Printing Company and Serial Building Loan & Savings Institution, New York.

A Fatal Cigarette.—Albert G. Bouton, a lineman, while working on top of a telegraph pole in South Norwalk, Conn., January 5, attempted to roll a cigarette. He lost his balance and fell to the ground and was killed.

Valuable Books.

Practical Telephone Handbook and Guide to Telephonic Exchange. By T. S. Baldwin.

This book contains chapters on the use of the telephone, line construction, line materials, locating and correction of faults in lines and instruments, besides much other information of value to promoters, builders and managers of rural telephone lines. It is written in popular language and covers the field of telephony very thoroughly. The book is well illustrated. Price $1.00 per copy.

Operators' Wireless Telegraph and Telephone Hand Book. By Victor H. Laughter.

A complete treatise on the construction and operation of the wireless telegraph and telephone, including the rules of naval stations, codes, abbreviations, etc. The principal systems of wireless telegraphy are described and altogether this book will be found an excellent aid in the study of the art and practice of wireless telegraphy and telephony. It is profusely illustrated with views and diagrams of instruments, etc. Price $1.00 per copy. For sale by TELEGRAPH AND TELEPHONE AGE, New York.

Signal Corps Men Elect Officers.—Gen'l A. W. Greely, camp United States War Veterans, held their annual election of officers at Chicago, December 28, and elected these officers: Geo. Lee, commander; Richard S. Gill, senior vice commander; Danl. F. Delahunt, junior vice-commander; Jos. A. Beckemeyer, adjutant; John W. Konigsmark, quartermaster; Capt. J. W. McConnell, trustee. Greely Camp is composed entirely of signal corps men who served during the Spanish-American war, the membership being scattered throughout the United States.

Annual Meeting of Serial Building Loan and Savings Institution.

At the recent annual meeting of the Serial Building Loan and Savings Institution held at 195 Broadway, New York, the following officers were elected: A. G. Saylor, president; James R. Beard, vice-president; E. F. Howell, secretary.

Directors: A. G. Saylor, Thos. M. Brennan, T. E. Fleming, G. W. Blanchard, M. S. Cohen, H. A. Konninger, W. B. Dunn, James R. Beard, M. W. Rayens, W. J. Quinn, M. J. O'Leary, E. E. Brannin, C. A. Kilfoyle, J. T. Laidlaw; attorney, John T. Mulhall.

Advisory Committee: Chas. P. Bruch, Thos. W. Carroll, E. S. Butterfield, John A. Hill, W. H. Baker, Edwd. Reynolds, E. M. Mulford, A. C. Terry.

The report for the six months ending December 31, 1911, shows:

ASSETS.	
Cash	$19,256.01
Mortgages	516,912.23
Loans on shares	5,688.00
Real estate	14,733.30
Land contracts	5,804.61
Tax and insurance	1,234.46
Furniture	400.00
	$564,118.61
LIABILITIES.	
Shareholders' Cumulative	$358,845.48
Income " "	128,109.31
Juvenile " "	736.52
Borrowed money	30,240.38
Due on loans	3,000.00
Surplus	43,196.92
	$564,118.61

New Western Union Office at Memphis, Tenn.

The Western Union Telegraph Company has moved into new quarters in Memphis, Tenn., and now has one of the best equipped and most thoroughly up-to-date telegraph offices in the country. The entire office is fitted up in oak with furniture to match, and brass pneumatic tubes run to the operating department, which is located on the fourth floor. The bookkeeping, delivery and telephone departments are divided off by a frosted glass partition so that the public only see the desks of officers. All customers' writing desks in the lobby are covered by heavy plate glass. The employes have also been provided with suitable rest and locker rooms, and every attention has been given to their comfort and convenience. L. E. Rudd is manager, J. C. Young, cashier; J. E. Lively, chief operator; W. D. Bard, wire chief; R. E. Griffey, repeater chief; C. R. Vestal, night chief operator; L. C. Howard, all-night chief operator, and E. A. Shaw, day traffic chief.

New York Telegraphers' Aid Society.

The New York Telegraphers' Aid Society's financial statement for the quarter ended December 6, 1911, shows:

Balance on hand September 6, 1911		$24,493.71
Receipts		1,685.50
Total		$26,179.21
Disbursements—		
Sick Benefits	$757.90	
Death "	300.00	
Expenses	164.00	
		1,221.90
Balance on hand December 6, 1911		24,957.31
Total		$26,179.21
RELIEF FUND.		
Balance on hand September 6, 1911		$5,508.16
Receipts		496.39
Total		$6,004.55
Disbursements		152.90
Balance on hand December 6, 1911		5,851.65
Total		$6,004.55

Philadelphia Electrical Aid Society.

The annual meeting of the Electrical Aid Society of Philadelphia was held January 9 and the officers elected for 1912 are: President, Wm. R. Harmstad; vice-president, A. G. Strickland; recording secretary, W. E. Van Arsdall; financial secretary, R. C. Murray; treasurer, J. H. Wilson. Executive committee: F. E. Maize, A. S. Weir, Miss Mary McFadden, Mrs. N. H. Maloney. Trustees: George J. Wells, R. H. Conway, Merritt H. Redding.

Amendments were passed increasing the salaries of the recording and financial secretaries and the cashier. At the close of the business a banquet was held, after which dancing was indulged in.

LETTERS FROM OUR AGENTS.

Los Angeles Western Union.

On December 22 the Los Angeles-San Francisco printers handled 1,749 regular messages including 550 night letters on one wire working duplex in fifteen and one-half working hours. There were also eighty-two service messages handled. The length of this circuit is about 600 miles. Mr. A. L. Fish is printer chief days, and C. J. Covher nights. The chief operators of the Los Angeles office are A. C. Parsons, days; C. C. Hawcroft, early night, and D. F. Ingold, late night.

NEW YORK WESTERN UNION.

Mrs. Marietta F. Adams, aged 68 years, an operator in this office for the past 35 years, was found dead at her home in Brooklyn, N. Y., on January 2.

Maurice J. Coughlin, formerly of this office, died in New York January 11.

Mr. James V. Riddick will sail for his former home, Port-Arlington, Ireland, on January 17, on the steamer *Baltic*, and expects to be absent about one month.

Mr. W. L. Ives has been absent for several days on account of sickness. His many friends will be pleased to hear that he is on the road to recovery, and hopes to soon be able to resume duty.

OKLAHOMA CITY WESTERN UNION.

Improvements are being made to the office and equipment. Arrangements for the installation of a Barclay printing system have also been made, as well as plans for an increased delivery system, and a more efficient check service.

A new Athearn multiplex system is also being installed. We expect to have all trunks equipped with these sets at an early date. The work of installation is in the hands of Mr. L. J. Tucker, the day wire chief, who is performing the work admirably.

Several changes have been made among the chiefs. Mr. L. J. Tucker has been appointed day wire chief, vice Mr. H. K. Pottenger, who has been transferred to the night board and loops, vice Mr. J. F. Slack, appointed to the position of late night chief. Mr. T. G. Meader has been made assistant traffic chief days.

Traffic chief G. C. Moeser was the recipient of a handsome gold watch and fob at Christmas from the office force. In a neat speech he manifested his appreciation and thanked the force, wishing us all a Merry Christmas and a Happy New Year.

SAN FRANCISCO WESTERN UNION.

This company has opened a training school for the benefit of its younger employes under the direction of competent instructors. It is equipped with up-to-date telegraph apparatus and is arranged so as to receive students in any stage of advancement. Main line practice is afforded. The school is open all day and during the early evening. At present only telegraphy is taught, but the experiment has been so successful that the company is considering the advisability of adding instructions in telegraph accounting so that the graduates will be competent to take charge of a telegraph office. There are now sixty to seventy pupils.

Messrs. M. B. Brown and John Egan, who have been confined at home for a long time with sickness, were the recipients of Christmas and New Year's greetings from their many friends in the telegraph service. Mr. Brown has served the Western Union for the past forty-five years, and was at one time manager for this company at Des Moines, Ia., and Salt Lake City, Utah. He has been located at San Francisco for the past ten years. Mr. Egan has been a telegrapher for fifty years and has served the Western Union at New York and other important points. He came to the coast in the golden days, when Virginia City, Nev., was one of the busiest offices. After spending some time in the mining camps of Nevada, he found his way to Sacramento, at which point he was chief operator for a number of years. He has been located at San Francisco for the past fifteen years.

WINNEMUCCA, NEV., WESTERN UNION.

One of the finest and thoroughly equipped repeater offices in the country has been established at this point. The Western Union overland circuits following the Western Pacific and the Southern Pacific converge at this place, which is just half way between San Francisco and Salt Lake, and many important circuits are repeatered here, including the Southern Pacific multiplex circuits. The repeaters are handled by Messrs. J. H. Hadley, J. C. Tucker and H. B. Witter. Mr. S. J. Mercer is the manager, and while Winnemucca is a small place, big things can happen. Mr. Mercer within a year has secured forty-one clock subscribers and now has one clock subscriber for every forty-five inhabitants.

Telegraph and Telephone Age

No. 3. NEW YORK, FEBRUARY 1, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

New Wrinkles in the Construction of Apparatus.

An old timer in point of service and well informed concerning the operation of telegraph apparatus, after admiring neatness of construction and admitting the acquisition of a number of new appliances remarked: "After all there don't seem to have been any, or, at least, very many changes in the construction of the principal apparatus used. We still have the same old relays, condensers, rheostats and many other devices that look about the same today as they did years ago."

In a sense his remark is true; they do "look" somewhat the same, but in some respects they are not the same.

His remark recalls the substance of a number of inquiries from correspondents showing that there is a desire to know more about the inner construction of apparatus than text-books usually give. It is the lack of such information that creates the erroneous impression that electrical engineering is not progressing as rapidly as it might.

It would probably be better for all concerned if quadruplex attendants knew the "true inwardness" of their instruments better, and as there has always existed considerable curiosity along that line on their part it seems proper that they should have the desired information. It is certainly not wilfully withheld.

For illustration let us take one of the old pieces of apparatus that "looks the same," say, a quadruplex proportion box, otherwise known as the "leak" and "added resistance" box. They resemble the earlier devices from the outside and have the same number of ohms resistance, in each division, but there the resemblance ends. The material and inner construction are entirely different. The coils of the old type usually consisted of silk or cotton-covered german silver or or other high resistance wire and frequently became defective through overheating which destroyed the insulation.

The coils in the new type contain no such covering. They consist of enameled wire wound around a porcelain tube with a thicker coat of hard enamel covering the entire coil. Wires so treated are practically indestructible when used in the manner for which they are intended. There are three of these tubes in the modern box, each of which possesses 900 ohms. One of them is tapped at 600 ohms for one shunt, another at 100 ohms for the second shunt, while the third is connected in series with one of the other two to provide the "added resistance."

Nor is this the only example indicating the discontinuance of the use of fabric insulation for coil windings. Nearly all our modern rheostats, such as the radial arm, the combination leak box, the line resistance, condenser retardation coils, as well as several others, contain coils without even a suspicion of silk, cotton or other inflammable covering for the wire. All these consist of wire coated with a hard enamel. Industrial companies are now making resistance units of nearly all values required in telegraph and telephone service so that it is hardly necessary or even economical to the operating companies to wind them.

It is probably safe to say that the day is not far distant when all our relays will be enamel insulated. In fact we have some now. The little 1-ohm signal relay seen on the top of multiplex tables which controls the frosted pear-shaped lamp is one of them, and there are others on trial, all of which have proved satisfactory. There seems to be no physical reason why they should not come into general use, as wire with enamel covering has another advantage aside from that of insulation. In the first place the enamel occupies less space than do cotton or silk, as it is very thin, hence a greater length of wire could be wound on the spool within a given space. Consequently a larger gauge wire would provide the same number of convolutions on the spool, and have a lower total resistance.

Another old apparatus that "looks just the same," is the condenser, but the new type is much superior in many ways. In the old type the tinfoil and dielectric consisted of a great number of square sheets with the edges of the different groups joined together in order to get the superficial area equivalent of one large sheet. In the new type each unit consists of only one long sheet of tinfoil and one of paraffine paper rolled together. This method not only eliminates the necessity of joining the edges, but requires less space.

A glance at the combination condenser used in connection with multiplex apparatus will show that the box is several inches shorter than the old type box, yet it contains an additional 1 m. f. condenser for the "spark."

Not only that but the group is made up of a number of standard unit condensers, seven of 1 m. f. each, and two of ⅞ m. f. each, contained in separate little japanned tin boxes not more than 1½ inches square by about 4 inches long, any one of which may be detached or replaced without disturbing the others.

As in the case of rheostats it is no longer necessary to keep in stock so great a variety of condensers in order to provide different capacities. Such requirements are now met by combining the different units as the occasion demands. As previously stated, being in roll-sheet form they occupy comparatively little space, while the detachable boxes are adaptable to almost any unoccupied space on or under the table where they may be required.

Again we shall soon see fewer resistance lamps than now. Enameled units of various resistance values will supersede the carbon filament lamp in many cases not because they are necessarily more efficient or cheaper, but because they are more durable, just as efficient, and easier handled.

Students should endeavor to look deeper in the details of construction. It is not only an interesting study, but the knowledge thus gained stimulates inventive tendencies. One cannot well improve an apparatus until he knows its construction and is thus afforded an opportunity to compare existing material and methods with something he may deem better. All of the improved apparatus herein mentioned has been brought about through the perception of some close observer.

Recent Telegraph and Telephone Patents.

ISSUED JANUARY 2.

1,013,112. Telephone Attachment. To L. Bennett, New York.

1,013,412. Party-Line Telephone System. To A. Marchand, Bridgeport, Wash.

ISSUED JANUARY 9.

1,013,865. Telephone System. To W. W. Dean, Chicago, Ill.

1,014,002. Apparatus for Wireless Signaling. To J. L. Hogan, Jr., Brant Rock, Mass.

1,014,220. Monotelephone Relay. To P. Heina, Paris, France.

1,014,268. Combined Transmitter and Receiver. To W. B. Thompson, North Conway, N. H.

1,014,488. Cable Duplex Repeating System. To I. Kitsee, Philadelphia, Pa.

1,014,492. Telephone Cabinet or Hood. To G. W. Lancaster, Richmond, Va.

1,014,600. Electrical Relay. To E. E. Kleinschmidt, New York.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange January 26:

Amer. Telep. and Teleg. Co.	140¼
Mackay Companies	75
" " pfd.	70
Western Union Tel. Co.	83¼

Personal.

Mr. Roy W. Thomas, general news manager of the United Press, New York, is on a business trip to the Pacific Coast.

Mr. C. H. Shedd, of the telegraph and telephone department of the National Packing Company, Chicago, was a recent New York visitor.

Mr. F. L. Hutchinson has been appointed secretary of the American Institute of Electrical Engineers, New York. Mr. Hutchinson has been acting secretary since the resignation of Mr. Ralph W. Pope on August 1, 1911.

Mr. Frank C. Mason, of Washington Mills, N. Y., an old-time telegrapher and former superintendent of telegraphs of the police department, Brooklyn, N. Y., has been elected an honorary member of the New England Historical Society.

Mr. F. Douglas Watson, former provincial superintendent for the National Telephone Company in Scotland, who was recently appointed general manager and secretary of the Société Anonyme Ottomane des Téléphones de Constantinople (Constantinople Telephone Company), has taken up his duties in Constantinople.

Mr. H. A. Reed, president of the Bishop Gutta-Percha Company, New York, a forty-niner of the telegraph, and author of the story of Professor Morse, which appeared in the January 16 issue of this paper, has gone to Florida where he will spend the next few weeks. Although Mr. Reed is 83 years of age he is enjoying the best of health.

Mr. P. V. DeGraw, fourth assistant postmaster-general, Washington, D. C., has submitted to postmaster-general Hitchcock, his annual report for the fiscal year ended June 30, 1911. It is an interesting document and shows progress in this branch of the service. Mr. DeGraw is an old-time telegrapher and was a member of the celebrated staff of operators on the original Associated Press leased wire between New York and Washington.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. B. Pillsbury, general superintendent, New York, sailed on Saturday, January 27, for Panama and the West Indies on a vacation trip of three weeks.

Mr. G. H. Usher, general superintendent of the Southern Division, Atlanta, Ga., was an executive office visitor in New York on January 23 and 24.

Mr. W. I. Capen, general superintendent of plant, will be in Texas for several weeks to come on business connected with construction work in that State.

A daughter was born on January 17 to Mr. and Mrs. J. F. Skirrow. Mr. Skirrow is associate electrical engineer of the company.

Mr. E. W. Collins, superintendent, Cleveland, Ohio, was a recent New York visitor.

Mr. W. B. Dunn, assistant secretary of the company, and a director of the Serial Building Loan and Savings Institution, New York, is starting a vigorous campaign to increase the membership of the Institution among executive office employes.

Mr. C. Troeller, Jr., has been appointed manager of the Atlantic City, N. J., office of this company, vice W. M. Phillips resigned.

Mr. P. Chamberlain, manager of the Mackay Telegraph and Cable Company, Waco, Tex., has been appointed supervisor, and has been succeeded as manager by Mr. S. S. Lacey, formerly night chief operator at Dallas, Tex.

New quarters have been leased for this company's office in Indianapolis, Ind. Mr. G. F. Fuller is the manager.

The San Antonio, Tex., office of the Mackay Telegraph and Cable Company opened for business on February 1. Mr. J. B. Sampley, manager of the Austin, Tex., office has been appointed manager at San Antonio.

Postal Tariff Book for 1912.—The Postal Telegraph-Cable Company has issued its tariff book for 1912, revised and brought up to date. Complete instructions are given with reference to cable messages together with rates and rules governing this service. The money transfer service is the subject of general instructions in a special section of the book; as is also the rules for the government of the receiving department. At the back of the book are given maps of the Commercial Cable Company's systems as well as those of affiliated companies. This book was compiled and issued under the supervision of Mr. Isaac Smith, superintendent of tariffs, New York, and bears evidence of intelligent and painstaking work.

Prominent Telegraphers at Ohio Society Banquet.

The thirtieth annual banquet of the Ohio Society of New York was held at the Waldorf-Astoria, Saturday evening, January 27, President Taft being the guest of honor. The occasion was made memorable by the presence of many well-known former and active telegraph men, including Mr. Andrew Carnegie and Mr. James Bertram, his secretary, Mr. Theo. N. Vail, president American Telephone & Telegraph Company and the Western Union Telegraph Company, New York. Mr. Newcomb Carlton, vice-president Western Union Telegraph Company, New York; Mr. E. J. Nally, vice-president and general manager Postal Telegraph-Cable Company, New York; Mr. C. C. Adams, and Mr. C. P. Bruch, second and third vice-presidents, respectively, Postal Telegraph-Cable Company, New York; Mr. F. H. Bethell, vice-president New York Telephone Company, New York; Mr. W. C. Brown, president New York Central Lines, New York; Mr. D. H. Bates, secretary Society of the United States Military Telegraph Corps, New York; Mr. Frank Munsey and Mr. Frank N. Dowler, New York.

Messrs. Theo. N. Vail, C. P. Bruch, D. H. Bates, F. Munsey and F. N. Dowler, are members of the Society. Mr. Bates was selected to escort Mr. Carnegie to the guests' table. Postmaster-general Frank Hitchcock was also present.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

President Theo. N. Vail states that there will be no increase in the dividend rate at the March meeting of the Board of Directors of this company as was reported recently in the daily newspapers.

Mr. Belvidere Brooks, general manager; Mr. A. G. Saylor, general superintendent, New York, and Mr. W. C. Merly, secretary to Mr. Brooks, New York, visited Philadelphia, Baltimore and Washington recently on company business.

Mr. W. E. Athearn, engineer of equipment New York, was a recent visitor at Pittsburgh, Pa., and Wheeling, W. Va., on business connected with the service.

Mr. A. C. Terry, district commercial superintendent at Pittsburgh, Pa., was a recent New York visitor.

Mr. F. A. Aspinwall has been appointed manager of the office at 270 West Twenty-third St., New York, vice Miss M. L. Barry transferred to the Knickerbocker Hotel.

Mr. M. S. Snedeker, superintendent of the Western Union building in Chicago, has resigned and is succeeded by W. I. Lake.

Mr. L. K. McNees, formerly of Gulfport, Miss., has been appointed manager of the Jackson, Miss., office of this company.

Mr. H. R. Stallings, formerly manager of the Sherman, Tex., office, has been appointed traveling auditor for the company.

Mr. S. P. Jones, manager of the Houston, Tex., office of this company, has been transferred to the managership of the El Paso, Tex., office and Mr. R. D. Gould, manager at El Paso, takes Mr. Jone's place at Houston. These transfers were made for account of the ill-health of the wives of these two gentlemen.

Mr. J. S. Calvert, district superintendent, Richmond, Va., announces the following recent appointments of managers in his district: Miss Ruby Bowden at Clio, S. C., vice F. B. Markey, who has left the service; J. B. Pope, at Rockingham, N. C., vice P. C. Bowling, left the service; W. T. Tignor at Wilson, N. C., vice W. V. Emory who enters the operating department at Charlotte, N. C. (Mr. Tignor was transferred to Wilson from the operating department at Richmond, Va.); Mrs. Annie E. Parks, at Barnwell, S. C., vice C. J. McNab who has left the service, and E. M. Phillips, at Weldon, N. C., vice W. G. Fowlkes.

Mrs. M. I. Ufford, chief operator at New Haven, Conn., has retired from active telegraphic duties after a service of fourteen years with this company. She is a sister of Mr. S. E. Lonergan, manager of the New Haven office. Mr. John George, night chief operator, has been promoted to be chief operator, vice Mrs. Ufford.

The regular monthly meeting of Group 2 of the Commercial Association of the Western Union Telegraph Company, New York, was held at 195 Broadway, January 25. In addition to the local managers, the receiving and delivery clerks were present.

This company has taken a 20-year lease for quarters in the new "Woodmen of the World" building in Omaha, Neb., and will fit up fine offices. The operating department and district offices will be located on the fifteenth and sixteenth floors, the commercial office on the ground floor.

Electrical Class in Jacksonville.—A student class has been started in the Western Union office at Jacksonville, Fla., Mr. Albert J. Dillon being the instructor. The class is in charge of manager W. R. Edmondson and acting chief operator R. L. Branton.

The Morse Electric Club Dinner.—The annual dinner of the Morse Electric Club, which will be held at the Hotel Savoy, Fifth Avenue and Fifty-ninth Street, New York, Saturday evening, February 17, will be attended by several prominent men as guests. The entertainment committee is making arrangements for a suitable programme. Mr. R. J. Murphy, 195 Broadway, New York, is treasurer to whom applications for tickets should be made not later than February 14.

The New Western Union Building in New York.

Rapid progress is being made in the construction of the new building in New York to be occupied jointly by the Western Union Telegraph Company and the New York Telephone Company. This building is located on Walker and Lispenard streets, and was described in our issues for February 16, September 16 and October 16, 1911, illustrations being shown in the first named issue. The foundations are now under way and it is expected that the building will be so far advanced by January 1, 1913, that the installation of the telegraph and telephone equipment will be started at that time. The building will be ready for occupancy about the middle or latter part of the summer. The engineering forces of both companies are busy drawing the plans for the new offices and equipment.

The Cable.

Mr. Basil C. Combe, captain of the Commercial Pacific Cable Company's steamer "Restorer," of Vancouver, B. C., was a recent New York executive-office visitor on company business.

The Mexican Telegraph Company and Central and South American Telegraph Company have issued a folder giving a map of their systems. On the front page is a colored picture of the flags of all the countries touched by the lines of these companies.

Extension of Half-Rate Cable Service by Commercial Cable Company.

The Commercial Cable Company has announced that it will transmit, subject to the conditions of acceptance, messages written in plain language at a reduction of fifty per cent from the charges for an ordinary message to Great Britain and Ireland, France, Germany, Portugal, India and Burmah, Aden, Algeria, Ascension, Bathurst, British North Borneo, Ceylon, Cocos Island, Cyprus, East Africa and Uganda, Gold Coast, Labuan, Mauritius, Northern Nigeria, Southern Nigeria, Perim, Southern Rhodesia, Rodriguez St. Helena, Sierra Leone, Somaliland, South African Union, Straits Settlements and Malay States, Tunis and Zanzibar.

The conditions are the same as those published on page 37 of our issue for January 16, with the exception of two changes which read as follows:

The text must be written entirely in the plain language of the country from which the message is sent, or entirely in the plain language of the country to which the message is addressed, or entirely in the French plain language. Other languages or mixtures of any languages are not admitted.

A reply to a deferred plain language message may be prepaid but the instruction must be expressed in the terms of full rates. For example: If the sender of a deferred message wishes to prepay a deferred reply of twenty words the instruction to be written before the name and address should be —R P 10—.

New City Electrical Positions.—The Board of Estimate of New York City has made an allowance of $200,000 for the establishment of a fire prevention bureau. The bureau will have an assistant electrical engineer at an annual salary of $3,000 and two electrical inspectors at a salary of $1,800 each.

A Future Investigation.—The British postmaster general has promised to appoint a committee of inquiry in 1913 to investigate the grievances of the telegraphers in the postal service in that country.

The Telephone.

Mr. H. B. Thayer, president of the Western Electric Company and vice-president of the American Telephone & Telegraph Company, New York, sailed for Europe on January 24 and will be absent about six weeks.

Telephone Between Paris and Madrid.—On January 1, telephone service between Paris, France, and Madrid, Spain, was inaugurated. The distance between the two cities is about 1,000 miles.

All-Night Shopping by Telephone.—A number of large firms in London have made arrangements for receiving orders for goods by telephone at all hours of the night, the articles required being dispatched by the first delivery in the morning.

Combined Telephone and Electric Light.—A patent has recently been granted on a combined desk telephone and lamp standard. The unique feature of the invention lies in the fact that the transmitter is located in the top of the electric light shade, the shade also serving to gather up the sound and concentrate it upon the transmitter.

Telephone Merger in Utah.—The Mountain States Telephone and Telegraph Company, with headquarters at Denver, Col., assumed active control of the Utah Telephone Company in Ogden, Utah, on January 1. The merger adds 1000 subscribers to the Mountain States Company. The physical absorption of the independent plant at Salt Lake City has been deferred until June.

A Discovery by Mr. Marconi.—During some experiments in the desert in Tripoli, according to a despatch from Rome, Mr. William Marconi discovered that wireless messages could be sent with security over the desert without the usual masts. Instead of poles, wire is laid on the sand, in the direction in which the message is to be sent. The message is received without any interruption, exactly the same as though the usual system were employed. The sand, being a non-conductor, electric waves are not affected in any way.

Time Consumed in Answering Telephone Calls.—The average time consumed by telephone operators in answering calls in some of the larger exchanges in New York State is shown in a report of the Public Service Commission, second district. Rochester stands at the head of the list, with 3.4 seconds per call, then follow Jamestown, 3.6; Watertown, 3.7; Buffalo, 4.1; Troy, 5.2; Albany, 5.5, and New York, 6.6. The Inspectors who made the investigation report that they found the service to be much faster in cities than in small places, as a result of the public demand for speed where business is urgent. They also report that the tests in New York City were made in the holiday season and were taken at two central offices, against which complaints were made. They say that these tests show a slow service, and are probably unfavorable as compared with the general service throughout the city.

To Redeem Telephone Stocks.—The American Telephone & Telegraph Company, which in 1909 bought from the Western Union Telegraph Company some $16,000,000 of the stock of the New York Telephone Company, will come into the possession of the final $9,733,100 of its purchase after May 1. At the time of the purchase it was explained that $9,733,100 of the stock had been pledged in 1906 as collateral for $10,000,000 convertible 4 per cent. collateral bonds of the telegraph company, of which $8,000,000 are outstanding. These bonds, which are due in 1936, are redeemable May 1 at 105.

Highest Telephone Station in the World.—The highest telephone line in the world is said to be that to the summit of Monte Rosa, in Italy. The line connects with the observatory on the summit which has an altitude of 14,960 feet above sea level. The poles carrying the telephone line are set in the snow, largely on the surface of glaciers, and the construction involved the solving of many difficult and unusual problems. It is in operation but a short time each year, the poles being removed and stored for re-building the following year. In order that the shifting of the glaciers might not break the wires, the latter are not made fast to the insulators, but are strung through rings, thus allowing free play. The middle of each stretch of wire, between the poles, rests on the snow, while in the uppermost section of the line, between the Col du Lys and the summit, poles are dispensed with altogether, the wire being simply laid on the surface of the dry snow. In one of the lower sections of the line two valleys had to be crossed, each over 3,000 feet wide. In each case a single span of heavy steel wire was installed. The line was opened on September 8, 1909.

Radio-Telegraphy.

Wireless in Russia.—The Russian government has decided to establish wireless stations on the coasts of the White and the Kara seas.

Wireless Equipment for Yachts.—Mr. J. P. Morgan's yacht "Corsair" and Mr. G. W. Vanderbilt's yacht "Warrior" have been equipped with 3-kw. Marconi wireless outfits.

Compulsory Wireless in Uruguay.—The Uruguayan government has decreed that passenger vessels calling at ports in that country after May 1 will be required to be equipped with wireless telegraph outfits.

Marconi Dividend.—The Marconi Wireless Telegraph Company, London, England, will, on February 1, pay a dividend on the seven per cent cumulative participating preference shares for the six months ending December 31.

Modern Wireless.—Mr. W. E. Dixon Bennett read a paper entitled "Radiotelegraphy in Modern Practice," before the South African Institute of Electrical Engineers on December 21, 1911. It is historical as well as practical, and goes into the subject very fully. It is published in full and illustrated in the transactions of the institute.

Transatlantic Wireless Station for New York.—Mr. John Bottomley, vice-president and general manager of the Marconi Wireless Telegraph Company of America, New York, is authority for the statement that his company will erect in or near New York in the near future a high power wireless station for the purpose of handling transatlantic messages directly with Clifden, Ireland, or some other station in Great Britain.

Wireless Appointments.—Mr. A. H. Ginman, formerly manager of the Marconi wireless station at Siasconset, Mass., has been appointed the company's representative for the Pacific coast division with headquarters at San Francisco, Cal. Mr. Ginman has as his chief assistant Mr. J. D. Taylor, who was formerly in charge of the Marconi staion at South Wellfleet, Mass. Mr. J. C. Cowden, chief operator at Siasconset has been appointed manager of that station vice Mr. Ginman.

Extensive Wireless System for Navy.—It is proposed to ask Congress for an appropriation of $1,000,000 to establish an extensive wireless system for the purpose of keeping the Navy Department in touch with naval vessels in the Atlantic or the Pacific oceans. The plan is to have powerful wireless stations at San Francisco, Panama, Pearl Harbor, Hawaii, Guam, Samoa, and the Isle of Luzon. The towers, of a height approximating five hundred feet, will be used either in direct or relay communication with the wireless towers now being erected for the navy at Arlington, near Washington.

Wireless on the Pacific.—The Marconi Wireless Telegraph Company of America, New York, has closed contracts to equip with wireless outfits thirteen steamers including those of the Matson Navigation Company and the California Atlantic Steamship Company, with headquarters at San Francisco, Cal. The company has also opened a land station at San Francisco and will open two additional stations at San Diego, Cal., and Seattle, Wash. Each of the land stations will have an operative radius of 1,000 miles at least, and the ships will have the same radius of operation, each being equipped with a 3-kw. outfit. The first ship fitted held communication with San Francisco, 1,500 miles away. All of the steamers referred to are in the Pacific trade.

Wireless Ship Equipments.—According to the report of the navigation commissioner of the Department of Commerce and Labor, Washington, D. C., the wireless ship act has been applied to 188 ocean passenger steamers leaving American ports, and 142 other vessels in this country have voluntarily equipped with wireless, while the total number of merchant vessels in the world thus equipped is 1,013. The act has been generally commended and steamship and wireless companies have willingly co-operated in its enforcement. Certificates of skill have been issued to 507 wireless operators and examinations will be held throughout the current year.

Investigation of Amateur Wireless Interference.—An investigation of the extent of interference by amateur wireless-telegraph operators in the transmission of legitimate messages between ship and shore stations has been undertaken by the United States Navy Department. The immediate cause of the investigation was a delay of more than one hour in the transmission of messages of distress from the torpedo-boat destroyer "Terry" recently. During this delay the wireless-telegraph apparatus on the vessel was disabled and the exact position of the ship in distress could not be ascertained. It is estimated that at least 500 stations are in use and owned by amateur operators in the neighborhood of New York.

Wireless Patents.

Proceedings at law have been commenced in New Zealand by Marconi's Wireless Telegraph Company, Ltd., against Huddart Parker, Ltd., says *The Marconigraph*, for infringement of the company's patents by the use of the Telefunken system of wireless telegraphy on board some of the latter company's ships plying between Australia and New Zealand. Similar proceedings have also been started in Australia against the same firm and the Australasian Wireless Company, who supplied the plant.

The Helsby Wireless Telegraph Company, Ltd., having applied for a license to work under the extended patent granted to Sir Oliver Lodge, and now the property of the Marconi Company, the Board of Trade appointed Sir Cornelius Dalton, late Controller-General of Patents, as arbitrator. The hearing commenced on December 11 and is still proceeding.

Messrs. Siemens Brothers & Co., Ltd., the assignees in England of the Telefunken system of wireless telegraphy, have also applied for a license to work under this patent, and are assisting the Helsby Company in the arbitration proceedings. It is contended on behalf of the applicants that they cannot work any system of wireless telegraphy without a license under the patent in question.

The Wireless Telegraph Situation.

Meetings of local stockholders of the United Wireless Telegraph Company have been held in various cities, notably New York, Philadelphia, and Cincinnati, for the purpose of devising ways and means to reorganize the company and protect, as far as possible, the interests of the many stockholders in the concern. Since the company went into the hands of receivers last year little of a definite character has been learned of the true condition of affairs and in justice to the hundreds of innocent stockholders the receivers should make a statement showing the actual situation.

The business of the company has been conducted almost wholly for the purpose of selling stock and it is regrettable that so important a utility as wireless telegraph should be so debased and used for fraudulent purposes. It is absurd to imagine that a company with $20,000,000 stock outstanding and assets of less than a quarter of million dollars can ever hope to pay dividends, and this great disproportion will have to be reduced before the company's affairs can be placed on a legitimate basis. The unsuspecting stockholders were decoyed into the snare, of course, by the glowing pictures presented to them of the great usefulness of the wireless telegraph to navigation, etc., etc., and the unlimited possibilities for the paying of large dividends. The part of the story about the utility of wireless is true, but that part of it in reference to dividends is fabulous, and it was this part of the game that was emphasized more particularly for the benefit of the unwary investor.

As a matter of fact the revenues of a wireless station very rarely more than offset the maintenance expenses, and unless conditions change and more compensation is exacted for this class of service the United Wireless Company will find it extremely difficult to pay dividends on $1,000,000 let alone the $20,000,000 now outstanding.

Canadian Notes.

Government Ownership of Canadian Telegraph and Telephone Lines.—Hon. Joseph Armstrong, member of the Canadian Parliament, Ottawa, Ont., has introduced a resolution having in view the nationalization of the telegraph and telephone systems in Canada, and to operate them as a branch of the Post Office department.

Train Dispatching by Telephone.—Mr. W. J. Camp, assistant manager and electrical engineer of Canadian Pacific Railway Telegraphs, Montreal, Que., made an address on the subject of train dispatching by telephone, at a recent noonday dinner in that city of the Electrical Association of the province of Quebec. The Canadian Pacific was among the earliest roads, he stated, to recognize the advantages of telephone dispatching over the telegraph and now has nearly 4,000 miles of track controlled by telephone.

The Canadian Telegraph Investigation.

Another hearing in the investigation into the the operation of telegraph companies in Canada before the Board of Railway Commissioners was held in Ottawa, Ont., from January 8 to January 12 inclusive. Evidence regarding the Great Northwestern Telegraph Company was given by Mr. G. D. Perry, the company's general manager, and the investigation so far as that company is concerned is practically completed. The Board then proceeded with the investigation of the Canadian Pacific Railway Company's Telegraphs, evidence being given by Mr. W. J. Moule, assistant auditor, W. J. Camp, assistant manager of telegraph and Messrs C. H. Bristol, and E. P. Griffith from the United States. After spending four days in the examination regarding the Canadian Pacific Railway Company's Telegraph, the case was adjourned for further statements to be filed and will probably come up again in the course of two or three months.

Obituary.

Edoth Willis Humphrey, aged 51 years, president of the Northern Commercial Telegraph Company, of Montreal, Que., died in Brooklyn, N. Y., on January 14.

Frank P. Wyne, aged 55 years, a former telegrapher and a member of the Old Time Telegraphers' and Historical Association, died in Peoria, Ill., January 3.

Dr. John C. Graham, formerly a well-known telegrapher identified with the Western Union service in Cleveland in the early seventies, died at La Porte, Iowa, last month. He had been a prominent member of the medical profession of that State for the past thirty years.

Daniel B. McCoy, a member of the United States Military Telegraph Corps, died at Bogota, N. J., January 21. Deceased was formerly assistant general manager of the New York Central & Hudson River Railroad Company. He was an Old-Time Telegrapher and a well-known railroad official and had recently retired from active service.

E. N. Dennis, aged 53 years, night wire chief of the Western Union, Richmond, Va., office, died while at work on January 15. He was on extra duty on account of the heavy business, and death came suddenly while he was receiving a message from New York. Mr. Dennis was a man of high character and admired by all who knew him, and his sudden death is a shock to his many friends. Mr. Dennis was a thirty-three degree Mason, and the funeral services were attended by many Masons of prominence. The remains were buried at Morehead City, N. C.

Increasing the Membership of the T. M. B. A.

Dr. L. M. Rheem of Minneapolis, Minn., has taken active steps to increase the membership of the Telegraphers' Mutual Benefit Association in his section of the country and his plans for accomplishing this object are well worth careful consideration and adoption by others who have the welfare of the association at heart.

Dr. Rheem proposes to get the members in that agency together for consultation and then arrange to hold a few meetings at which as many eligibles from the telegraph and telephone companies as possible will be invited to attend. Appropriate addresses will be made, and enthusiasm and interest aroused. Dr. Rheem sees no reason why the membership cannot be increased from 1,000 to 2,000 during the next year if every one pulls a little.

It certainly is a unique idea and will no doubt be attended with successful results.

A Joker in the Government Telegraph-Control Bill.

Congressman Carey of Milwaukee, Wis., who has distinguished himself in the government telegraph-ownership cause by introducing a bill in the House of Representatives at Washington, to accomplish the reality, has robbed the bill of some of its most interesting features by adding certain provisos. The measure stipulates that wages "shall not be increased more than 15 per cent over those paid the year preceding government acquisition."

Such a provision if carried out literally would prove to be a great hardship. It frequently happens in the course of telegraphic events that an operator is appointed to a superintendency, and if, in such a case, the salary is to be limited as Representative Carey provides in his bill, there will be a general strike against the acceptance of such promotions. Evidently the honorable gentleman never experienced such a sensation during his telegraphic career or he never would have placed such a stumbling block in the path of ambitious and worthy telegraphers who may enter the government service, if government control comes to pass.

The Reid Monument.

Following is a complete list of the representatives of the organizations named which are to meet as a committee of the whole to devise ways and means to raise funds for the purpose of erecting a suitable monument over the grave of the late James D. Reid in Mt. Hope Cemetery, Rochester, N. Y.:

The United States Military Telegraph Corps—David Homer Bates and Charles A. Tinker.

Postal Telegraph Club of Atlanta, Atlanta, Ga.—G. H. Usher and W. C. Daviet.

Serial Building Loan and Savings Institution, New York—James R. Beard and Edwin F. Howell.

New York Telegraphers' Aid Society—Thomas M. Brennan and Robt. J. Marrin.

Morse Club, New York—William J. Dealy and William Holmes.

Magnetic Club, New York—C. P. Bruch, A. B. Chandler and W. B. Dunn.

Association of Railway Telegraph Superintendents—L. B. Foley, F. G. Sherman and E. P. Griffith.

Old-Time Telegraphers and Historical Association—F. J. Scherrer and J. B. Taltavall.

A meeting of the committee will be held in February.

Dinner of Directors and Officers Serial Building Loan and Savings Institution.

The directors and officers of the Serial Building Loan and Savings Institution, New York, met at dinner at the Astor House, January 18, for the purpose of a general discussion of the affairs of the association. President A. G. Saylor being out of the city, vice-president James R. Beard presided.

Addresses were made by Messrs. C. P. Bruch, W. H. Baker, T. W. Carroll, E. M. Mulford, A. C. Terry, E. S. Butterfield and John A. Hill, on the subject of property valuations and the saving features of the association. All of the others present also made a few remarks. Mr. C. P. Bruch acted as toastmaster.

Several of those present pledged themselves to bring in at least fifty new members during the year, and as a result of this campaign over 100 new members have been added since January 1.

Those present were: Jas. R. Beard, Chas. P. Bruch, Thos. W. Carroll, E. M. Mulford, A. C. Terry, W. H. Baker, E. S. Butterfield, John A. Hill, T. M. Brennan, G. W. Blanchard, W. J. Quinn, E. E. Brannin, H. A. Konninger, C. A. Kilfoyle, E. F. Howell, T. E. Fleming, M. W. Rayens, M. J. O'Leary, J. T. Laidlaw, M. S. Cohen and W. B. Dunn.

Associated Press.

Mr. Charles Friedlander, traffic chief of the Associated Press at Chicago, Ill., was a recent New York visitor.

Mr. W. L. Waugh, dean of the press operators in this country, has returned to the New York Bureau after an absence of three months in recuperating his health. Mr. Waugh, who is one of the finest operators in the United States, has a new lease of life and is good for many more years of useful service to the Associated Press. He has been continuously employed in the news gathering service since 1878 and is one of the best known members of the newspaper staff in the country.

Trade Notes.

Bids Invited for Signal Corps Cable.—The Signal Corps of the United States Army is advertising for bids for thirty miles of single conductor cable intermediate, type 44. Bids will be received by Captain R. J. Burt, Signal Corps, U. S. A., until February 11.

Increase in Western Electric Company Sales Last Year.—The Western Electric Company's year, ended December, 1911, shows a total of $67,000,000 in goods billed out, or about 6% greater than the corresponding twelve months in 1910, and ranks as the second largest the company has experienced. Increased cost of labor and material, while the prices of manufactured articles have not advanced, have cut down the Western Electric's margins of profits in common with many industrials. The situation has been largely met by introducing operating economies and scientific management of manufacturing operations. At the close of the year there were about 24,000 persons on the pay-rolls.

Taxing Telegraph Lines in Nevada.—The Nevada state board of assessors has levied a rate of $40 a mile for each wire maintained by the Western Union and Postal Telegraph-Cable companies in Nevada.

Early Telegraph Days in Montana.

Recently a rancher in Montana received a cablegram from his partner in Australia the day before it was sent, this seeming paradox being due of course to the difference in time between the two points. This achievement led the Butte, Mont., *Inter Mountain* to compare the telegraph service of the present day to what it was in the early days of the West, when telegraphing was uncertain as regards the promptness of delivery at destination and operation. Several well-known old-time telegraphers are mentioned in the article, part of which we reproduce.

"After P. A. Largey and Count John A. Creighton built the first telegraph line into Montana in 1866 for the Western Union, it was not such a sure thing that a message filed today would reach its destination east of the Missouri river to-morrow, the next day, or later, although the company then charged $5 for a message of ten words. Telegraph line building was done and lines kept up under great difficulties during those early days.

"For instance, Levi S. Wild, the veteran manager of the Western Union at Butte, remembers when the buffalo covered the plains like leaves of grass, and in the Sun River valley, as the buffalo migrated south in the fall and north in the springtime, telegraph poles went down before them like reeds. There was no timber in the route of the buffalo migration, and the huge beasts welcomed the sight of the telegraph lines, for the poles offered an opportunity against which to rub their shaggy hides, and after the band of thousands had passed, the line had to be rebuilt.

"The telegraph company had other troubles of an unusual nature. There were snowstorms in Montana in the old days, storms and snowfalls of which the newcomers can have no idea. It was not uncommon to see a fall of snow, backed up by drifts, as high as the telegraph poles themselves. Linemen sent out to repair damages walked along on top of the snow, picked up the wires and had to stoop over to fasten them to their places at the top of the poles!

"The first telegraph line into Montana was built from Salt Lake to Virginia City, and followed the old stage route. The line was 470 miles long and touched at all the old stage stations of Ogden, Brigham City, Bear River, Malad, Ft. Hall, Old Eagle Rock, now Idaho Falls; Market Lake, Camas, Pleasant Valley in Montana, Ryan's station and other stopping places on the way to Virginia City.

"From Virginia City the line was extended to Helena in 1867, following along old Indian trails, down the Ruby valley to White Tail station, on to Boulder, over the divide, and down the Prickly Pear valley into Helena. Later the Government built a line from Helena to Ft. Shaw, Ft. Benton and to Ft. Ellis near Bozeman.

"The old overland line with its one wire was the only means of telegraph communication between Montana and the outside world until the completion of the Utah Northern Railway, now the Oregon Short Line, in 1878. Then the Western Union abandoned the old route and rebuilt its line along the railroad.

"The first manager at Virginia City, 1866, was Barney Hughes, and the following year Mr. Wild was sent there to assume charge. Mr. Wild made the trip from St. Joe, Mo., to Salt Lake on horseback, and he went on to San Francisco by stage and back again to Salt Lake, from which place he staged it to Virginia City.

"The great stretch of continent between the Atlantic and Pacific oceans, up to the completion of the Union Pacific in 1869, had only two telegraph wires as means of communication. The first line to San Francisco was completed in 1861. John A. Creighton of Omaha and the first Brigham Young of Salt Lake were partners in the construction of the line from Omaha to Salt Lake.

"In the half century since Mr. Wild first became a manager for the Western Union he has had experience that would fill a library. He fought his way through hostile Indians when he came West on horseback, and he rode for his life from a stampeding band of buffalo; he dug telegraph wires on top of high poles out of the snow, and was lost on plains and in forests, but he has an idea that the most strenuous time he ever had was a few years ago when, with the aid of one delivery clerk, he kept the Butte office of the Western Union going during the telegraphers' strike, receiving and sending from 350 to 500 messages a day."

The Telegraph Union Monument.—It was reported recently in the daily press that it was the intention to revise the decision of the international jury in accepting the design of Signor G. Romagnoli, of Bologna, Italy, for a monument to be erected at Berne, Switzerland, to commemorate the founding of the international telegraph union. We are informed officially by the director of the Bureau of the International Telegraph Union at Berne that the report is pure invention and that the jury which was unanimous sees no reason to change its decision.

The Johnson-Varley System of Tuned Telegraphy.—A demonstration was given in London recently by Messrs. Johnson and Varley of their tuned system of telegraphy, which they claim to be applicable to land wires, cables and wireless telegraphy. The tuning is acoustical, and is accomplished by the use of accurately constructed and standardized vibrating reeds, corresponding reeds being used in transmission and reception. Very great sharpness of tuning is attainable, as is instanced by the plans for a type-printing telegraph now under construction, in which the reeds controlling the forty-nine characters are all within the interval of one semitone. By the use of properly tuned relays, in conjunction with transmitters giving the corresponding notes, multiplex telegraphy is possible, and these may give in wireless telegraphy an additional safe-guard against interference and a means of increasing secrecy of communication.

Postal Company's New Type of Peg Switchboard.

BY JOHN F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The Postal Telegraph-Cable Company's new type of peg switchboard for intermediate stations

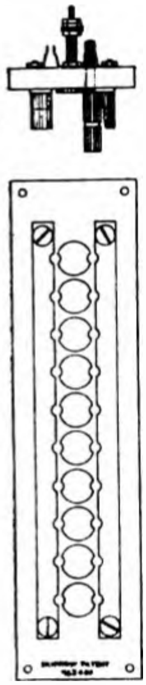

FIG. 1.—PEG SWITCHBOARD.

Skirrow Patent 732012.

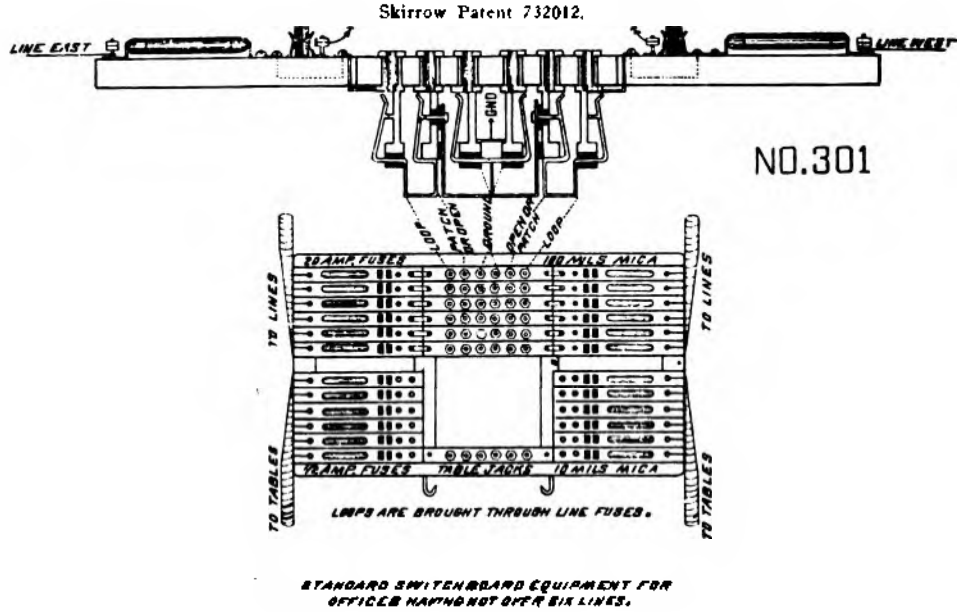

FIG. 2.—STANDARD SWITCHBOARD FOR SMALL OFFICES.

differs from those of other companies in mechanical construction but not in principle.

The Postal's intermediate peg switchboards are made up of slate units each holding two straps and ten rows of discs. (Fig. 1.) These units can be combined to make a board of any size which can be assembled locally and enlarged or decreased at will.

The pegs used are of standard telephone type instead of the taper pegs used in the regular type of peg switchboard. The holes are drilled clear through and contact springs are placed on the back of the discs and straps. The pegs are pushed through and engage with the springs insuring a good contact for either telegraph or telephone use.

In addition to the peg switchboard described, the Postal Company uses a unit type intermediate board made up of porcelain blocks with "pin" or telephone-type jacks mounted in the blocks. Each of these blocks accommodates one wire in and out of the office. Two of the jacks are looping jacks, one to cut in east and the other to cut in west; two of the jacks are patching jacks east and west and the remaining two are grounding jacks east and west. Wires are grounded by inserting a telephone type plug in the grounding jacks, they are opened by inserting the same plug in the patching jacks, and they are patched with cords having a plug at each end, one plug being inserted in the patching jack of one wire and the other plug in the patching jack of the other wire. A double cord and plug connected to the instrument is used in the looping jack to cut the instrument in circuit. A knowledge of circuits is not necessary to operate this type of board. If the

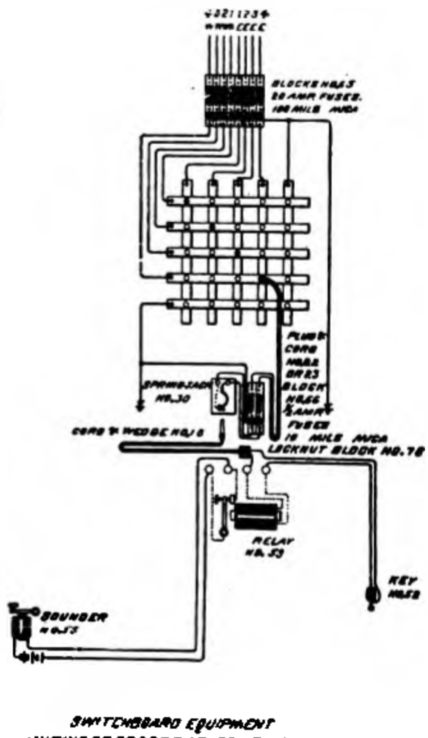

FIG. 3.—CROSS-BAR SWITCHBOARD.

plugs are inserted in the jacks as indicated in Fig. 2 the connections are made automatically. For convenience a diagram of the circuits through the jacks is herewith shown. The circuits can be readily traced.

The Postal Company has a number of switchboards in service of a type known as the crossbar. This board is made with a square wooden frame with vertical brass strips on the face of the frame and horizontal brass strips on the back of the frame. The distance between the front and the back strips is about two inches. The ends of incoming line wires are connected to the tops of the vertical strips on the face of the board. The ends of outgoing wires are connected to the horizontal strips on the back of the board. Holes are drilled in the front and back strips so that they come in line with each other wherever the strips cross each other. It will be seen that by inserting a peg through any holes at any cross-over, a front strip will be connected with a back strip, and an incoming wire thus connected with an outgoing wire. The connections can therefore be visibly traced with ease.

For connecting up instruments a double cord and peg is used, the upper half of the peg connecting with the front strip and the lower half of the peg connecting with the back strip, thus looping the instrument in between the front and back strips of the board. Fig. 3 shows the connections.

Policy of American Telephone and Telegraph Company with Reference to Independents.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, has issued a statement setting forth the policy of the company and its associated companies with respect to independent telephone companies.

The statement, which is dated January 5, reads as follows:

"In order that the American Telephone & Telegraph Company and its associated companies may follow the same policy with respect to maintaining toll connections with independent companies, it seems wise to state just what that policy is in this regard, and to advise the Associated Bell Companies and ask them to adopt the same for their guidance.

"FIRST. The Associated Bell Companies will extend toll line connections to any point or to any company where opposition exchanges do not exist, and where the result of such toll line connections would be a reasonable return upon the investment involved in the connection. The terms and conditions for transmitting or receiving toll or long-distance messages at such points shall be fair and equitable and as favorable as the terms and conditions extended to any other companies operating under similar conditions.

"SECOND. Should any Associated Bell Company acquire, by purchase or otherwise, any toll line which has connection with any independent exchange or toll line, all facilities enjoyed at the time of the acquisition by the independent exchanges or toll lines for sending or receiving messages shall be continued. When increased facilities shall be needed from time to time, such facilities shall be subject to future contracts which shall be made fair and equitable to both parties.

"THIRD. Should any Associated Bell Company acquire, by purchase or otherwise, any independent exchange property which has toll line connections, the Associated Bell Company will not cut off or disturb in any way such connections.

"FOURTH. It is to be understood that all existing connecting contracts or arrangements between independent companies, or between independent and Bell companies, shall continue without interruption should there be any change in the ownership, thus preserving the status of the situation.

"FIFTH. It is to be understood in all of the above cases that it is the wish and intention to preserve any facilities or connections which independent companies and their patrons may enjoy at the time the property of an independent company may be acquired, with such increase of the same facilities as may be necessary on account of future growth and extension of the business, but it is not the intention that by virtue of such acquisition, the range of facilities of any independent company or of the patrons of any independent company shall be increased.

"SIXTH. The Associated Bell Companies will not require connecting companies to use any special make of apparatus or equipment. The only requirement will be the use of such facilities and equipment as will give commercial service.

"SEVENTH. It is to be distinctly understood that this policy does not in any way contemplate physical connection between opposition exchanges, nor does it contemplate the interchange of messages between two or more exchanges located within the same town or community."

Telegraph Rates in Oklahoma Upheld.—The Oklahoma Supreme Court has set aside the telegraph rates for business within the State ordered by the Corporation Commission. This action was taken on the ground that the Commission's rates would not yield a fair return to the companies in Oklahoma. The court also modified the order by making it applicable to free deliveries within a radius of two miles of an office in incorporated cities only; also, as to the closing of offices in the State without the consent of the Commission, to an application to close on twenty days' notice.

Ferroconcrete Poles in New Zealand.—The Post and Telegraph Department of the New Zealand government is introducing telegraph poles and pillar letter boxes made of ferroconcrete. For ordinary straight lines the poles are six by eight inches at the base, six by six inches at the top and twenty-six feet long. Angle poles are eleven by eight inches at the base, eight by four inches at the top and 30 feet long, and are made hollow to reduce the weight.

Telephone Recording Tables in Philadelphia.

There has recently been placed in service in the Philadelphia Western Union office, says the *Journal of the Telegraph*, a telephone recording table to care for the large increase of telegrams received and delivered by telephone. During the short time that it has been in service the number of telegrams received by telephone has advanced 400 per cent. The use of the table has given the necessary accuracy and dispatch and assured the efficient handling of the telegrams.

The recording table consists of ten positions equipped with disappearing typewriter pedestal, pigeon holes for blank forms and a twenty trunk multiple, eight of which are at present in service. The ultimate equipment is sixty trunks in which case the table would be increased to thirty positions, the design allowing for two trunk lines per position.

Each operator may take any call signalled by a white light. Busy trunks are shown by a green signal. There are two cord circuits at each position, one for answering and transmitting, and the second for reserve or for information purposes. Outgoing messages are delivered to the telegraph operator by means of a pneumatic tube and likewise the telegrams to be telephoned to the addressee are received through the tube.

It has been found that long-hand prepared forms, because of the necessary haste in writing them, are untidy and often nearly illegible, causing confusion and delay. Therefore the typewriter is used to record messages. In addition to the perfect legibility of its work, greater speed is thus obtained. An operator with only two weeks' experience on the typewriter has recorded ten messages, totaling 113 text words in an hour. The long-hand recorder has only been able to handle four messages or seventy-eight text words.

Transmitting Pictures by Telegraph. — *La Nature*, of Paris, describes a process of sending pictures over a telegraph line, using ordinary apparatus. The picture is divided into small squares and the quantity of light in each square is indicated by a number. These numbers are transmitted by wire and the corresponding parts assembled at the receiving station according to a definite plan.

TELEPHONE RECORDING TABLES AT PHILADELPHIA WESTERN UNION OFFICE.

An Operator in Love. — An ardent young Romeo in the West who, while not making love works as an operator, tried to compel the object of his affections to marry him by pointing a revolver at the girl. He was arrested and fined $100 for his display of affectionate zeal. Being an operator, however, he can pay the fine with ease.

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REMITTANCES to Telegraph and Telephone Age should be made invariably by draft on New York, postal or express money-order, and never by cash loosely enclosed in an envelope. By the latter method money is liable to be lost, and if so remitted is at the risk of the sender.

February 1, 1912.

Government Ownership of Telegraph Lines.

The recommendation of Postmaster-General Hitchcock that the government purchase and operate the existing telegraph lines has met with strong opposition from all quarters. There have been times in the past when the public mind would have accepted such a proposition more seriously, but, at the present, sentiment seems to be very strongly against it. Fully ninety percent of the newspapers who have thus far expressed an opinion on the subject are positively against the government ownership of the telegraphs.

Mr. Hitchcock endeavors to point out how the public will be benefited by government control of this important utility, but all of his arguments in favor of the proposition will not bear close analysis. For instance he says that lower rates will be possible because, among other things, there will be no taxes to pay, as private corporations are required to do, and the postoffices and telegraph offices can be consolidated, thus effecting a large saving in rent. What he says may be true from the government's standpoint, but what about the public—the party of the second part?

As far as taxation is concerned, it will simply shift the taxes from the private corporations to the public, should there be any deficiency, and there is every reason to believe that the government cannot operate the lines at a profit, notwithstanding the assertions to the contrary. England's experience with government controlled telegraphs may be taken as an example of what may be expected in this country if the government ever comes into possession of the lines.

Again, if the telegraphs are taken over the telephone systems must necessarily be included, because the telegraph and the telephone are so closely united that it would be extremely difficult to disjoint them and make two separate institutions of them.

Reverting to the question of taxation an interesting fact should be kept in mind in connection with this proposition. A very small percentage of the people use the telegraph, and it is proposed to tax all the people for the benefit of the few who use it. Will the American people agree to such a proposition? The government telegraph department would soon become a huge machine, burdened with charges of all sorts, and these burdens would of course have to be borne by the people.

The proposition to close independent telegraph offices and combine the service with the postoffice would certainly not meet with public favor. The private companies establish branch offices for public convenience, but the government would close many of these, and the public would be required to travel longer distances to reach a telegraph office, or telephone instead. But could they telephone their messages if the government did not own the telephone too?

Under government ownership invention would stagnate. Uncle Sam never buys an invention. He simply appropriates what he needs, and the inventor has no redress.

The question of damages for errors in messages is also a very important one to consider. What redress would a person have in such cases if the government operated the telegraph?

These and many other questions of a practical character come to mind in considering Mr. Hitchcock's scheme, which may be all right in theory, but in practice it is extremely questionable whether it would prove to be such a boon as its projectors think it would be. It is highly interesting and significant that the public has expressed so positively what it thinks of the matter, and, although the good sense of the people may be relied upon in the last analysis, it will be necessary for their champions to be wide awake and on the defensive at all times.

The United States and the Radio-Telegraph Treaty.

Although the United States Government took an active part in the treaty of the International Radio-telegraph Conference held at Berlin in 1906, it has not as yet confirmed the treaty. As the conference to be held at London on June 4 is a plenary one, the United States will not be invited to send representatives unless the Berlin treaty should be confirmed previous to that date.

The situation at this time is as follows: The international wireless-telegraph business of the world is conducted under a treaty signed at Berlin on November 3, 1906. 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 telegraphy, as none of the contracting countries is compelled to receive a telegram from the ship of a non-contracting country, and any coastal station in a foreign country may refuse transmission of a message to a station on shipboard subject to a non-contracting country.

A dispatch from Washington states that on January 18 the wireless treaty was referred back to the Senate Committee on Foreign Relations for renewed recommendation. The treaty was favorably reported to the Sixtieth Congress, but the session adjourned without action upon it. In view of the London conference an endeavor is to be made to secure the adherence of the United States to the treaty before that time.

The Genesis of Public Service Commissions.

Many of the States now maintain public service commissions whose duties are to watch public service corporations and see that they maintain reasonable rates and commit no illegal act. Such corporations include railroad telegraph, telephone and other companies.

Public service may be conducted by the government or by private individuals, but there is a great difference in the powers of the two classes. The government has no one to get after it with a sharp stick while the private corporation is being continually watched. Almost every business man has ground for complaint against the Post Office department for instance, for the loss of letters, etc., but that service being under the protection of the government generally escapes public censure. The aggrieved individual must submit to such inconveniences and losses with equanimity for the public good. Public service corporations are at the mercy of the government. It fixes rates and prescribes rules with little regard to financial consequences, and the result is a general disturbance and uneasiness in business affairs.

Public service legislation originated in trivial complaints, which, when ventilated through the press, became exaggerated beyond all proportions. Many fictitious crimes were laid at the doors of public service companies, the people got excited and the legislatures were compelled to take cognizance of the cause of all the trouble. We do not mean by this that we believe that private individuals or corporations are, like some kings, incapable of committing a wrong. It is right that they should keep within reasonable bounds in dealing with the public, but they also have rights which should be respected.

It is noteworthy that the investigations of the public service commissions have, as a rule, failed to find any abuse of power on the part of electrical companies. The commissions have learned that railroad, telegraph and telephone companies are efficiently managed and that their charges for the service rendered are on the whole, reasonable.

Public clamor results in much mischief, and it is extremely unfortunate that selfish interests should promote and maintain such unreasonable action. Yet these things are always with us and vested interests are compelled to do the best they can under the circumstances.

While of course it is inadvisable to attempt to undo what has been done there is an evident reaction in public sentiment and a tendency to deal less harshly with public service companies. After sober, second thought, public opinion, so-called, is beginning to recognize the principle of fair play. Misunderstanding is the cause of most all individual and corporate troubles, and if each of the parties at issue would only endeavor to view the matter in dispute from the standpoint of the other, they would arrive at a rational understanding of the situation and settle their difficulties without resorting to oppression or warfare.

Is Telegraphy an Art or a Science?

A correspondent asks if we are correct in referring to telegraphy as an art and not a science.

The only way we can pass upon the question is to refer to the standard definitions of these two words. The Century dictionary defines science as "knowledge gained by systematic observation, experiment and reasoning; knowledge co-ordinated, arranged and systematized."

Art is defined as "the employment of given means to effect a purpose; an especial facility in performing an operation, intellectual or physical, acquired by experience or study."

"The object of science is knowledge; the objects of art are works."

These definitions are taken directly from the dictionary and are not tainted in the least degree by personal belief or opinion; they are what all men accept as standard. It requires little consideration of the matter to understand that our use of the word "Art" is correct.

One can practice an art but cannot practice a science.

Canadian Pacific Promotions.

In looking over the list of promotions in the telegraph service of the Canadian Pacific Railway Company one is impressed with the fact that reward for merit and fidelity seems to be the predominating feature. When a vacancy or other change occurs, the great wheel moves forward one cog, the resulting vacant position being filled from the lower ranks, those in front being advanced correspondingly.

It must be a feeling of great satisfaction to the members of the telegraph staff of this company to know that faithful and intelligent service will bring its reward. Every official position, from the highest down, is filled by a former telegrapher, and it is safe to say that each occupant holds his position because he is entitled to it by reason of fidelity to duty and loyalty to the company. So great and important a corporation as is the Canadian Pacific Railway Company must have the very best of material in every department for its successful operation.

Operators in Demand for Navy.—There is an urgent demand for enlisted men in the United States Navy who are telegraphers, wireless operators particularly.

Course of Instruction in the Elements of Technical Telegraphy—VIII.

(Copyrighted.)

(Continued from page 48, January 16.)

[We began in our issue for October 16 the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Electricity.

POTENTIAL, CURRENT, RESISTANCE.

The peculiar charm of a trout stream lies in the delightful variety of water scenes it affords to the angler. Here we have the noisy, rushing rapid with its foam-streaked pool below, there the quiet run with stones and tailing eddies, yonder the placid still-water marking the level meadowland.

The current strength, or the rate of flow of the water, depends in each case upon the height through which the water falls in a given distance, and with a uniform channel it is only necessary to establish a certain difference in level to produce a current of any required strength.

Similarly a current of electricity will flow with almost imperceptible strength, or with the rush and power of Niagara, if the required difference in electrical level, or potential, be provided, but it must be understood that the current thus obtained is not a material current like the stream, for it possesses neither weight nor extension. It is not matter, but simply a condition of matter, and the statement that electricity is flowing through a wire is only another way of expressing the fact that the wire and the space surrounding it are in different conditions than usual, and that they possess unusual properties. The action of electricity, however, is quite similar in many respects to the flow of liquids, and the study of electric currents is much simplified by the analogy.

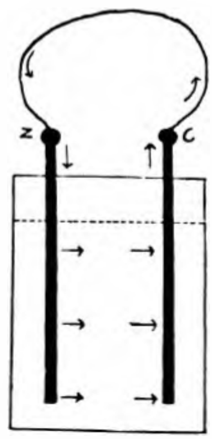
The zero, or normal water level, is taken as that of the surface of the sea. The zero of electrical potential is the earth itself, an electrical level or potential higher than zero being called positive, and a potential below zero, or lower than the earth, negative. The direction of current flow is, like the stream, always from the higher to the lower level or potential.

A difference of potential may be obtained by placing two dissimilar metals such as copper and zinc in contact. Place the tip of the tongue between a silver quarter and a copper cent, allowing the coins to remain in contact, and the peculiar taste experienced will denote the presence of an electric current resulting from the difference of potential developed by the dissimilar metals.

The same results will follow if the plates are slightly separated from each other and placed in a vessel containing acidulated water, leaving a small portion of one end of each plate exposed. A vessel containing two dissimilar metals immersed in this manner is termed a voltaic cell, and the metals are called the voltaic elements. The liquid is called the electrolyte.

There is now a difference of potential between the exposed ends of the plates, the copper exhibiting a positive potential, or a pressure higher than that of the earth, and the zinc a negative potential. Connect the two exposed ends with a wire and the potential inequality will tend to equalize, or come to the same level, and in doing so will produce a momentary current. This equalization of potential will be instantaneous, and unless a further difference of potential can be obtained, the current will cease after a momentary flow. But the effect of this momentary current passing through the cell is to cause certain chemical changes, which, in turn, cause a new difference of potential, resulting in another momentary flow of current; and since these actions follow each other with inconceivable rapidity, the result is a practically continuous current.

The exposed copper and zinc are, as before stated, positive and negative respectively, and consequently the electrodes or poles—the metallic terminals of the plates to which the wire leading to the next cell or apparatus is connected—are of similar polarity, but with the submerged ends the opposite conditions exist, namely, a negative charge on the copper and a positive charge on the zinc. The current, therefore, will flow from the exposed end of the copper, or positive pole, through the connecting wire to the zinc, or negative pole, and from the submerged end of the zinc through the electrolyte to the submerged end of the copper.



FLOW OF CURRENT WITHIN AND OUTSIDE OF A CELL OF BATTERY.

The current is maintained by the chemical action which takes place between the zinc and the electrolyte. The copper serves mainly as a means of connecting the external circuit to the electrolyte, the other end of the circuit being connected to the zinc.

(*To be continued.*)

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. There is a general demand for knowledge on the quadruplex, duplex, etc., and to aid in the acquirement of such knowledge we are extending our help to students by asking questions on these subjects in each issue of our journal, so that they may be encouraged in their studies by answering them. We use as our textbook Maver and Davis' "The Quadruplex," and students should have a copy of this book at hand in order to be able to give the answers. The questions are progressive and a careful reading of the book on the points under inquiry unfolds the answers. This method of acquiring technical knowledge is a fascinating one.]

WHEATSTONE SYSTEM (*Continued*).

How are the two levers of the transmitter kept in an upright position?

Do the two levers move the same distance to the right?

What is the function of the clockwork in the transmitter box?

How is the upward motion of the levers regulated?

How is the disc D divided and connected with the circuit?

What is the purpose of the metal pins on the disc?

How does the disc change the line polarity from positive to negative and from negative to positive?

What is the purpose of the star-wheel in the transmitter?

How is movement imparted to the star-wheel?

What is the marking current?

How many impulses are sent to line in forming a dot?

How many times do the levers move per minute in transmitting at a speed of 250 words per minute.

Where is the polarized relay located in the receiving apparatus?

How is the paper roller operated?

What is the function of the governor on the receiving instrument?

When there is no current to line what position does the polarized-relay armature assume?

What action takes place when a positive or spacing current is connected to line?

What action takes place when a positive or marking current is sent to line?

How is the armature of the polarized relay adjusted?

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(85) Q. You occasionally print references to the relief fund of the New York Telegrapher's Aid Society. I would like to know how this fund is created and administered, if you will kindly explain. I. W. L.

A. In a large city like New York there are always some members of the telegraph fraternity who, for one reason or another, cannot be admitted to membership in this society. In times of sickness these persons are cared for and in the event of death proper burial is provided. The relief fund bears such expenses. It is maintained entirely by voluntary contributions and its financial operations are kept separate from those of the aid society. Each year the society gives an entertainment and ball for the benefit of the relief fund.

(86) Q. How are wireless signals sent from station A to station B, and from station C to station D without interfering with one another? A. C. L.

A. This is accomplished by what is called "tuning," or varying the frequency of the transmitter. If the B station is tuned to respond to signals of a definite frequency sent from A, and D to respond to signals of another frequency from C, there will be no interference. The transatlantic system of the Marconi Company is worked duplex in this way, and it is furthermore practicable to send two messages from A to B at the same time.

Electrical Instruments and Testing.

Every one connected with the telegraph and telephone service should know how to test lines and also be familiar with the instruments used in such work. It does not require much study to learn the mechanical operations of this important branch of the service, but of course a knowledge of electrical and mechanical principles involved in the design and construction of the instruments, and of the principles involved in measurements is the source of deep and never-ending pleasure to the ambitious student.

An excellent book on this subject, intended for the practical man, is "Electrical Instruments and Testing," by Norman H. Schneider, with new chapters on testing wires and cables and locating faults, written by Jesse Hargrave, division superintendent of the Postal Telegraph-Cable Company, Atlanta, Ga.

The price of this book is $1.00 and copies can be had of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York. Any other book on telegraph, telephone or general electrical subjects can be obtained at the same place.

Fifty Years Ago.

BY WALTER P. PHILLIPS.

In my recent article in the *New York Times*, which TELEGRAPH AND TELEPHONE AGE did me the honor to reproduce in its issue of December 16, I refrained from going into many particulars as to individuals, thinking I might take up some of these later. Among the many interesting men employed by the American Telegraph Company, first at No. 21 Wall Street, New York, and later at No. 145 Broadway, was Nelson D. Pratt now a wire merchant in Chicago. I first met him in Providence fifty years ago, the eleventh of last May. The wire with which he was associated in those days was not an inspiring affair and did not have anything like the possibilities in it for the youthful Pratt possessed by the wire proposition in which he has been interested for many years past. It ran from New York to Fall River via most of the towns along the New York and New Haven Railroad in both New York and Connecticut and it was very liberally represented in the state of Rhode Island by River Point, Providence, Warren and Bristol. When he was unable to get circuit on this leaky old wire which was designated as No. 5 he would go over to another one on which the printing system was used and make himself useful there. Number 5 was a difficult circuit at best, and was rendered more so by William P. Potter, manager of the office at Fall River. He had ideas on the subject of right of way and he had the courage of his convictions and was willing to fight circuit the year around rather than let anybody in on the wire as long as Fall River had even one message to go.

Providence had formerly been on another wire which went to New York via New London and New Haven, and its interpolation on No. 5 was not relished by Mr. Potter. He claimed that Providence should not be there at all but superintendent Wood did not share that view so the "little giant," as he was sometimes called, was often thwarted in his intention to run the whole show. He was such an insistent circuit-struggler that it is related of him that getting into trouble with some small office whose manager had rigged up a circuit into which the pendulum of a clock was connected, he fought all night. The philosophically minded manager had simply gone home and left the clock in circuit. When he came to the office the next morning the first thing he did was to cut out the clock, and this was what greeted him: "Another time when you want to fight circuit with me you had better not try it, but close up shop; go home and get some sleep. No one can beat me out at this game. "PFR."

After the absorption of the American Telegraph Company by the Western Union in 1866, an order was issued instructing all operators to adopt a signature, or sign letter, and to send it over the line at the end of each message. This rule has since been changed as we all know, and the signature is sent now at the beginning of messages. Almost every one signed a single letter but the very first day the new rule was in effect Mr. Potter appeared on the scene with a three-lettered signature—P for Potter and FR for Fall River. He desired everybody to know that he was no ordinary potter but William P. Potter of Fall River. So the signature went forth and became famous. It was known all over the country.

Various imitators of Mr. Potter's somewhat mincing but quite fast and pretty sending rose up, among them Preston J. Hurlburt of Providence. His imitations were the best, but all of us were more or less versed in the art. Hurlburt had all of Potter's ways down fine and no one could detect him in the act of committing these forgeries in the second degree. There were many turnpike wires in New England which had been bought up by the Western Union and one of Mr. Potter's little side line enterprises was the keeping of a horse and wagon which he farmed out to the Western Union as needed for the use of the linemen sent out for trouble on defective circuits. At about the time Mr. Potter went to his luncheon one was liable to hear Fall River calling New Bedford at a great rate and presently Benoni Paine the manager would respond. He and Potter had been messengers together in Providence many years before and were great chums. Hurlburt would say; "When my man gets there, put my horse in the stable give him six quarts of oats, and don't take his harness off. PFR."

These fictitious commands, having the very air of authority that were imparted to them when they were really given by Mr. Potter, led to many misunderstandings between him and his friend Paine, but they were none the less heartily enjoyed by the precious scamps who did the telegraphing in Providence during and after the civil war, and those stationed along the line who were familiar with the eccentricities of "three lettered jack," as he was sometimes called. As No. 5 became more and more congested, in later years, Fall River was permitted to come in on the through wire between New York and Newport and when the regular operator at Fall River went to luncheon PFR took the wire and as long as he was permitted to send he was on safe ground, being a tuneful sender who separated the spaced letters in a particularly intelligent way and who got over the ground at a lively pace.

For years PFR regarded himself as the best and fastest sender in New England and he only yielded the palm, at last, when Burns and Kettles made some time records that left him in the shade. But when it came to receiving he developed an obvious weakness. His handwriting was small and graceful but not adapted to being put on paper at more than fifteen or eighteen words per minute. He was constantly in hot water with everybody who sent even two-thirds as fast as he did, and his general complaint was that the sender "stuck," a phrase that was also woven into the telegraphic parlance of the time together with the six quarts of oats that went with the horse whose harness was to be kept on.

Probably a more contentious little man over the wire never existed, but *in propria persona* he was a dear good fellow. He used to visit Providence, quite frequently, and on one occasion he said to me in strict confidence, "Walter, I think I can send a little faster than any man can receive." A few years later, on August 7, 1864, I was in Taunton, over Sunday, and PFR called up and said there had been a great Union victory. The *Fall River News* which was publishing a morning edition, temporarily, had columns of the story, but there was no way to get Fall River or Boston or Providence papers to Taunton, on Sunday, in those days. So PFR said he would send the news if it were desired, and Charles Crandall, the manager of the office, replied very promptly that he wanted the best synopsis of it that could be sent in a couple of hours, and Mr. Potter got started about half past nine o'clock.

For some time previously Farragut had been adding fresh lustre to his fame by his operations around Mobile and on the Friday preceding the Sabbath day on which PFR was to distinguish himself in such a striking manner. Farragut's fleet, reinforced by four monitors, had made a savage attack on Fort Morgan in Mobile Bay. The Admiral lashed his fourteen wooden ships together in pairs, and at six o'clock in the morning the long line steamed into Mobile.

"As they drifted on their path
There was silence deep as death;
And the boldest held his breath
For a time."

The above is from Campbell's Battle of the Baltic, but it applies with equal force to Admiral Farragut's start through the narrow passage of Fort Morgan. The monitors steamed ahead, cautiously, and the other ships, slowing down, dropped back from the rest of the squadron. The strong current carried them across the channel and the long line of ships curled itself up directly under a raking fire from Fort Morgan. No one held his breath after that and the fight was on in earnest.

The smoke from the guns was so great that the Admiral climbed into the shrouds of his flagship, the "Hartford," to get a better view of the struggle, and as he went higher and higher, his position seemed so perilous that a man was sent up to fasten him in his place. Fort Gaines was taken, but the expected capture of Fort Morgan was deferred for nearly three weeks when it yielded to a bombardment. The port of Mobile was henceforth closed to Confederate commerce, though the city, itself, did not capitulate until the the following April. News had been arriving in driblets for several days, but it was not until the night of Saturday, August 6, the day after Farragut, when warned of the presence of torpedoes in the channel, had signalled the reply, "Damn the torpedoes!" that with the probable assistance of a smuggled copy of the *Mobile Register* and such data as he could secure from other sources, the Associated Press correspondent, with Farragut, got his graphic story on the wires. It was very interesting and gave the Sunday papers an August sensation that was thrilling in the extreme, notwithstanding the terribly hot weather that prevailed from Mobile Bay to the New England coast.

The Associated Press writer confidently predicted the fall of Mobile, within a few days, but we had to wait seven or eight months for his prediction to come true. The chances are that he drew on his imagination quite liberally for southern newspapers, even if he had been well supplied with them, did not afford great opportunities for the judicious use of the scissors. They were always reticent when the battle was going against the South. The occasions when the southern press were well supplied with news, foreign and domestic, was whenever somebody got a copy of the *New York Herald* through the lines and delivered it into the hands of Frank West, the representative of the Associated Press at Richmond. His son was once an employe of mine, in Washington, and he was well supplied with stories his father used to tell about news gathering, on the Confederate side, in war times, and the extravagance with which the southern papers ordered the news and the reckless prices they were willing to pay for it. "Send everything the *Herald* has and will ship money at once," was the conventional formula, according to the younger West. "Why, sir, at the end of the war," he would conclude, "my father had more Confederate money than any man in the South. Yes, sir, and he would have had ten times as much, if he hadn't refused to pay the freight charges on most of it."

Mr. Crandall, who was a magnificent receiver, invited me, in very seductive tones, to sit in while he went for a flour barrel that he intended to have used for some one to stand on and read the despatches to a multitude that he knew, from previous experience, would quickly gather when the report began to spread that vital war news was to be received. As he was the manager of the office and I the guest of one of his operators, whose experience had not been sufficient to enable him to take press reports, I could scarcely decline, and before I knew it, PFR was piling the stuff into me at a gait that must have pleased him exceedingly, although it did not quite agree with me. The day was suffocating and I was done up in my full individual allotment of the cuffs and collars, white vests and spats, that go with youths of eighteen. I was not happy and the excitable Potter increased his steam capacity like a locomotive, when he was fairly under way. He had got a break out of Crandall in 1857 and had been laying for him ever since, hoping to score another one against him, and this was his golden opportunity. He knew nothing about the change in operators, and he was in his element, for he had two or three hours of sending to do and was in no danger of having to receive anything. The only man, singular as it may seem, whom Crandall could find to mount the flour barrel and read the despatches, was himself, and the bravery of the boy who stood on the burning deck of his father's flagship at The Battle of the Nile in obedience to the French admiral's command, yielded no more gracefully to the voice of parental authority than Crandall acquiesced in the expressed wishes of his auditors as they cried, now and again, "Give us some of that stuff over again, Charlie," or "Go on, old man and read us a lot more," etc.

As I emerged from the sweat box in which I had been imprisoned for more than two hours, which had seemed like a hundred and two, the church services were ending, and people were pouring into the streets from many directions While they had been at worship the reports of the stirring events in far away Alabama which had been taking place during several preceding days, had been drifting over from Fall River, on the wings of the morning, and Crandall, as he saw me approaching with the final pages of copy in my hand, striking a Roman senator attitude, on the head of a flour barrel, was a cheering sight to see, under the circumstances, with his constantly increasing congregation listening to his news with all the ears they possessed.

Charles was something of a wag. In replying to a question which PFR asked me, quite early in the proceedings, I made some unconscious revelation of myself, and after that he let out his last link. But it was all in vain for I was just as stubborn as he was and would not have broken him for worlds. He was very gracious when he finished the 5,000 or more words he had sent me, and observed: "I take back what I said to you once, in Providence. Let me revise it and put it this way: I believe you can receive faster than any man can send." He little knew what was in store for me when the new crop of senders should come to the front. He did not see his finish, then, but he was convinced when he heard Kettles send that he had never been in it, from first to last, and that he was a back number, with all which that eloquent phrase implies.

In 1862 Pratt went to New York and his presence in the principal office of the American Telegraph Company was marked by his selection as one of those chosen to receive President Lincoln's message to Congress in 1863. There were eight of these men and the message was divided into eight parts so exactly alike, in size, that all of the Washington senders finished at the same moment. The whole document was handled in fifty-two minutes, and before the last of it had been delivered to the newspapers, boys were on the street crying their "extras," and shouting that their papers contained the President's message. Of course only the first part of the message was given, but to have any of it in print before the work of telegraphing it from Washington was finished was regarded, fifty years ago, as a feat of surpassing magnitude. Presidential messages are supposed to be presented to Congress as soon after the members meet at noon, as is consistent with the making of the daily prayer by the chaplain, and the reading of the journal, but, on this occasion, although eight of the best operators in the world were in readiness to do their part, the message was not ready for transmission, until 2 p.m., and no pains was spared to keep them at their desks until the message was disposed of.

Not only "men must work and women must weep," as we are assured by Canon Kingsley, but telegraph men must eat. Knowing this the managers of that day provided the waiting octette with an acceptable supply of food which did not come from Delmonico's by any means, although Lorenzo Delmonico, "the original Jacobs," had his restaurants in the neighborhood and a particularly fine one in Beaver Street, where I remember going, as a boy, to view the marble pillars which had been excavated at Pompeii and brought to New York at great expense. I had read Bulwer's "Last Days," and anything that had come from the scene of his wonderful story had more attractions for me than all the tempting viands that his talented chefs could produce and all the famous wines contained in the cobwebbed bottles or the dust laden flagons and fiascos hidden away in Delmonico's well stored cellars.

Mr. Pratt, much to the regret of all his friends, left the telegraph business in the summer of 1864, but as long as he remained he was a vital part of the operating force at No. 145 Broadway as he had been at No. 21 Wall Street where the general telegraph office had been located up to the early part of the year 1861. Among other interesting despatches that passed through his hands in 1863-4, was one from an agonized father in Maine, who wired to Senator Fessenden asking him to see President Lincoln and intercede for a delay in the execution of his son, for sleeping on post, which was appointed for the next morning at six o'clock. The father asked that action might be deferred until he could reach Washington.

The files of the War Department are filled with the notes, letters and telegrams from Mr. Lincoln to military officials ordering stays in cases such as the one in which Senator Fessenden's correspondent was interested. Burnside might lose the day at Fredericksburg, McClellan win at Antietam, Greeley cry aloud for the emancipation of the slaves before Lincoln was ready to break their shackles, Grant might capture Vicksburg, or anything else that was vital might happen, this great man, his eyes ever roaming from point to point, and his mind as active, ingenious and commanding as that of Caesar or Napoleon, always found time to extend a succoring hand, or speak a kindly word and to do all that it was within human power to do for the unfortunate soldier, however humble he might be. In that respect he rose superior to every great commander in the world's history and revealed a love for his fellow man that the horrors of war and the demands upon his time and attention could not change excepting to strengthen it.

About the time referred to the records show the appended despatches and quite likely one of these was written in response to the pleading message that passed through Mr. Pratt's hands en route from a heartsore parent in Maine to the man who represented his state, in the Senate, with such great distinction from 1854 until his death in 1869:

Washington, D. C., Dec. 3, 1863.
Major General Meade:
Please suspend sentence in the case of William A. Gammon, Seventh Maine and send record to me.
A. Lincoln.

Washington, D. C., Dec. 14, 1863.
Please suspend execution in the case of William Gibson, Fourth Maine, until further notice and send record.
A. Lincoln.

January 28, 1864.
To the Commanding Officer,
At Fort Preble,
Portland, Maine.
Suspend the execution of the death sentence of Charles Caple, set for tomorrow, until further orders and forward record for examination.
A. Lincoln.

Telephone Pioneers of America.

F. H. BETHELL.

Mr. Frank H. Bethell, vice-president of the New York Telephone Company, who, as announced in our issue for January 16, was elected president of the Bell Telephone Company of

FRANK H. BETHELL (1890).

Pennsylvania, The Delaware & Atlantic Telegraph & Telephone Company, The Diamond State Telephone Company, The Chesapeake & Potomac Telephone Company and The Central District & Printing Telegraph Company, assumes these important positions well equipped with experience and natural ability.

Mr. Bethell entered the telephone service in November, 1890, as a messenger for the New York & New Jersey Telephone Company at Newark, N. J., and in the following January was appointed to a position in the auditor's office of the Metropolitan Telephone & Telegraph Company in New York. In July, 1901, he became contract agent of the New York Telephone Company and in 1904 he was appointed general manager of The Chesapeake & Potomac Telephone Company with headquaters at Washington, D. C, Mr. Bethell's duties were further increased in 1906 when he went to Philadelphia as vice-president of The Bell Telephone Company of Pennsylvania and associated companies. In February, 1908, he became president of the Maryland Telephone Company, which previous to that date had operated as a competing company in the state of Maryland, and in 1910, he was elected vice-president of The Central District & Printing Telegraph Company. Mr. Bethell is now president of all of these companies as noted, with headquarters in New York, and under his direction they will get the benefit of a ripe experience and sound judgment.

It is not often that so many honors are bestowed upon so young a man, but Mr. Bethell has proved his ability and the telephone company has not been slow in recognizing his worth and using it. He is well versed in the science of organization and is very popular.

Mr. Bethell is vice-president of the Telephone Pioneers of America and takes an active interest in its affairs, as he does in all things he undertakes.

Decision in Regard to Telegraph-Telephone Office at Watervliet, N. Y.

An interesting decision has been rendered by the Public Service Commission, second district, New York, with reference to telegraph facilities in the city of Watervliet, N. Y.

The Western Union Telegraph Company closed its office in that city and arranged to handle its business through a telephone station. A complaint was made to the Commission, requesting that a city office with a telegraph operator be maintained.

The Commission in dismissing the complaint states that free delivery of telephones has been extended over the entire city limits of Watervliet; that a telephone office will be maintained in charge of an agent of the Western Union Telegraph Company, and that telegraph messages will be transmitted by telephone to Troy, in a closed booth to preserve secrecy. It is also provided that the Western Union Company shall display a sign on the outside of the building showing that it maintains an office at that point.

Mr. L. Derrick, of Philadelphia, Pa., in renewing his subscription for another year, writes: "This is one way I have of remembering myself at Christmas and to my mind the one best gift."

Telephone Train Dispatching in 1911.

Almost every issue of TELEGRAPH AND TELEPHONE AGE during 1911 recorded the introduction or extension of telephone train dispatching on one or more roads, and the ordinary plain system of telegraphy seems to be going out of fashion. Dispatching of trains by telephone has proved to be so reliable and efficient that there can be no reasonable doubt that all the railroads in the United States will finally be equipped with a system of this character.

Compared with the telegraph method the consensus of opinion among railway telegraph superintendents is that the telephone system is far superior and effects gains in many ways, particularly in time, which is one of the most important factors in railway operation.

With a view to ascertaining what has been done along these lines we invited all the railway telegraph superintendents in the country to state what progress they had made in the past year and what plans were laid down for extensions, etc., during the new year. Following are some of the replies:

Mr. Charles Selden, general inspector of transportation and superintendent of telegraph, Baltimore & Ohio Railroad, Baltimore, Md.: "During the year 1911 we have strung a telephone train dispatching circuit and in addition a telephone message circuit, covering 512 road-miles, and the equipment is just being installed for operation. We have had in service for almost a year a train dispatching circuit on one division, and the results were so satisfactory that it has been decided to add to this service every month during 1912. It is the intention and expectation that by the end of 1912 the entire Baltimore & Ohio Southwestern Grand Division, 980 road-miles, will have been provided with a telephone train dispatching circuit and a telephone message circuit in addition, and the probability is that within the year 1912 all of the single track portions of the Baltimore & Ohio system will be so arranged."

Mr. S. A. D. Forristall, superintendent of telegraph of the Boston & Maine Railroad, Boston, Mass.: "The Boston & Maine Railroad did not extend its telephone dispatching system during 1911. We have three circuits at present and they are giving satisfaction in every particular. We expect, during the coming year, to install two or three more circuits."

Mr. W. F. Williams, superintendent of telegraph Seaboard Air Line, Portsmouth, Va.: "The Seaboard Air Line Railway, with a mileage of 3,100, has 1,100 miles of train dispatching by telephone, and we will very likely complete the whole in the course of time, but at this writing I have no authority for future extensions. We have found the telephone to be a great saver in train time, and I am now preparing some figures showing a comparison in this respect."

Mr. L. B. Foley, superintendent of telegraph Delaware, Lackawanna & Western Railroad Company, New York: "The Delaware, Lackawanna & Western Railroad Company is entirely equipped with selective telephone dispatchers' circuits and the telegraph is no longer used for dispatching purposes. We also have three telephone message circuits on which messages are handled by telephone instead of the Morse. We have three hundred selectors in use and fifty-two telephone booths at freight sidings, where train men can communicate with the dispatchers and obtain information or orders. We have ten dispatching circuits with a mileage of 1,001 miles. Our entire dispatching system, being operated by telephone, we contemplate, during the year 1912, installing additional telephone message circuits and several hundred miles of railroad commercial telephone circuits."

Mr. E. C. Keenan, superintendent of telegraph, New York Central Lines, Cleveland, Ohio: "On the Lake Shore & Michigan Southern, Lake Erie & Western and Toledo & Ohio Central systems, we practically completed last year the construction and installation of telephone train dispatching circuits and equipment on all divisions, having covered all of the main lines. The construction of new telephone circuits gave us added Morse facilities, which have been utilized for through service, so that the telegraph and telephone circuits now provided and arranged for give adequate facilities for satisfactorily handling the railroad business."

Mr. J. F. Caskey, superintendent of telegraph, Lehigh Valley Railroad Company, South Bethlehem, Pa.: "Two telephone train dispatching circuits, were installed and put in operation on the entire Wyoming division, 260 miles of single and double track, making 520 wire miles. A yard dispatching circuit covering the New York division, between Jersey City and Newark, distance sixteen miles or thirty-two wire miles was installed and put into service. A train-dispatching circuit covering the entire Pottsville branch, forty miles or eighty wire miles, were installed and put into service. the line being attached to the Lehigh division dispatching circuit. To accomplish this forty miles of pole line were rebuilt, the old line being unreliable. Three hundred and fifty Western Electric portable telephones and line poles were installed on cabooses and baggage cars, covering the entire portion of the road now equipped with train dispatching circuits, which includes the territory between Jersey City, N. J., and Sayre, Pa., a distance of 270 miles. These telephones are found very effective during derailments, delays, etc., saving the time of train crews. Rail gangs, bridge and section forces, have also been supplied with this apparatus which enables them to work their men on closer time by being thoroughly informed as to the progress of trains over the section of road on which they are engaged. We a about completing the rebuilding of 125 miles of pole line between Burdett and Depew, N. Y., erecting forty twenty-five-foot poles per mile, aiming for a low line to prevent trouble during storms and to enable the train crews to reach the telephone lines without difficulty when necessary to use the portable telephones and line poles. We have in course of erection two train dispatching circuits to cover the entire Buffalo division, 352 miles. These lines will be ready for service some time during the coming spring. When these lines are erected we will install on all cabooses and baggage cars, between Sayre, Pa., and Buffalo, N. Y., 140 portable telephones and line poles, so that each train running over the road will be able to reach the dispatcher without delay. During the coming summer we expect to erect a train dispatching circuit on the Elmira and Cortland branch, between Elmira and Camden, a distance of 140 miles—280 wire miles."

Mr. J. B. Murphy, superintendent of telegraph, Southern Railway Company in Mississippi, Jackson, Tenn.: "We did not improve our telegraph facilities any during the past year. There is some talk of a telephone circuit during the present year, but realization is doubtful."

Mr. G. O. Perkins, superintendent of telegraph, Chicago Great Western Railroad Company, Chicago, Ill.: "During 1911 the Chicago Great Western Railroad inaugurated on its eastern division two telephone dispatching circuits and two telephone message circuits each equipped with thirty-five selectors and from forty to sixty telephones. The dispatchers' circuits are simplexed and a through telegraph circuit worked over them. A grounded phantom telephone circuit is also worked over the wires of the two dispatcher's circuits giving a through telephone circuit and a through telegraph circuit and two local dispatching circuits on one pair of wires between Chicago and Oelwein. The grounded phantom was designed by Mr. W. L. Cook of the United States Electric Company. On the western division telegraphones have been installed at all important stations and are carried on all freight and all passenger trains. On the northern division telegraphones have been installed at all important stations. On the southern division a telegraphone circuit was established between Oelwein, Iowa, and Des Moines, Iowa, a distance of 132 miles on a No. 8 iron wire on a heavy lead, most of the wires of which are quadruplexed, and where the inductive disturbances were so great that telegraphone communication had been considered impracticable even for short distances. This circuit is equipped with special instruments designed by Mr. H. O. Rugh of the Sandwich Electric Company. I regard the new devices by Messrs. Cook and Rugh as very important advances in the art of communication."

Mr. George Boyce, superintendent telegraph and signals, Chicago, St. Paul, Minneapolis and Omaha Railway Company, St. Paul, Minn.: "We have no telephone train dispatching circuits as yet."

Mr. W. S. Melton, superintendent of telegraph, Queen and Crescent Route, Danville, Ky.: "The Cincinnati, New Orleans & Texas Pacific Railway built two parallel telephone circuits between Danville, Ky., and Oakdale, Tenn., during 1911, one of which is a dispatcher's circuit and the other a message circuit. From an efficiency standpoint these circuits have exceeded the expectations of the transportation officials."

Mr. B. F. Frobes, superintendent of telegraph, Oregon Short Line Railroad Company, Salt Lake City, Utah: "We have made no progress in telephone installation during the year 1911 on our line. The only installation we have is a short one between Salt Lake and Ogden, which is badly affected by induction from power transmission lines and we have not been doing very well on account of this. The leakage from these power lines seems to interfere with the satisfactory working of selectors of any make."

Mr. W. J. Camp, assistant manager, Canadian Pacific Railway Company's Telegraph, Montreal, Que.: "During the year 1911 the Canadian Pacific Railway Company's telegraph department added to its equipment nearly 5,000 miles of copper wire and 1,500 miles of iron wire for telegraph service, 1,750 miles of telephone dispatching circuits, 100 miles of other telephone circuits and about 400 miles of pole line, with two or more wires over new branches. It has also installed a storage battery plant at Moose Jaw, Sask., and a dynamo plant at Saskatoon, Sask., besides increasing the dynamo equipment at Ottawa and Fort William. The erection of a 16-story office building in Toronto has also been commenced. About 1,200 miles of old line have been rebuilt besides general repairs over other lines. During the whole season there have been between 600 and 700 men employed in extra gangs doing this work."

Mr. J. J. Ross, superintendent of telegraph, Michigan Central Railroad Company, Detroit, Mich.: "Very little was done in the year 1911 in the way of extensions or improvements in the telegraph or telephone. The present mileage is divided into nine dispatching circuits all of which are giving excellent satisfaction, and we expect to add at least four more dispatching circuits this year. It is hoped that we will also be able to put up a few message circuits."

C. J. Steinel, superintendent of telegraph, San Pedro, Los Angeles & Salt Lake Railroad Company, Los Angeles, Cal.: "During the year 1911 we were engaged in rehabilitating our lines through a part of southern Nevada where, in former years, we had suffered greatly from washouts. The new line has been placed in solid rock and high up out of reach of anything less than a general deluge. This work entailed an enormous expense so there was little opportunity to devote to the development of modern systems of telephony for train dispatching, or for experiments of an innovating character."

Mr. E. P. Griffith, superintendent of telegraph, Erie Railroad Company, Jersey City, N. J.: "There have been no additions made on the Erie Railroad since the time covered by the report in your issue of June 16, 1911, but several additional circuits are under consideration."

H. D. Teed, superintendent of telegraph, St. Louis & San Francisco Railroad Company, Springfield, Mo.: "It is very probable that this company will extend its telephone dispatching and accompanying message circuit approximately three hundred track miles during the coming year, in order to relieve a congested territory."

(To be continued.)

Government Ownership of Telegraph Lines.

Announcement was made from Washington on January 14 that Postmaster-General Hitchcock would submit to Congress a plan for acquiring the telegraph lines by the government to be operated as part of the postal service. This, it appears, was done without first submitting the matter to the Cabinet, and a statement has been issued from the White House to the effect that as the report containing the recommendation has not yet been submitted to the President, it has not been considered by him or by the Cabinet with a view to presenting it to Congress as an Administration measure.

Mr. Hitchcock stated that he had made a thorough study of the subject and was convinced that if his recommendation were adopted it would result in important economies and very materially lower telegraph rates that now are exacted. "In approximately fifty countries of the world," he said, "notably in Great Britain, France, Germany, Austria, Italy, Spain, Russia, and Japan—government-controlled telegraphs now are in successful and profitable operation. In many of the countries they are operated in connection with the postal service. These telegraphs serve an aggregate population of 950,000,000, and in every instance they have been found to be of immense practical benefit to the people, in both promptitude and cost of the service.

"In this country Post Offices are maintained in numerous places not reached by the telegraph systems, and the proposed consolidation, therefore, would afford a favorable opportunity for the wide extension of telegraphic facilities. In many small towns where the telegraph companies have offices the telegraph and mail business could be handled readily by the same employes. It is evident that the separate maintenance of the two services under present conditions results in a needless expense.

"The first telegraph in the United States was operated from 1844 to 1847 by the government, under authority from Congress, and from many viewpoints it is desirable that government control should be resumed.

"My own view," Mr. Hitchcock continues, "is that every reason for the transmission of mail under government control can be urged with equal force for the transmission of communications by telegraph. Because of the more extensive organization maintained by the Postal service and the freedom from taxation and other charges to which private corporations are subject, the government undoubtedly could afford greater facilities at lower rates than are afforded by companies now conducting the telegraph business. Next to the introduction of a general parcel-post, for which there is a strong popular demand, the establishment of a government telegraph system offers, in my judgment, the best opportunity for the profitable extension of the nation's postal service."

It is not Mr. Hitchcock's purpose to recommend the acquisition of telephone lines, except possibly in instances where they are operated as telegraph lines and are an integral part of definite telegraph systems.

The latest census figures available indicate that about 100,000 persons are connected with the telegraph companies of the United States. The appraised value of the systems proposed to be acquired would be purely conjectural, but it is said it would approximate $250,000,000.

Mr. Theo. N. Vail, president of the Western Union Telegraph Company, in commenting on Mr. Hitchcock's proposition said he did not think the government would do such a thing. "The expense the British government has been under," he said, "in maintaining the telegraph lines, should indicate that public ownership is not very promising and I should not think our government would find very much to enthuse over if Congress will read the last report on the cost over on that side of the ocean. The last annual report of the Western Union Telegraph Company refers to the situation in England where the general revenue pays just about one-half the cost of conducting the telegraph lines. In other words the expense of handling every message exceeds the amount received about 50 per cent."

Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Company, New York, stated that government control of the telegraph would be unprofitable.

"The step would lead to taking over the telephone lines also," Mr. Mackay said. "The British government found this to be so, and on January 1 it took over the telephone lines in England at an enormous expense.

"The telegraph and telephone lines in this country are worth two billion dollars to three billion dollars. This would include the independent telephone companies having some 450,000 stockholders.

"I venture to say that they would be operated by the government at a great annual loss, just as in Great Britain, where the losses on the telegraph alone up to date are figured at $175,000,000. Moreover, the government would then be employing hundreds of thousands of clerks, telephone girls telegraph operators, managers, etc. It would be a colossal political machine."

Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company, New York, gave it as his opinion that "the country is not quite prepared for such a step. If the government is to take over our public utilities shouldn't the bigger things be taken first? Surely the railroads are bigger than the telegraph."

All of the New York daily newspapers, with one exception, and the papers throughout the country, editorially express themselves against government ownership of the telegraphs.

Representative Carey, of Wisconsin, (an old-time telegrapher,) on January 19 introduced a bill in the House providing for government ownership of telegraph lines. The bill recites that the telegraph systems be placed under the supervision of the Post Office Department in charge of a Commissioner of Telegraphs, to be appointed in the same manner as assistant postmasters general. It also provides that the Inter-State Commerce Commission appraise at their bona fide market value all the telegraph properties engaged in Inter-State commerce, the attorney-general then to begin condemnation proceedings against the companies. The measure stipulates that wages should not be increased more than 15 per cent. over those paid the year preceding government acquisition, and bars any immediate decrease of telegraph tolls.

Many telegraphers favor government ownership of telegraph lines, believing that they will receive higher pay, shorter hours of labor, an annual vacation and pension on retirement from active service.

W. J. Camp, Assistant Manager of Telegraphs, Canadian Pacific Railway Company.

Mr. William J. Camp recently appointed assistant manager of telegraphs of the Canadian Pacific Railway Company with headquarters at Montreal, has reached this high position through merit and unflinching fidelity to his trust. He is a Canadian by birth and experience and is a leader in his line of activity.

Mr. Camp was born at Oakville, Ontario, April 22, 1855. At the age of sixteen he was obliged to leave school permanently, and for the following three years engaged in different kinds of employment including bookkeeping and various duties in a saw mill and in the freight office of the Grand Trunk Railway at Prescott, Ont. Here he learned telegraphy and entered the service of the Dominion Telegraph Company as operator in that place in September, 1874, and then took up the study of wire testing and switching. In the following spring he moved to Montreal and became chief bookkeeper in the office of the Grand Trunk and in the summer of 1876 became manager of the Watertown, N. Y., office, but left the service toward the end of the year and was temporarily employed at various points on the New York Central Railway, Troy & Boston Railway, Atlantic & Pacific Telegraph Company and the Western Union Telegraph Company at Albany, N. Y. He left the latter company to re-enter the service of the Dominion Telegraph Company at Montreal in the summer of 1877, becoming night chief. In January, 1878, he became train dispatcher on a line which is now a portion of the Canadian Pacific Railway. When this road was seized by the government he returned to the position as night chief in the Dominion Telegraph Company's office being later advanced to the position of assistant day chief. On the consolidation of the Dominion and Montreal Telegraph companies in 1881 under the name of the Great North Western Telegraph Company, he was made local electrician at Montreal and filled this position until July, 1883. He then became operator for the Canadian Pacific Railway at Hochelaga and in September, 1884, he received the appointment of superintendent of the Holmes Electric Burglar Company at Montreal. He held this position until April, 1886, when he re-entered the service of the Canadian Pacific Railway as chief electrician over the whole system for the telegraph department which had recently been formed. In December, 1899, he succeeded Mr. James Kent as superintendent of the Eastern Division which then covered the territory between Port Arthur, Ont., and Louisburg, Cape Breton. In November, 1903, he was appointed electrical engineer for the whole system, which position he held until his promotion on January 1 this year to be assistant manager of telegraphs.

W. J. CAMP,
Assistant Manager of Telegraph, Canadian Pacific Railway, Montreal, Can.

The keynote of Mr. Camp's success has always been "attention to business" and it may be said of him that he considered himself always on duty. He has the happy faculty of making business a pleasure. He is an active and popular member of the Association of Railway Telegraph Superintendents and was its president during the year 1908-09.

Mr. W. I. Sweet, assistant chief of Division of Telegraphs and Telephones, Public Service Commission, Second District, New York, says in reference to renewal of subscription to TELEGRAPH AND TELEPHONE AGE: "Our office would be at a serious loss without this magazine on our files."

Telephone Companies in New York State.

The annual report of the Public Service Commission, second district, New York, for 1911, says with reference to telephone companies: The jurisdiction of the Commission was extended in September, 1910, to telegraph and telephone corporations, and the work of supervision of these corporations is now fully organized. As a result of inspection by Commission employes, a vast number of defects in operating efficiency and methods, as well as of the equipment, lines and apparatus, has been found in telephone plants. During the year, 424 central offices serving 372,-800 sub-stations have been inspected.

Attention is called to the exemption of telephone companies having property of less than $10,000 in value which do not come within the jurisdiction of the Commission. The Commission has no power to make an examination of the property of a company which claims to be without its jurisdiction, and it is possible for companies to organize with less than $10,000 of stock and obtain a foothold in communities without any regulation or supervision whatever by the Commission, and thereby defeat the real purpose of telephone regulation.

Further attention is called to the fact that under the law as it stands the stock of one telephone corporation can be purchased by another without application to or authorization by the Commission, or local plants can be transferred in the same manner. Companies in most cases can be consolidated or merged in precisely the same manner as before telephone companies were placed under the jurisdiction of the Commission.

Attention is also called to the tendency to consolidation among telephone companies of importance. The Legislature is asked to note that if any evil is in this policy, measures to correct the same should be taken.

Gold & Stock Life Insurance Association Annual Meeting.

The thirty-fourth annual meeting of the Gold & Stock Life Insurance Association was held in New York, January 15. Mr. G. W. E. Atkins, president, in his report said that in reviewing the work of the association each year one is impressed by the immense amount of good that has been accomplished in the distribution of the benefits accruing from the privileges of membership in it, and with the lesson that has been taught, and which will continue to manifest itself through the beneficent influences of fraternal co-operation. He said that $149,300 has been distributed to the association's beneficiaries to date.

In closing he referred to his having been president of the association for ten years, and expressed regret that he had for some time been prevented by other duties from doing more than a small part of the work of the association, but that in the future while he could always be called upon, he hoped that he would not be expected to do more than a member's share. He appealed to the members to continue their good work in the direction of increasing the resources and enlarging the scope and benefits of the association.

Mr. Lewis Dresdner, treasurer, in his report showed $10,325 paid to beneficiaries during the past year. Balance in the treasury, $17,217.34.

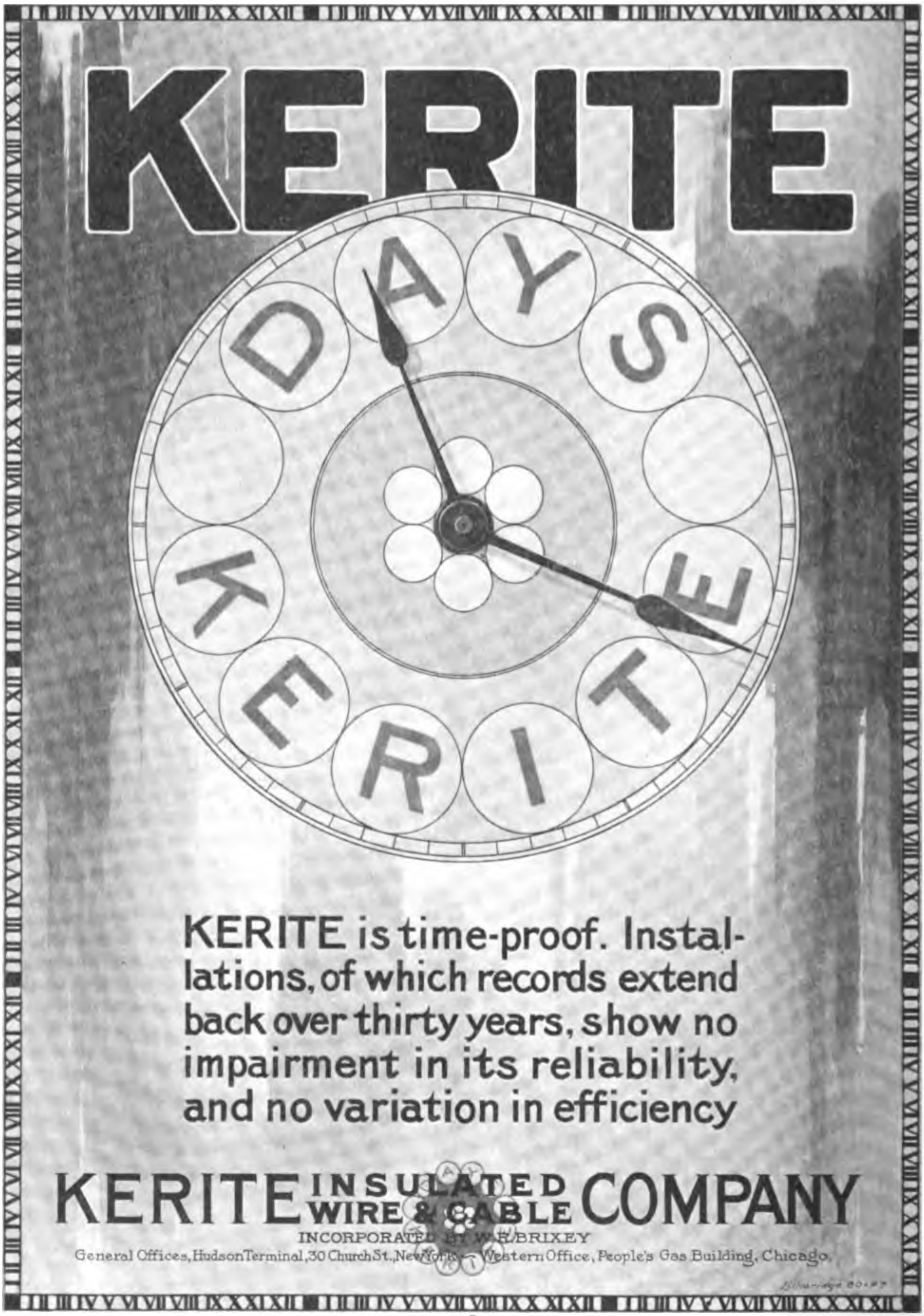
Mr. Atkins' desire being well known that the first vice-president should now be advanced to the presidency, several of the members present spoke in the warmest terms of appreciation of the work that Mr. Atkins has done during the past ten years, and in due course, suitable resolutions were passed, expressive of such appreciation.

The following officers were then elected: Gardner Irving, president; Charles Shirley, vice-president; William J. Dealy, secretary; Lewis Dresdner, treasurer; Herbert Smith, Thomas A. McCammon, Michael Breslin, Albert J. Driver, Herbert M. Heffner, executive committee; Michael J. O'Leary, Frederick J. Nurnberg, James A. Sweeney, auditing committee.

Association of Broker Telegraphers.—The Association of Broker Telegraphers of New York is doing good work in a quiet way for Wall Street bankers and brokers. Whenever a vacancy occurs in the ranks of the broker-telegraphers the brokerage firm concerned looks to the association to recommend a competent man to fill the position, and the results of this policy are uniformly satisfactory to both parties. The association has on its list the pick of the profession and its work in behalf of the brokers has gained for it a high standing among this class of employers. Mr. C. L. Hall is the secretary of the association, Mr. T. L. Mahan, chairman, and J. B. McKeever, treasurer. It was recently stated in one of the New York newspapers that the members of this association were in favor of government ownership of the telegraph lines, but this report, Mr. Mahan states, is not true. A large majority of them are in favor of private ownership and this, he says, is true of the brokers themselves, reports to the contrary notwithstanding.

Wants Branch Office Every Five Blocks.—An alderman in one of the cities recently proposed a resolution asking for a better telegraph service. When asked as to what he considered a better telegraph service he said he thought that the telegraph company should be compelled to open a branch office every five blocks so that any one wishing to send a telegram would not have far to walk. This gentleman evidently has not the slightest idea how few people in the residential section of a city ever have occasion to send a telegram, although they use the telephone almost every hour in the day.

Telegraph in Uruguay.—The Uruguayan government has authorized an expenditure of nearly $400,000 in improving the state telegraph lines.


KERITE
DAYS
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KERITE is time-proof. Installations, of which records extend back over thirty years, show no impairment in its reliability, and no variation in efficiency
KERITE INSULATED WIRE & CABLE COMPANY
INCORPORATED BY W. R. BRIXEY
General Offices, Hudson Terminal, 30 Church St., New York — Western Office, People's Gas Building, Chicago.

The Railroad.

Mr. G. A. Cellar, superintendent of telegraph, Pennsylvania Lines West of Pittsburg, Pittsburg, Pa., was a New York visitor, January 19.

Mr. L. S. Wells, superintendent of telegraph of the Long Island Railroad Company, New York, is absent on a few weeks' vacation on account of ill health.

Dr. B. D. Caldwell, vice-president of the Delaware, Lackawanna & Western Railroad, has resigned the position to accept the presidency of the Wells Fargo Express Company with headquarters in New York. Mr. Caldwell is well known in telegraph and railroad circles and is an executive of great ability.

Mr. G. H. Corse, Jr., has been appointed general passenger agent of the San Francisco Overland Route, with headquarters at Yokohama, Japan, the Oriental Agency of the Chicago, Milwaukee & St. Paul Railway at Shanghai, China, having been abolished. Mr. Corse's territory covers eastern Siberia, China, Japan, Philippine Islands and India. He is a well-known member of the telegraph profession and was a recent visitor in New York.

Meeting of New York Central Telegraph Superintendents.—The regular quarterly meeting of the superintendents of telegraph of the New York Central Lines, was held at the Grand Central station, New York, on January 18, and matters pertaining to the general service were discussed. The superintendents present were: A. B. Taylor, superintendent of telegraph, New York Central & Hudson River Railroad, New York; W. W. Ryder, general superintendent New York Central Lines, Chicago; E. C. Keenan, superintendent of telegraph, Lake Shore & Michigan Southern Railway, Lake Erie & Western Railroad and Toledo & Ohio Central Railway, Cleveland, Ohio; L. A. Lee, superintendent of telegraph, Pittsburg & Lake Erie Railroad, Pittsburg, Pa.; and J. J. Ross, superintendent of telegraph, Michigan Central Railway, Detroit, Mich.

W. M. Godsoe, Superintendent Atlantic Division, Canadian Pacific Railway Company's Telegraph, St. John, N. B.

Mr. Walter M. Godsoe, recently appointed superintendent of the Atlantic Division of the Canadian Pacific Railway Company's telegraph, with headquarters at St. John, N. B., was born in St. John, January 2, 1876, and has always resided in his native country. He entered the telegraph service at Dorchester, N. B., September 11, 1890, as agent, afterwards occuping the position of operator at St. John, N. B. In 1896 he went to Halifax, N. S., as night chief, later becoming chief operator, and in 1902 local manager of the office, which latter position he occupied at the time of his recent appointment to a superintendency.

Mr. Godsoe is a man of wide experience and assumes his new position well qualified to meet the duties of the office.

Canadian Pacific Telegraph Appointments.

The Canadian Pacific Railway Company may be likened to a school or a family. The higher officials have reached their present positions of trust through the lower grades, and it is the policy of the company in every branch of its service, including the telegraph, to recognize merit and reward faithful service.

In the January 16 issue we published a list of some of the more important promotions in that company's telegraph service on January 1. In addition to these we have since received a list of other promotions as follows:

F. E. Camp, inspector at Revelstoke, B. C., has been transferred to Nelson, B. C.; Geo. Wady, general foreman, has been appointed inspector at Revel-

W. M. GODSOE.
Superintendent Canadian Pacific Railway Company's Telegraph, St. John, N. B.

stoke, B. C.; D. L. Howard, chief operator at Calgary, Alb., to be inspector at Cranbrook, B. C.; J. J. Schetgen, manager Calgary, to be inspector at Medicine Hat, Alb.; S. M. Thurston, circuit manager at Moosejaw to be inspector at Regina, Sask; W. Rutherford, manager Winnipeg, Man., to be inspector at Souris, Man.; W. J. Kane, chief operator at Winnipeg, to be inspector at Brandon, Man.; F. B. Scott, wire chief, Winnipeg, inspector at Kenora, Ont.; W. G. Jackson, operator to be manager at Saskatoon, Sask.; P. G. Bowman, traffic chief at Winnipeg, to be assistant chief at the same place; W. D. Neil, chief clerk, Calgary, Alb., to be manager at Winnipeg, Man.; W. M. Thompson, manager at Saskatoon, Sask., to be chief operator at Winnipeg; H. S. Ingram, assistant chief, Winnipeg, to be wire chief at the same place; J. H. Griffin, night circuit manager, to be circuit manager, Moosejaw, Sask.;

B. U. Stiff, operator, to be night manager at Moosejaw; R. J. McInnis, night chief, to be chief operator at Calgary, Alb.; R. E. Larrabee, traffic chief, to be night chief at Calgary; E. F. Perrin, operator, to be all-night chief, and E. Branston, night traffic chief, to be traffic chief at Calgary; W. B. Way, operator, to be all-night chief at Moosejaw, Sask.; J. Clark and J. T. Chambers, operators, to be night chief and chief operators, respectively, at Regina, Sask,; R. Arbuckle, Ira E. McLeod and E. B. Smith, operators, to be chief operator, night chief and all-night chief, respectively, at Saskatoon, Sask.; J. Bowes, operator, to be night chief, at Halifax, N. S.; C. W. McDonald, assistant night chief, Toronto, to be manager at London, Ont.; C. T. Barber, assistant traffic chief and W. Smith and L. W. Van Every, operators, to be night chief, assistant night chief and assistant traffic chief, respectively, at Toronto, Ont.

The Late E. N. Dennis.

The announcement of the death at Richmond, Va., on January 15, of Edward N. Dennis caused regret throughout wide telegraphic circles, and to his personal friends was the source of sincere sorrow. To know him was to admire a man of sterling qualities and to love him for his genial, gentle nature. Few men have been marked by greater individuality, and, while he was sociable and charitable in disposition, he was quick to discern the genuine and the worthy, and had but little in common with pretentious mediocrity. He was a gentleman of pure mind, methodical habits, dignified bearing, yet withal one having a keen sense of humor; was approachable and cordial in manner, intelligent and dignified in conversation, and universally respected.

Mr. Dennis was born fifty-five years ago in Morehead City, N. C., of sturdy Scotch-Irish parentage. He early developed into a superior operator, and during the early seventies worked in Richmond, Va., Houston, Tex., Washington, D. C., and New York. In 1879 he returned to Richmond, and for many years copied the night Associated Press report, his presence on the wire being known only by his response to the office call and his "sign." About fifteen years ago he became night wire chief and shortly afterwards was created night chief operator, which position he held at the time of his death. He declined other positions, and his relations with the operating department continued unbroken for more than thirty years. He usually worked three or four hours daily at the key, and it was while thus engaged that the vital spark suddenly left him and his hands fell lifeless to his side. He was lifted by tender hands and borne to the rear of the operating room while a physician was summoned. Death, however, had been instantaneous. His remains were turned over to the Masonic order, of which he was a thirty-third degree member. A weird but impressive midnight service was held in his honor by members of the Scottish Rite, after which his remains were forwarded to Morehead City, to be buried alongside those of his father. They were accompanied by delegations from his Masonic lodge and the Western Union office, Messrs. Veale, Murphy and White representing the company.

Mr. Dennis was the last of a long line, his mother having only recently died at the advanced age of ninety years. He had accumulated considerable property, and it was doubtless his intention to spend his last days in comfortable retirement, but that time never came, and he laid down his life in harness faithful to duty even to the supreme moment.

An Operator Who Turned Reporter.

Mr. I. A. Davis, an operator who had been doing relief work at Charleston, S. C., during the two weeks prior to the disastrous hurricane which swept the South Atlantic coast last August, says the *Associated Press Service Bulletin*, deserves great credit for his good judgment and voluntary zeal in his efforts to get news of conditions in Charleston to the outside world.

Mr. Davis had finished his work for the Associated Press and was preparing to leave the city when the storm came. Early Monday afternoon, August 28, he was in the Western Union office talking with the operators when he heard the chief operator giving instructions concerning a proposed trip to Summerville, a small village twenty-two miles out from the city, on the Southern Railway, where it was hoped communication could be established with one of the nearby cities. He obtained permission to go along and exacted a promise of the use of a wire if the Western Union was successful in restoring the wires to working order.

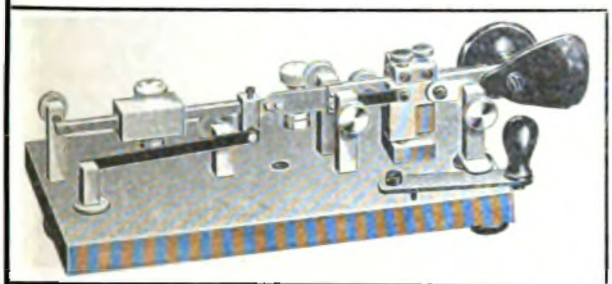
With this feature of his trip settled, Mr. Davis's next thought was what he would do with the wire if he got it. He puzzled his brain until the party boarded the train for Summerville, then he quickly decided to write a story *en route* and have it ready for transmission the moment he got the wire. He is a rapid writer, and by the time his destination had been reached, he had put together a story of about a thousand words.

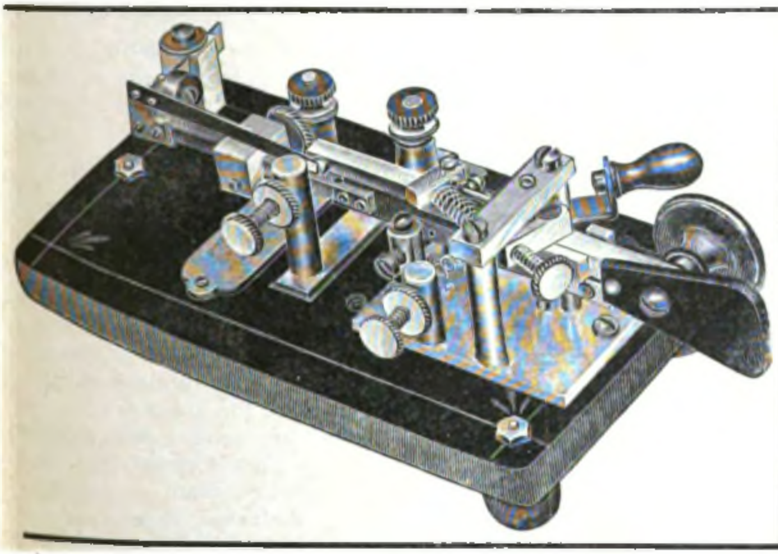
It did not take the Western Union long to find a good wire, which they turned over to Mr. Davis, and within a short time he had climbed a pole and sent out a comprehensive description of the chaotic conditions in Charleston.

After he finished sending his story, he proceeded to outdo himself by copying with a pencil the report being sent on the regular Associated Press circuit. How difficult a feat this is, but few people outside of the telegraph field realize.

In appreciation of Davis' splendid work, he was substantially rewarded and assigned to a regular position in the Atlanta office.

Mr. W. S. Barker, district plant superintendent, Western Union Telegraph Company, Boston, Mass., in renewing his subscription, writes: "You say that you have renewed my subscription and you ask if your action meets with my approval. I consider the editorial page alone worth the subscription price; therefore, I approve of your action and enclose my check covering said approval."





Meeting of Western Union Chapter, Telephone and Telegraph Society of New England.

Mr. A. G. Saylor, general superintendent, Eastern Division, Western Union Telegraph Company, New York, delivered an interesting address at a meeting in Boston on January 25 of the Western Union Chapter of the Telephone and Telegraph Society of New England. He was in a happy, reminiscent mood, and his remarks were interspersed with a number of humorous stories in connection with the service and occasion.

The early struggles of Professor Morse and his close personal friend and partner, Mr. Alfred Vail, during the period between 1835 and 1837, in inventing the telegraph, was referred to as well as the first successful experimental trial over a short circuit, which was established in the building occupied by the Vail Iron Works, Morristown, N. J., on January 6, 1838. Mention was made of the fact that Mr. Alfred Vail was undoubtedly the first person to read the Morse characters by sound.

A brief review was given of the early struggles of Prof. Morse and Mr. Vail to induce private capital to become interested in the development of the telegraph, to the end that its practicability and commercial value could be demonstrated, and how, finally, an appeal was made to Congress for an appropriation of $30,000 for the purpose of constructing a main line wire, with the result, after many months of pleading, the House of Representatives finally passed the appropriation bill on February 23, 1843, only to learn that then but small hope existed for favorable consideration by the Senate.

Without discouragement, the efforts to secure the appropriation were renewed, both Prof. Morse and Mr. Vail having unbounded faith in their enterprise, and a short time after the date mentioned, Prof. Morse, while seated at breakfast, was congratulated by Miss Annie G. Ellsworth, daughter of the Commissioner of Patents, who said: "Prof Morse, the Senate last night voted you $30,000." The value of this great invention to the civilized world, and the impetus given in the development of the nations was brought out.

Reference was made to the farewell dinner given to Prof. Morse in New York, June 11, 1871, a short time before his death, and the message of greeting and thanks to the telegraph fraternity throughout the world, which on this occasion was transmitted by Miss Sadie E. Cornwall, the signature being sent by Professor Morse, from an instrument specially provided and connecting with the telegraph circuits throughout the continent, the message reading as follows: "Greeting and thanks to the telegraph fraternity throughout the world. Glory to God in the Highest. On earth peace. Good will to men.

"S. F. B. Morse."

Referring to his connection with the telegraph, Mr. Saylor said that he entered the service in 1871 at Ingersoll, Ontario, and recalled that at this time Prof. Alexander Graham Bell was working upon his invention of the telephone at Brantford, Ont., a few miles distant from Ingersoll. At a later period, Mr. Saylor stated, while an operator with the Western Union at Portland, Me., he had an opportunity, in 1876, to become one of the pioneers of the telephone, but missed the opportunity for the reason that in being tendered the first position given for the purpose of establishing an exchange, or what was then termed securing a few subscribers, part of the salary was to be paid in telephone stock, which to a young man at that period had but little attraction.

However, he partially excused his failure to appreciate the opportunity which was lost by relating the story told by Prof. Bell at the meeting of the Pioneers of the Telephone held at Boston last November, Prof. Bell stating that the practical working of the invention was exhibited at the Centennial Exposition in Philadelphia, in 1876, but the success of the exhibit had to depend upon his assistant, Prof. Bell having a more important engagement with a student body at Boston; and how the assistant finally succeeded in making the apparatus work, the evening before the Commissioners of Award examined the invention, and as a result the success of the telephone was heralded throughout the world.

Mr. Saylor repeated the story, which is told of Mr. Chauncey M. Depew, who, it is stated, in 1877 declined to take over a half interest in the Bell patents for the sum of $25,000 or $30,000, after conferring with the then president of the Western Union Telegraph Company, Mr. William Orton; all of which tended to show what heroic struggles were necessary to develop both the telegraph and telephone in the early periods, when their value was but little known and not generally recognized.

Reference was made to Mr. Theo. N. Vail's experience and knowledge of the telegraph from its early period to the present time and his great experience, grasp and conception of the telephone service. Mr. Saylor brought out the fact that Mr. Vail was the only logical mind to direct those great enterprises and bring about a construction epoch in the interests of better service to the public and an improvement in the conditions of the personnel of the telegraph forces.

The commercial features of the Western Union Telegraph Company were not referred to, and in a brief, statistical way it was shown that the telegraph, segregated as it was, from a close affiliation with the telephone was, with the great development of the telephone, becoming more and more a partial and incomplete service, and not a complete, prompt and satisfactory service to the general public. This was due, he said, to the wonderful progress and usefulness of the telephone, and to the commercial and social development of the country, and it was Mr. Vail who recognized the great possibilities of a universal telephone-telegraph service—one complementary to the other, one an auxiliary to the other, each working within its own field, but both interchangeably and each completing promptly the service performed only by the other—to the end that the telegraph company may more satisfactorily serve the public as a public service corporation. This, Mr. Saylor stated, was his personal view of the situation, and, so far as the Eastern Division was concerned, he could do but little to carry to a successful conclusion the great constructive work now undertaken by President Vail and his able executives. At the same time, however, he was proud of the Eastern Division organization, considering the opportunities heretofore afforded those engaged in the telegraph business during his forty-one years' experience, and he was satisfied that the division is working as one unit with a great spirit of co-operation, and, with this condition existing, he had no concern as to the results.

Mr. Saylor referred to the resolution passed by the Board of Directors in March, 1910, and to the confidence and interest which has been taken in the personnel of the forces of the company as expressed in the resolution, and was glad to say that the employes of the division had both confidence and faith in the management, and looked with much satisfaction upon the great work which is being undertaken.

Feeling reference was made to the faithfulness and spirit of fraternal kinship existing among the older members of the craft, and an expression of thanks was given the society for their invitation to him to be present, as such occasions gave him an opportunity to meet many old friends among the New England people—within the telegraph and telephone service.

Death of Henry L. Storke.

Henry L. Storke, aged 69 years, a well-known telephone pioneer, died in New York on January 27. In 1879 Mr. Storke became assistant general manager of the Western Union's telephone lines. The next year he helped in the organization of the first telephone company operating in Chili and Peru, and later organized the Central New York Telephone Company at Utica, the Telephone Company of Missouri, and the National Telephone Exchange Association. He was postmaster at Auburn, N. Y., for five years. He retired from the telephone business in 1902.

Transfer of the English Telephone Service to the Postoffice.

At midnight on December 31, 1911, the British government took formal possession of the 600,000 telephones owned by the National Telephones Company and thereby assumed actual operation and control of all public telephones in the United Kingdom, and the 18,000 employes of the National Telephone Company. The employes will now be protected by civil service against the loss of positions and enjoy the rights of postoffice department employes to pensions, sick benefits and annual vacations. The government now has an absolute monopoly of all public means of communication by mail, telephone and telegraph.

The government, which has had a commission of experts studying the telephone service of other countries, especially in the United States, promises to introduce many new improvements and give better service at a lower cost. Already telephones are being installed in private houses in London, giving subscribers the benefit of a single party wire for $25 a year. Subscribers at this rate are entitled to call any other subscriber in an area embracing a population of over 7,000,000. No ceremonies marked the transfer.

The price which the government will pay for the old company's property is not yet determined. It is being fixed by a commission which is taking an inventory and will base a decision on the actual value of the property.

Establishing a New Office in Quick Time.—Some rapid construction work was done by the Western Union Telegraph Company when its office in the Equitable building at 120 Broadway, New York, was destroyed by the fire of January 9. By 11 o'clock the same morning the commercial department had secured quarters for a new office in the Trinity Building, 111 Broadway, and before 4 p. m. the plant department had supplied the necessary fixtures to fit up the office, connected up the wires, erected signs, etc., and the traffic department had sufficient force ready to take hold as soon as the equipment was ready. By 8 o'clock the next morning the American District Telegraph call circuits were all in operation. The three functional departments worked together harmoniously in this emergency and business was resumed in the new quarters with slight interruption.

New York Telephone Society.—At the meeting of the New York Telephone Society on January 24 Mr. H. G. Kerr, division commercial manager, Westchester district, New York, made an address on the subject of handling telegrams by telephone. Fourteen telephone operators are now employed in taking telegrams by telephone at 195 Broadway, whereas six months ago only three operators were employed. Mr. R. S. Scarburgh, special agent, New York, described the commercial end of the telephone service. Mr. Scarburgh presided.

Telegraph Managers Subpoenaed.—The managers of telegraph offices in over a dozen different cities have been subpoenaed to appear before the Federal grand jury at Indianapolis, Ind., to testify in the investigation of the dynamite conspiracy which, it is said, was directed by telegraph by J. J. McNamara, who is now serving sentence for complicity in the *Los Angeles Times* dynamite explosion.

Nebraska Telephone Injunction Dismissed.—The Nebraska supreme court has dismissed the injunction suit brought by that State to prevent the American Telephone & Telegraph Company from purchasing the independent telephone exchanges at Plattsmouth, Nebraska City and Papillion, Neb.

Fire Alarms by Telephone.—The cities of Ann Arbor and Ypsilanti, Mich., use the regular telephone exchange in sending alarms of fire, and it is stated the method works successfully.

Cash Registers in Telegraph Offices.

In a recent issue we referred to the introduction of cash registers in New Zealand telegraph offices. Further information regarding the use of these machines will be of general interest in telegraph circles.

The cash register constructed for the New Zealand telegraph department automatically tabulates all classes of telegrams and shows at any minute the total of each kind of message, as it contains a number of sets of adding wheels, showing the total amount as well as the total number each of prepaid, urgent, ordinary, collect, and press messages. In addition, it prints on the message which the sender hands over the counter the kind of telegram, the date, the number, the office of origin, and amount of cash paid. The amount is also shown to the sender of the message on wheels, which come up each time and are visible to the clerk as well as to the sender of the message. No message will be accepted by the operator and sent without having the amount printed thereon showing that it has been put through the register. A detailed record of this information is printed on a strip of paper which is, when in use, concealed under lock, just the same as all totals.

The wheels can all be set to zero, or only certain totals set back, allowing others to accumulate the amount for an indefinite period. The machine also has inside a secret total where all amounts which are recorded are accumulated. This can be audited once each week or month by an auditor or official of the post office department. Each clerk in the telegraph office has his separate cash drawer which opens automatically, when it is operated, and each one has a distinct sounding bell. When the clerk goes off duty he locks his cash drawer and in this way is fully protected. The machine is electrically operated and four small electric globes light up each time the machine is used.

Cheap Night Telegrams in England.—On January 1 cheap night telegrams were introduced experimentally on the British telegraph lines between London and Aberdeen, Scotland, and London and Belfast, Ireland. The charge is twelve cents for thirty-six words and one cent for every three words thereafter. The telegrams are accepted up to midnight at the head offices and delivered with the first morning delivery of letters.

Boston Aid Society Ball.—The twenty-seventh annual ball of the Telegraphers' Mutual Aid Association of Boston, Mass., was held on the evening of January 26, and was a great success in all respects. There was a large attendance and a substantial sum was turned in to the treasury of the association as a result of this affair. It is gratifying to note that the Boston association is so well supported. Everyone present had an enjoyable time.

T. M. B. A. Assessment.—Assessment 534 has been levied by the Telegrapher's Mutual Benefit Association to meet the claims arising from the deaths of William P. Phelps at Merchantville, N. J.; Julian S. Eves at Philadelphia, Pa.; Thomas J. Stout at Bonners Springs, Kan.; William H. Dale at Petrolea, Ont., and William W. Burhans at Washington, D. C.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL.

Among recent visitors at this office were Mr. Charles P. Bruch, third vice-president, and Mr. L. Lemon, division superintendent, of New York, and Mr. R. A. Barton, manager at Lancaster, Pa.

Mr. J. O. Carr of the Morkrum Printing Telegraph Company, Chicago, is here and has installed a new printer between Philadelphia and New York.

Sympathy was extended to night chief operator E. H. Locke on the recent death of his brother.

The Lamson carrier system has been installed and business now moves more rapidly from the south to the north ends of the room.

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 employe. 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 employes not otherwise provided with adequate life protection.

Telegraph and Telephone Age

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Hint to Students—Some Things They Must Unlearn.

Did it ever occur to the student of electricity by the way of the old conventional text-book route that there are today many things he reads therein that he must unlearn, so to speak? If not, he should be cautioned at the start against accepting every explanation given as being literally true.

Many of the terms used and the explanations advanced are fanciful, to say the least, but necessary in order to convey certain ideas conforming to certain theories, and which latter in turn are apparently simply one big guess.

Probably the most fanciful theory advanced is that which tells us that the earth acting in the capacity of a return wire actually conveys an underground current of electricity between two widely separated localities in volume exactly equal to that which flows through the overhead wire connecting such localities. Nearly every text-book even goes so far as to show by means of dotted lines the course of the current through the earth. In some text-books this statement is given as an absolute fact, without any qualification whatever.

How much better it would have been to have stated that in the case of grounded circuits the earth connection gives the same result in the overhead circuit as would be obtained by a metallic return wire possessing no resistance. Obviously some law of compensation exists which enables us to utilize the earth in place of a return wire, but just what it is, is still an enigma. However, the earth affords a very convenient means of providing the other half of a circuit between both poles of the batteries, for which the draughtsman should be very thankful; otherwise where else could he have placed the dotted lines?

Text-books also tell us of the existence of earth currents, giving the student the idea that electric currents do actually flow through the soil itself. Now who ever measured or even detected a current while it was actually in the ground? Every indication of the presence of electricity in that form that the writer has heard of was invariably manifested, not in the earth or soil itself, but in the overhead conductors connecting two separated localities, and in which circuit the ammeter was connected. They are called earth currents, not because they actually flow through the soil, but because the earth's magnetic potential when raised to a greater degree at one locality than at another, owing to storms, sun spots, and other external influences, is capable of causing an electric current to flow through any good overhead conductor connecting such localities. Hence an earth current is one created by natural electricity in contradistinction to one created by the difference of potential in a battery or generator. The current, however, flows above ground, not through it.

The two-fluid theory, at one time quite generally accepted and advanced to explain the existence of the two polarities of current, is still given in many elementary text-books. It assumes that the current consists of two equal parts, each of which flows in an opposite direction from that of its companion, one being called positive and the other negative. The latest theory on this subject is that positive and negative electricity are one and the same thing, the terms merely relating to the direction or excess of one over the other.

Text-books are also full of such expressions as current, current volume, current density, current flow, etc., etc., the natural inference of which is that electricity is something tangible and therefore capable of being measured as we measure a material substance. Such impressions are misleading and must later be corrected, or at least qualified.

Electricity, according to our best informed authorities, is not a material substance. The longest conductor or coil of wire will not weigh one iota more when fully charged with electricity than it did before being electrified.

The student should early understand that the nature of electricity is unknown and that the name is merely a word adopted to designate that mysterious force which is fast supplanting nearly all its competitors.

The terms current, volume, density, direction, etc., are simply arbitrary terms adopted to fit the different manifestations of this force, which are now believed to be the effects of different degrees of activity and actions of ether excitation. At this point the definition of electricity ends; no one can go further.

In the July 1, 1911, issue of this journal, Dr. C. P. Steinmetz, one of the leading electricians of the day, has called particular attention to the fallacy of many early theories still adhered to and actually taught in our public schools. It would be worth while for students to get a copy and read what he says about lightning, conductors, etc.

Telegraph and Telephone Patents.

ISSUED JANUARY 16.

1,015,034. Telephone. To J. Lapicki, De Kalb, Ill.

1,015,255. Telephone Apparatus. To D. H. Wilson, New York.

ISSUED JANUARY 23.

1,015,280. Telephone Toll Apparatus. To E. P. Baird, Chicago, Ill.

1,015,414. Telephone Repeating System. To C. Adams-Randall, Augusta, Me.

1,015,494. Electric Transmission of Intelligence. To I. Kitsee, Philadelphia, Pa.

1,015,644. Selector for Automatic Telephone Exchanges. To B. Settegast, Berlin, Germany.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange February 10:

Amer. Telep. and Teleg. Co.	140⅜
Mackay Companies	81
" " pfd.	70
Western Union Tel. Co.	84¼

Personal.

Mr. G. K. Heyer of the Western Electric Co., New York, has returned from a general business trip in the South.

Mr. Frank F. Fowle, Chicago, Ill., a well-known electrical engineer and writer on telegraph and telephone subjects, has joined the editorial staff of the *Electrical World*, New York.

Mr. Frank S. Schanher, of Mount Clemens, Mich., son of the former manager of the Western Union office at that point, and an operator himself, sailed from New York for Egypt on February 8 to be absent about three months.

Count Wm. E. L. de la Motte, who was for thirty-eight years manager of the marine observatory of the Western Union Telegraph Company at Sandy Hook, N. J., now retired, was a New York visitor February 2, and called on many of his old friends.

Mr. Thomas A. Edison celebrated his sixty-fifth birthday on February 11 by abstaining from work. In the evening he and Mrs. Edison gave a dinner and reception at their home in Llewellyn Park, West Orange, N. J.

Mr. Patrick B. Delany, the well-known old-time telegrapher and inventor, has been named a delegate to the seventh annual convention and dinner of the Navy League of the United States to be held in Washington, D. C., February 22, 23 and 24.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. H. Mackay, president of this company, who has been absent from the city for some time past, is again at his desk.

The boy scouts of Roslyn, L. I., visited the office of president Clarence H. Mackay on February 10 under the command of Scout-Master Peach.

Mr. W. I. Capen, general superintendent of plant, was elected fourth vice-president of this company at a meeting of the Board of Directors on February 1.

Mr. E. B. Pillsbury, general superintendent, New York, who is spending a three weeks' vacation in the West Indies, has been visiting Havana, Cuba. During his absence Mr. L. Lemon, division superintendent, New York, is acting as general superintendent.

Mr. Edgar W. Collins has been appointed general superintendent of the Western Division, vice Mr. Guy E. Paine, who has been appointed superintendent of the second district, Western Division, with headquarters in Chicago.

The general and district superintendents of this company will meet in conferences in New York during March and April, as follows: Eastern Division, March 4, 5 and 6; Western Division, March 12, 13 and 14; Southern Division, March 26, 27 and 28; Pacific Division, April 22, 23 and 24.

Mr. C. H. Ashburn, district superintendent, Atlanta, Ga., came to New York recently to visit his son who is ill. After calling on a few friends, Mr. Ashburn returned to Atlanta, accompanied by Mrs. Ashburn, who has been a New York visitor.

Mr. W. W. Morrison, manager of the Lincoln, Neb., office of this company, has been transferred to the managership of the Mackay Telegraph and Cable Company, at Oklahoma City, Okla., vice W. A. Logan, resigned.

The Serial Building Loan and Savings Institution of 195 Broadway, New York, has opened an office at 253 Broadway to accommodate its patrons in the Postal Company's service.

This company is stringing four copper wires between Chicago, Ill., and South Bend, Ind., under contract with the South Bend Independent Telephone Company.

Wireless Telegrams for European Steamers.—Wireless telegrams are now accepted by the Postal Telegraph-Cable Company for transmission via Cape Race, N. F., the year round, but delivery to outbound steamers is not guaranteed between January 20 and August 20.

E. W. Collins, General Superintendent, Postal Telegraph-Cable Company, Chicago.

Mr. Edgar W. Collins, district superintendent of the Postal Telegraph-Cable Company at Cleveland, Ohio, who was promoted on February 1 to be general superintendent, with headquarters at Chicago, Ill., was born near Ottawa, Ont., on December 25, 1852. He entered the telegraph service in 1869, and in 1875 was employed by the Western Union at Cleveland, Ohio. In July, 1883, he was appointed

E. W. COLLINS,
General Superintendent, Postal Telegraph-Cable Company, Chicago.

chief operator of the American Rapid Telegraph Company, afterwards the Bankers' & Merchants', and when the Postal Company absorbed the Bankers' & Merchants', Mr. Collins became a Postal man and has been one ever since. He was afterwards manager of the Cleveland office, and in 1901 was appointed district superintendent at Cincinnati, Ohio, his headquarters being removed to Cleveland later.

Mr. Collins is a man of brilliant attainments, and, while a faithful company man, he is not unmindful of the interests of the employes under his charge, and is very popular among them.

Money Transfers for Switzerland.—Arrangements have been made by the Postal Telegraph-Cable Company with the Swiss Postal Administration for remitting money via the Deutsche Atlantische Telegraphengesellschaft (German Cable Company) to all points in Switzerland.

Hardships of Linemen in the Northwest.—Telegraph linemen in the Northwest meet with many hardships in the prosecution of their work during the winter. George W. Hall and William J. Wolf, linemen of the Postal Telegraph-Cable Company, were lost for three days in the deep snow on the summit of the Cascade Mountains in Washington, and were without food all that time. A searching party found them and brought them back to Easton, Wash.

Shooting Off Tree Limbs from Wires.—In order to clear a Postal wire of contact with the limb of a large tree at Canyonville, Ore., the lineman shot the limb off with his rifle. The tree was too large to climb.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

A contract has been closed between this company and the Underwood Typewriter Company, New York, for the delivery of 5,595 typewriters for use in Western Union offices throughout the country. The company has an option to increase this order up to 10,000 machines during the next five years. The first lot of 1,000 machines will be delivered in two months and thereafter they will be delivered in lots of 750. The machines will be arranged with a special keyboard. There will be no small or "lower case" letters, all the letters being Gothic capitals. Mr. H. E. Roberts, general purchasing agent, New York, will have charge of the distribution of the machines.

Mr. E. M. Mulford, division commercial superintendent, New York, has returned from a business trip through the South. He made a short trip to Havana in company with Mr. T. W. Carroll, of New York, assistant to the general manger, who has also returned.

Mr. W. E. Athearn, engineer of equipment, New York, has gone on a trip through the South on company business.

Mr. S. M. Williams, manager of press service, New York, will make an address before the New York Telephone Society at the regular meeting on February 20.

Mr. E. E. Williams, district superintendent, has been appointed special agent for the Southern Division, with headquarters at Atlanta, Ga., and Mr. J. E. Schofield has been appointed acting district superintendent at the same point in place of Mr. Williams.

Mr. J. F. Nathan, commercial superintendent, New York, has issued a circular letter dated January 30, announcing to the public the inauguration of the new classes of cable service, including cable letters, week-end cable letters and deferred service. These new services have been fully described in recent issues of this journal.

Mr. A. C. Kaufman, commercial agent, is all ready at work in planning the arrangements for telegraphic facilities at the Democratic National Convention to be held in Baltimore, Md., next June. Two hundred wires and one hundred extra operators will be available to handle the business, which promises to be unusually large.

Mr. Edward Altemus, supervisor of messengers, Greater New York district, has resigned. After a rest he will go to California.

Mr. R. L. Smith, of the Selma, Ala., office has been promoted to be assistant manager at Charlotte, N. C.

Miss M. E. Davis, formerly located at Washington, D. C., has been appointed night manager at the new Vanderbilt Hotel, New York.

This company will, on March 1, begin demolishing the buildings at Nos. 14 and 18 Dey Street, New York, at the rear of 195 Broadway, preparatory to the erection of a 26-story structure which will have an extension running to Fulton Street. When this section is completed the annex to the main building, at 10 and 12 Dey Street, will be torn down and rebuilt to the height of twenty-six stories. Later, the main building itself, at 195 Broadway, will likewise furnish a site for a similar extension, thus completing a structure which will have a frontage of 75 feet on Broadway, 250 feet on Dey Street and 33 feet on Fulton Street. The subsidiary concerns which will be displaced by the reconstruction have been provided for in adjacent buildings. The first unit of the new building will be ready for occupancy by May, 1913. The completed building will represent an outlay of about $3,000,000.

Two floors and parts of two other floors in the Riker Building, at the corner of Broadway and Dey Street, opposite 195 Broadway, have been leased by this company and several offices are being moved from 195 to the new quarters. These changes include the offices of Mr. W. A. Sawyer, district commercial superintendent; Mr. H. E. Roberts, general purchasing agent; Mr. J. W. Rahde, auditor of the Eastern Division; Mr. Herbert Smith, district traffic superintendent; Mr. F. N. Whitney, tax attorney; Mr. J. McRobie, general manager, American District Telegraph Company of New Jersey, and Mr. McLane, auditor of the same company. The bookkeeping department, the Gold and Stock Telegraph Company's quarters, the underground cablemen's and the tube-repairing departments are being moved to 170 Fulton Street. The offices on the third floor vacated by district commercial superintendent W. A. Sawyer will be taken by the Associated Press.

The New York Telephone Company has moved its office into the Western Union quarters at Goshen, N. Y., and Miss Ruby Thompson, formerly manager of the Western Union office at Callicoon, N. Y., has been appointed resident manager for the telephone company at Goshen, and will have charge of the interests of both companies. Mr. John Kearney, manager of the Western Union at Hoosick Falls, N. Y., has been appointed manager of the joint interests at that point, the telegraph office having been moved in the new quarters of the telephone company. Mr. E. R. McCreedy, Western Union manager at Greenwich, N. Y., has been appointed resident manager at that point for the joint interests. Miss H. M. Burbank, manager of the Western Union at Hudson Falls, N. Y., has been appointed resident manager of the telephone company and will have charge of the joint interests at that point where the telephone company recently moved its quarters into the Western Union office. The Western Union office at Fishkill, N. Y., has been moved into the new telephone building at that place and the joint interests placed in charge of Mr. C. J. Shanon, former manager for the Western Union, who is now resident manager for the telephone company.

Mr. C. R. Tyler, an old-time telegrapher, now one of the street railway magnates of Omaha, Neb., was a recent New York visitor en route to Florida. In 1868 Mr. Tyler was day operator at Pine Bluff, Neb., when Mr. Theo. N. Vail was night operator at the same point. Mr. Vail, hearing of Mr. Tyler's presence in the city, entertained him at dinner, together with Messrs. F. D. Giles and John Morison of the Western Union staff at 195 Broadway, who were also associates of Messrs. Tyler and Vail in the late sixties. The gathering of these four old friends at the dinner table in the Railroad Club was a very happy occasion and old-time telegraphic reminiscences were recounted.

Mr. Raymond D. Gould, recently appointed manager of the Western Union Telegraph Company at Houston, Tex., was born in St. Charles, Mich., February 13, 1876. He began his telegraphic career at Owosso, Mich., in 1892, and until 1898 worked for the Postal, and the Western Union companies, and the Norfolk & Western Railway. Between 1898 and 1899 he was manager of the Western Union office at Leadville, Col., and for nine years afterwards was employed as operator on the leased wires of the Associated Press at various points. He returned to the Western Union service as district commercial agent at Dallas, Tex., in 1910, and became manager at El Paso, April 18, 1911, whence he was transferred to Houston.

Mr. Donald A. MacLaine, recently appointed traffic chief and supervisor of the Western Union cable station at Bay Roberts, N. F., was born in Liverpool, England, December 14, 1857. He began receiving instruction in telegraphy at Liverpool in 1870 and became an operator in January, 1871. He remained in the service of the post office telegraphs in that city until December, 1875; when he went to the Ballinskelligs office of the Direct United States Cable Company. In 1879 he went to St. Pierre Miquelon as a mirror operator for the French Cable Company and in 1881 he joined the American Telegraph & Cable Company's force at Canso, N. S. In August, 1910, he went to Bay Roberts and installed the plant there for the operation of the new Western Union cable after which he received his recent appointment.

Morse Electric Club Dinner.

The annual dinner of the Morse Electric Club, which will be held at the Hotel Savoy, Fifth Avenue and Fifty-ninth Street, New York, Saturday evening, February 17, promises to be one of unusual interest and will be attended by prominent telegraph and telephone officials and other invited guests. Mr. Theo. N. Vail, president of the Western Union Telegraph Company and of the American Telephone & Telegraph Company, will be the guest of honor. Other invited guests are Messrs. N. C. Kingsbury, vice-president American Telephone & Telegraph Company; Union N. Bethell, president New York Telephone Company; F. H. Bethell, president Bell Telephone Company of Pennsylvania; W. C. Brown, president New York Central Lines, E. T. Jeffery, president Denver & Rio Grande Railroad Company, and Judge Victor J. Dowling, all of New York.

Transformers are being installed along this company's lines paralleling the single-phase trolley road between Chicago, Ill., and South Bend, Ind., for the purpose of correcting the inductive effects of the trolley line.

The Cable.

Mr. G. G. Ward, vice-president and general manager of the Commercial Cable Company, New York, has been absent several weeks on account of illness. He is now convalescing.

Mr. P. H. Burns, electrical engineer to the Bahamas Government, Nassau, N. P., has resumed his duties after a vacation of six months. The twentieth anniversary of the installation of the Bahamas cable to Florida occurred on February 3.

Capt. W. G. S. De Carteret, of Halifax, N. S., commander of the cable steamer "Minia," of the Anglo-American Telegraph Company, was a recent visitor in New York.

A wireless message from the Commercial Cable Company's repair steamer "Mackay-Bennett" on February 10 announced the capsizing of the three-masted schooner "Caledonia," which she had in tow, by the weight of ice in the rigging. The crew of the schooner were rescued. The "Mackay-Bennett" was operating east of Halifax, N. S., at the time.

Mr. J. H. Carson, manager of the Anglo-American Telegraph Company, London, England, arrived in New York on the steamer *Oceanic* February 8. Mr. Carson's visit to this country is one of business connected with the cable service.

Mr. Carson is one of the pioneers of the cable service which he entered in 1852. In 1865 he joined the then newly-formed Atlantic Telegraph Company, which in the year following became the Anglo-American Telegraph Company. He was appointed manager of the company in 1893, and still remains with it. Mr. Carson has an intimate knowledge of all matters pertaining to transatlantic telegraphy, his forte being the rapid handling and transmission of messages, in which he has made some remarkable records. He represented the Anglo company as delegate to the International Telegraph Conference in Budapest, Hungary, in 1895, and at the London Conference in 1903.

Deferred Cable Messages. — The proper place for the letters LCF, LCO or LCD in deferred plain language cable messages, as announced by the Commercial Cable Company, is before the cable address or before the name of the addressee.

Reduction of Press Rates to South Africa.— The Eastern Telegraph Company, London, has agreed to reduce the press rate from England to South Africa from eighteen cents to seven cents per word, on condition that such messages shall be dispatched after ordinary and deferred telegrams.

Commercial Pacific Cable Interrupted.—The cable of the Commercial Pacific Cable Company, in the Midway-Guam section, is interrupted, probably close to the Midway Station. That station reported tremendous seas breaking on the reefs for several days. Messages for Guam, Dutch Indies, the Philippines, Hong Kong, Macao, Corea, China and Japan can, during this interruption, only go by the Atlantic cable routes.

The Telephone.

Mr. U. N. Bethell, president of the New York Telephone Company, has been elected a director of the Liberty National Bank, New York.

New Telephone Exchange in London.—The postoffice has opened a new central-battery telephone exchange in Creechurch Lane, London. The switchboard, which is of the forty-volt type, has accommodations for 9,000 subscribers.

Transatlantic Telephony.—Prof. M. I. Pupin states that transatlantic telephony would be practicable by the use of loading coils. A different type of cable from the present would have to be made, however. The problem is a commercial one rather than one of engineering.

Telephony Between England and Holland.—Direct telephone communication between London, England and Amsterdam and Rotterdam, Holland, took place on February 1. As soon as negotiations with the French and Swiss administrations have been completed the British postmaster general expects to open telephone service between England and Switzerland.

Cumberland Bell Bond Issue. — The stockholders of the Cumberland Telephone & Telegraph Company at the annual meeting in Louisville, Ky., on February 1, voted a bond issue of $15,000,000 for improvements and extensions. Messrs. W. T. Gentry and J. Epps Brown, president and vice-president and general manager, respectively, of the Southern Bell Telephone Company, Atlanta, Ga., and Mr. U. N. Bethell, of New York, vice-president of the American Telephone & Telegraph Company, were elected directors.

Taxing Telephones in Philadelphia.—Alderman Morris E. Conn, of Philadelphia, has introduced an ordinance imposing a license fee or tax of $5 on each telephone installed after May 1. The chief of the Electrical Bureau is empowered to investigate complaints regarding telephone service for which a fee of $1 will be charged, payable by the company. Failure to correct faults entails another tax of $5 per month and other taxes of $5 are to be imposed for sins of omission and commission. If the ordinance becomes law the telephone companies will find it rather difficult to keep on the straight and narrow path.

Telephone Pioneers.—A meeting of the executive committee of the Telephone Pioneers of America was held in New York, February 9, at which Messrs. J. J. Carty, Thos. D. Lockwood, Thos. B. Doolittle, Charles R. Truex and Henry W. Pope were present. Dr. Alexander Graham Bell was unanimously elected an honorary member. The secretary was authorized to present to president Theo. N. Vail, of the American Telephone & Telegraph Company, a group picture of the pioneers suitably framed and with an inscribed plate. Action on the selection of a place for the next meeting was deferred.

The Randall Telephone Repeater.

The *Boston Sunday Post* of February 4 contained an illustrated article on the telephone transmitter and repeater of Mr. Charles Adams-Randall, both of which devices we described on page 215 of our issue for March 16, 1911.

Mr. Randall states that these instruments have solved the problem of long distance telephone transmission. Tests were made at the convention in Chicago last year of the National Independent Telephone Association and it is said a deep impression was made upon the delegates as to the possibilities of the instruments for long distance work.

Mr. Randall claims that the transmission of voice currents between Boston and San Francisco is practicable with his high power transmitters and one of his repeaters every 1,000 miles.

Radio-Telegraphy.

Mr. Guglielmo Marconi and Mr. Godfrey C. Isaacs, managing director of the Marconi Wireless Telegraph Company, London, are expected to arrive in the United States during March.

All-English Wireless Service.—It is reported from London that negotiations are being conducted between the British government and the Marconi Company with a view to establishing wireless service between all of the British dominions throughout the world.

Bicycle Wireless Outfit.—It is stated that Mr. I. Wolff of Cambridge, Mass., has developed a wireless outfit for bicycles, which enables the rider to communicate with any other rider provided with receiving apparatus. He has thus communicated with an associate three-and-a-quarter miles distant.

Opening a New Wireless Station in Spain.—The new Marconi wireless station at Aranjuez, near Madrid, Spain, was formally opened on January 28 in the presence of the king and queen of Spain. Congratulatory dispatches were exchanged with the English and Italian monarchs, and a message was received direct from Canada conveying the good wishes of the Canadian prime minister.

It is stated that a special license good for the opening day only was granted by the British Government permitting the Poldhu station to receive messages from the new Aranjuez station to be transmitted to America.

Private Wireless Plant in Canada.—The Goodyear Tire & Rubber Company of Canada operates a wireless system between its offices in Toronto and its factory at Bowmanville, Ont., using private apparatus. A large business is handled between the two points. Mr. Fred B. Barton is in charge of the Toronto station.

Marconi Company to Absorb United Wireless.—Negotiations it is stated are under way for the absorption of the United Wireless Telegraph Company by the Marconi Wireless Telegraph Company, of London. The United Wireless Company is now in the hands of receivers after having been financially wrecked by Col. Christopher C. Wilson and his associates who are now in jail.

Day Wireless from Honolulu to Washington.—Wireless communication was had on February 2 between Admiral Thomas, commander of the naval fleet at Honolulu, Hawaii, and Washington, by way of the Mare Island, Cal., Navy Yard and the Key West, Fla., stations. The transmission was effected in daylight over distances of 2,098 miles from Honolulu to Mare Island, 2,205 miles from Mare Island to Key West and thence to Washington.

The London Radio-Telegraph Conference.

The Marconi Wireless Telegraph Company, New York, has issued a statement with reference to the radio-telegraph conference to be held in London, June 4.

The whole convention, it states, is based on the fact that telegraph lines are owned by governments and is absolutely inapplicable to the United States where the lines are owned by corporations which are not parties to the Convention.

"Article 1 is against the established principles of the American people to impose restrictions on private enterprises lawfully carrying on legitimate business and such restriction will hinder and impede the progress of the art of wireless telegraphy.

"Article 3—It is highly improper and unjust to throw open for the use of the whole public and to vessels equipped with any system or equipped in any cheap way stations on land which have been established and worked up to their present efficiency by the expenditure of large amounts of money and the exercise of intelligence and brain power.

"Article 5—Can only apply to nations which control the land lines, the United States can only request land line companies to connect or connections will only be made if remunerative business is shown.

"Article 7—By this article working may be altogether prescribed at the option of the Government; this is too sweeping.

"Article 9—A tariff per word pure and simple cannot be adopted in the United States until the land line companies agree to establish a word rate."

Canadian Notes.

Mr. Donald Coons, whose appointment as superintendent of telegraphs, Alberta division, Canadian Pacific Railway, at Calgary, Alb., was announced in our issue for January 16, was born at Iroquois, Ontario, October 25, 1870. He began his telegraphic career at Swift Current, Sask., in 1894, and has filled various important positions in the telegraph service throughout the northwestern territory of the Dominion, his last previous position being that of inspector of telegraphs. Mr. Coons has had a wide experience, which will find abundant application in his new post.

Mr. Daniel H. Bowen, whose appointment as assistant superintendent of telegraphs, Ontario division, Canadian Pacific Railway, was announced in these columns January 16, is a Canadian by birth and his business career has been spent entirely in his native land. He was born in Culloden, Ontario, May 7, 1866, and entered the telegraph service on the Canada Southern Railway at St. Thomas, Ont., in August, 1881, which position he held until October 1, 1886. He then accepted a position as agent for the Canadian Pacific Railway Telegraphs at St. Thomas, Ont., and in April, 1890, became local manager for the same interests at London, Ont. On January 1 of this year he was promoted to his present position.

New Telephone and Telegraph Construction on the Canadian Pacific.

Mr. W. J. Camp, assistant manager, Canadian Pacific Railway Company's telegraph, Montreal, Que., informs us that the president of that company has authorized appropriations for the following telephone train-dispatching circuits in addition to about four thousand miles already equipped: Kamloops to North Bend, B. C., 121 miles; North Bend to Vancouver, B. C., 129 miles; Medicine Hat to Lethbridge, Alta., 116 miles; Moose Jaw, Sask., to North Portal, Sask., 167 miles; Guelph Junction, Goderich & Listowell branch, Ont., 112 miles; Grand Mere & St. Gabriel branch, Que., 56 miles., which will make a grand total of 4,700 miles of telephone train dispatching on the Canadian Pacific Railway.

Authority has also been given for the erection of additional copper wires, as follows: Canso, N. S., to Montreal, Que.; Montreal, Que., to Winnipeg, Man.; Winnipeg, Man., to Moose Jaw, Sask.; Saskatoon, Sask., to Calgary, Alta., via Edmonton, besides several shorter circuits, making a total of about 6,000 miles of new wire.

Authority has also been given for considerable reconstruction of various parts of the line in order that the telegraph system shall be kept up to its present high standard. There will also be telegraph lines built along new branches of the railway to be constructed during the coming season.

The Reid Monument

The committee formed for the purpose of considering the question of erecting a monument or other suitable memorial to the late James Douglas Reid met at 253 Broadway, New York, on the call of Mr. C. P. Bruch, president of the Magnetic Club, on February 14, for the purpose of (1) to organize the committee; (2) to determine whether or not a monument or memorial shall be erected; (3) to devise ways and means of raising necessary funds, if it is decided to erect such monument or memorial.

In issuing the call, President Bruch said:

"At a meeting of the Magnetic Club held in New York November 15, 1911, attention was called to the fact that the grave of Mr. J. D. Reid, in Rochester, N. Y., is marked only by a very simple stone. It was pointed out that Mr. Reid was the first superintendent of telegraph; the employer of many boys who in later years attained success and prominence in the telegraph and other lines of business; the first employer of women in the telegraph service; the friend and contemporary of Morse; one of the organizers and the first president of the Telegraphers' Mutual Benefit Association; one of the organizers of the Old-Time Telegraphers' and Historical Association; that he was actively interested in and identified with other organizations and movements for the benefit of telegraphers; the author of the only history of the telegraph as yet published, and the founder and editor of the first electrical paper in the world.

"It was suggested that his services to the telegraph, his friendship for telegraphers, his helpfulness to everyone, and his gentle, lovable character—endearing him to everyone who knew him—entitles him to a more suitable and lasting monument than now marks his grave, and the opinion was expressed that it is the duty of telegraph associations and of the telegraph fraternity at large, to co-operate in erecting a monument to him.

"Pursuant to this suggestion, the Magnetic Club directed its officers to communicate with the various telegraph associations, requesting their co-operation in a movement to raise the necessary funds and erect a suitable monument or other form of memorial and to designate members to serve upon a committee to take charge of the movement.

"Attached is a complete list of the gentlemen who have been designated by their respective associations to serve upon such committee."

Telegraphers' Mutual Benefit Association. Michael J. O'Leary, W. C. Humstone.

Old-Time Telegraphers' and Historical Association: F. J. Scherrer, J. B. Taltavall.

The Society of the United States Military Telegraph Corps: David Homer Bates, Charles A. Tinker.

Association of Railway Telegraph Superintendents: L. B. Foley, F. G. Sherman, E. P. Griffith.

Magnetic Club, New York: C. P. Bruch, A. B. Chandler, W. B. Dunn.

Serial Building Loan & Savings Institution, New York: James R. Beard, Edwin F. Howell.

Gold and Stock Life Insurance Association, New York: Gardiner Irving, Louis Dresdner.

New York Telegraphers' Aid Society: Thomas M. Brennan, Robert J. Marrin.

The Morse Club, New York: William J. Dealy, William Holmes.

Postal Telegraph Club of Atlanta, Atlanta, Ga.: G. H. Usher, W. C. Daviet.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. There is a general demand for knowledge on the quadruplex, duplex, etc., and to aid in the acquirement of such knowledge we are extending our help to students by asking questions on these subjects in each issue of our journal, so that they may be encouraged in their studies by answering them. We use as our textbook Maver and Davis' "The Quadruplex," and students should have a copy of this book at hand in order to be able to give the answers. The questions are progressive and a careful reading of the book on the points under inquiry unfolds the answers. This method of acquiring technical knowledge is a fascinating one.]

WHEATSTONE SYSTEM (*Concluded*).

How much play is allowed for the armatures of the polarized relays?

Why is it necessary to limit the play of the armatures of these relays?

What is the effect of high speeds on the operation of the sounder?

On what class of circuit may the Wheatstone system be operated?

On what system is it operated by the Western Union Company?

What is the capacity of a circuit operating the Wheatstone system duplex?

What changes are necessary in order to balance a Wheatstone duplex, and how are they effected?

How is a balance obtained on a Wheatstone duplex? Does it differ from the method of balancing a quadruplex?

The polar relay being inaccessible, how is a balance indicated?

Trace and study the connections in Fig. 63.

What advantage is gained by interposing the resistance R between the rocker arm of the transmitter and the switch?

Why was the polechanging key displaced in this country by the pole changer?

What power is used to operate the perforating punches?

Study the construction of the perforators.

What air pressure is used for punching the tape?

Describe the various operations through which a message must pass in transmission and reception.

How many hands does a message pass through in the Wheatstone system as compared with the Morse?

What makes the Wheatstone system of special advantage on press circuits in England?

Why is the Wheatstone system particularly serviceable when wires are prostrated by storms?

Bound Volumes of Telegraph and Telephone Age.

TELEGRAPH AND TELEPHONE AGE for 1911 covers a period of great activity in telegraph and telephone development and contains a complete record of all important events in these lines, besides much other interesting and valuable matter of general and technical interest. The volume is well worth preserving by students and subscribers, as its contents will be frequently referred to on account of their important character.

Bound volumes are now for sale at the publication office of this journal, 253 Broadway, New York, at $3.50 per volume, express charges collect. These volumes are neatly bound in cloth and will be found very handy for the library.

The New Western Union Office at Winnemucca, Nev.

A general reference was made in our issue for January 16 to the new office of the Western Union Telegraph Company at Winnemucca, Nev. We have since received a detailed account of the office equipment, which will be found of general interest.

The office, to some extent, supplants that at Reno, Nev., which has for a decade or more repeatered all of the important circuits east and west on the Central route.

The new office is complete in every detail and represents the latest in modern practice. All of the multiplex equipment, consisting of nine direct-point duplex repeaters, three quadruplex sets and two printed repeaters, all of the new bridge type, are assembled on standard repeater tables. The office has been provided with the latest standard equipment for obtaining maximum results from the facilities, including distributing frames, bridge test sets, volt mil-ammeters, Gill selectors, etc.

The battery plant consists of 620 cells of chloride accumulators, manufactured by the Electric Storage Battery Company of Philadelphia, for the main potentials, divided into banks of forty cells each, type E. T. for the first and second potentials and type C. T. for the third and fourth potentials, and two banks of 39 cells each, for locals. The main potentials are charged in multiple and discharged in series. The locals are charged in series and discharged in multiple. The battery is charged from the latest type of mercury arc rectifier, manufactured by the General Electric Company. The charging current is obtained from the electric lighting service, and the power is rather unique in character, consisting of gasoline, steam and water, the source of the latter being from the snow in the mountains and after giving up its potential energy, is stored in a reservoir for domestic use of the city's population. The necessary rheostats, switches, meters, etc., used in connection with the operation of the battery, are mounted on a slate panel, manufactured by the Electric Railway & Supply Co. of San Francisco. This panel, together with the rectifier, distributing frames, switch and loop boards, repeater and operating tables, were located with a view to easy communication and the minimum travel for equipment attendants.

All of the equipment was assembled and installed by the Western Union district equipment department, of which Mr. A. W. Douglas is supervisor.

Classification of Western Union Offices.

The following definition of the various classes of Western Union offices has been officially announced:

Class 1. Western Union Independent Office:—An office, representing a distinct unit in the service, operated by the Western Union Telegraph Company, and having its business checked direct by other offices. Messages transmitted directly over telegraph lines, except during closed hours, when telephone toll lines may be used.

Class 2. Western Union Branch Office:—An office operated by the Western Union Telegraph Company, under the supervision of and in the same area as a Class 1 office and having its business reported and checked as of the office to which it reports.

Class 3. Western Union Tributary Office:—An office operated by the Western Union Telegraph Company under the supervision of a Class 1 office, but located in a separate area and having its business reported and checked as of the office to which it reports.

Class 4. Western Union Joint Railroad Office:—An office operated by a railroad company, representing a distinct unit in the service, and having its business checked direct by other offices.

Class 5. Western Union Branch Railroad Office:—An office operated by a railroad company, but located in a city or town in which there is also a Class 1 or Class 10 office, and having its business reported and checked as of the office to which it reports. Such offices are branches of Class 4 offices in exceptional cases only.

Class 10. Joint Check Direct Office:—An office located at a joint commercial or central office, operated by joint employes in the premises of the telephone company, and having its business checked direct by other offices. Offices which employ telegraph operators for the whole or part of each business day will be known as Class 10A, and offices which rely wholly upon telephone transmission to points of transfer will be known as Class 10B.

Class 11. Joint Tributary Office:—An office located at a joint commercial or central office, operated by the joint employes in the premises of the telephone company, and having its business reported and checked as of the Class 1 or Class 10 office to which it reports. Classes 11A and 11B defined as under Class 10.

Class 12. Joint Toll Agency:—An office operated by a joint agent of the telephone and telegraph companies, located at a coin box or non-coin box toll station or commission exchange, and having its business reported and checked as of the Class 1 or Class 10 office to which it reports. Messages are transmitted over telephone toll lines.

Class 13. Joint Public Station, Company Attended:—A local public station operated jointly with the telephone company, and having its business reported and checked as of the Class 1 or Class 10 office to which it reports.

Class 14. Joint Public Station, Agent Attended:—A coin or non-coin box local public station operated by a joint agent, and having its business reported and checked as of the Class 1 or Class 10 office to which it reports.

At all of these offices, classes 1 to 14, inclusive, direct telegraph rates will apply and written messages will be received.

Class 15. Joint Public Station, Agent Attended: A coin or non-coin box local public station operated by a joint agent, and having its business reported and checked as of the Class 1 or Class 10 office to which it reports. The usual local exchange telephone charge will be made for connection with the telegraph office in addition to the telegraph charges, and the agent will not be required to accept written messages.

Reminiscences of Early Telegraph Days in New York State.

Mr. W. D. Hanchette, an old-time telegrapher, is the author of an interesting article in the *Watertown* (N. Y.) *Times* under the title, "Reminiscences of a Veteran Telegrapher." He gives anecdotes of some of the old timers who are now well known in the business world, and the scene of his narrative is Watertown and vicinity. He states that Mr. Edwin Pope, who was superintendent of the northern New York division of the Montreal Telegraph Company in Watertown, was probably the first operator to copy press report by sound.

Other former telegraphers mentioned, all of whom began as messengers, are William Phillips, now of Reno, Nev., William and Charles Cundell, Matthew Hickey, Charles Ballard and several others who acquired prominence in and out of the telegraph business.

Western Union Electrical Club of St. Louis.

At a meeting of the Western Union Electrical Club of St. Louis held January 25 the following officers were elected: G. R. Alger, president; C. W. Frey, vice-president; A. Turner, secretary; Miss L. M. Hood, treasurer. The president announced the following Executive Board: E. A. McKnight, chairman; H. G. Gosting, W. J. Armstrong, W. J. Dill, E. H. Moore, J. J. McCruden, C. W. Crary.

In the absence of Prof. Hallet, the regular lecturer, the club listened to a very instructive address on and demonstration of apparatus and the uses of the Wheatstone bridge as applied to telegraph line testing, by Mr. E. A. McKnight, recently appointed senior assistant wire chief. It has been decided to alternate the lectures and demonstrations between the regular lecturer and any employe competent to discuss and demonstrate practical points in connection with the regular service.

Mr. Fred B. Barton, in charge of the Goodyear's Tire & Rubber Company's wireless station at Toronto, Ont., says, regarding the renewal of his subscription: "No wireless operator and engineer should be without Telegraph and Telephone Age."

The Chicago Western Union Office About 40 Years Ago.

BY L. K. WHITCOMB, DALLAS, TEX.

In March, 1873, the main office of the Western Union Telegraph Company in Chicago was located on the fifth floor of the Central Hotel on the corner of Market and Washington streets, having been removed from the Canal Street office across the river, the latter having been the temporary location after the great fire of 1871. There was but one telegraph company in the city, and there were less than sixty commercial operators employed. In May of that year the office was moved to the corner of La Salle and Washington streets, where it remained twenty years, when it was changed to its present location on the day of the opening of the World's Columbian Exposition, May 1, 1893. If I remember correctly, the room on the corner of La Salle and Washington streets was about sixty feet square, and it afforded space for all the operators, also the bookkeepers, batteries and storage. Two rows of operating tables on one side of the room provided ample space for the wires and two fifty-wire switchboards were only partially filled. The equipment was particularly up to date, there being included several "button" repeaters and three Stearns duplexes, the latter working with New York, Milwaukee and Cincinnati, respectively. There were less than fifteen branch offices at that time, including offices in railroad stations, and two wires handled all the city or "Metropolitan" business. The traffic of the entire Northwest (the Northern Pacific Railroad had not been built) was relayed at Milwaukee, and one duplex, usually worked by one operator, carried it. Between Chicago and New York one duplex and two single wires were used for messages, and one wire carried all the press. One wire on the Chicago and Northwestern Railroad was assigned to business for all points between Chicago and Omaha, and it was paralleled by the "overland" wire, which ended at Corrine, Utah, and handled the entire Pacific coast business, including the press. One wire on the Chicago, Burlington & Quincy route to Keokuk and another to Quincy, via Galesburg, provided for the business of that road, and the Iowa business was relayed at Burlington, one wire on the Chicago, Rock Island & Pacific to Omaha, Neb., one to Muscatine, Iowa, and two to Peoria, Ill., covered that territory; one on the Chicago & Alton Railroad to Springfield and one to St. Louis provided ample facilities. The St. Louis wire carried all the business for the Southwest, and, without going into further detail, one wire to a railroad was generally sufficient to carry the business with all towns through which it passed.

Perhaps a review of the personnel of the force and their assignments would better convey an adequate idea of the conditions than any other statement could. The following covers about all of them: F. C. Swain, manager (chief operator); George C. York, assistant manager; C. G. Sholes and H. W. Plum, chief operators; Wm. H. (Billy) McMillan, chief message clerk; Ed. Angel, timekeeper, and the following day operators: H. W. Hunt and Wm. Wallace, Jr., New York duplex; Charles H. Lithgow, New York; Curtis D. Meserve, Buffalo; E. L. Armstrong, Pittsburg; Dr. F. N. Benson, Indianapolis and Louisville; John L. Martin, Cincinnati; Charles T. Day, St. Louis; O. W. Hamilton, Springfield; J. Newton Crittenton, Milwaukee; Charles Wilkinson, Milwaukee; A. H. Babb, Quincy; H. E. Tatge, Burlington; Wm. H. Walsh, Davenport and way; Daniel Francis, Corrine, Utah; M. F. (Jeff.) Prentice, Peoria; Miss Lizzie Veazey, Dubuque; A. J. Long, Omaha; Elmer Stephens, Peoria way; Mrs. D. M. Tillotson, Illinois Central way; Fred M. Randolph, Fort Wayne way; L. J. Amsden, Lafayette way; Miss Julia Phelps, Michigan Central way; M. H. Smith, Eastern report; C. S. Jones, Chicago and Northwestern way. City department: C. W. Jones, chief; Ed. Bangs and Miss Lily Smithels, Board of Trade office; S. L. Robinson, manager; J. E. Pettit and D. S. Anderson, operators, the latter working at the main office, outside of 'change hours.

Night force: H. C. Maynard, manager; L. C. Springer, assistant manager; C. H. Kelly, wire chief; Octave Valliquet, late-night operator. Operators: A. J. Mereness, Milwaukee; C. F. Gooding, Milwaukee report; Douglass Burnett, New York report; H. J. Forman, "Smith" report; Gib. Merrill and George W. Hurd, New York duplex; Charles W. Thayer, Detroit; Dr. Bradnack, Buffalo; J. Q. Mason and Ed. Dorval, St. Louis, and overland alternate nights; E. G. Foote, Springfield; E. Lomasney, Burlington report; L. K. Whitcomb, Peoria and Dubuque report; M. L. Lawson, Springfield and Quincy report; Jno. M. Kemp, Omaha report; Francis W. Jones, Indianapolis; Wm. Linton, Cincinnati; E. O. Martin, Louisville; F. M. Lester, Pittsburg; George Wilkinson, L. W. Pitcher, Jerry O'Connell, way wires. Check boys: W. R. Halligan, A. J. Gallagher and George Shaw. There may be others who might rightfully claim place in this list, whose names are forgotten, but the above is about as I found them in the old "Market Street" office.

It would indeed be interesting to trace the careers of these operators, if such a thing were possible, as they scattered far and wide into various occupations; but time and space fail. As I look over the list, sixteen of them have signed their last pay check, and there is only one who has remained continuously in the service at Chicago. There are two or three others who are now employed there who worked in that office at the time. In those days there were no "woggle bugs" or other sending machines, the typewriter was not thought of as a telegraphic adjunct, and the working tools, other than those fastened to the tables, were a good pen, pencil or stylus.

Telegraphing was an art, proficiency in which depended on the mental and physical make-up of the operator, added to his experience and good judgment, without mechanical aids. The limited facilities and heavy business demanded ability of a high order. An operator was generally known by the quality and speed of the "Morse" he sent, and the penmanship and correctness of his copy. An operator who had received "a prize package" was a sort of seven-day wonder, to be questioned and interviewed, over and over again, and to be called up on the "carpet," made the recipient of that honor (?), a sort of a hero. That there were first class operators in those days goes without saying. The quality of their work demonstrated the fact.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(87) Q. How are newspaper despatches transmitted by wireless across the Atlantic? Is there any special preparation or arrangement for handling this class of business? S. P. O.

A. No special preparation is made or necessary. The correspondent files his matter with the telegraph company as he would an ordinary telegram, and it is handled just as it would be by a wire company.

(88) Q. Knowing that TELEGRAPH AND TELEPHONE AGE always stands ready to aid a struggling student, I wish to ask for light upon some points which I could better understand if explained by some one who knows more than I do about electricity. Electrical books state that

(1) Resistance varies directly with the electromotive force and inversely with the current.

(2) Electromotive force varies directly with the resistance and with the current.

(3) Current varies directly with the electromotive force and inversely with the resistance.

Will you please express these facts in plainer language and give an example in each case?

R. A. W.

A. These statements are expressed algebraically thus:

$$(1)\ R = \frac{E}{I},$$

$$(2)\ E = R \times I,$$

$$(3)\ I = \frac{E}{R},$$

E representing electromotive force; I, current, and R, resistance.

In Case (1) let us assume that $E = 50$ and $I = .5$, the value of R therefore must be 100. Suppose now we change the value of E to 100, I remaining the same as before, we get 200 as the value of R. We have increased the E. M. F. to twice as much as it was, and as a consequence the resistance is also increased twice as much. That is what is meant by the statement that the resistance increases directly with the E. M. F.—it increases as the E. M. F. increases and decreases as the E. M. F. decreases.

If we now decrease the value of the current, I, one-half, making it .25 instead of .5, the value of the E. M. F. remaining at 50, we obtain 200 as the value of R. If on the other hand we increase the current twice as much, making $I = .10$, we get 50 as the value of R. This shows that by decreasing the current we increase the resistance in the same ratio, and by increasing the current we decrease the resistance. That is what is meant by the statement that the resistance varies inversely as the current—that is, one increases in "inverse proportion" as the other decreases, and *vice versa.*

The same reasoning applies to the other formulas.

(89) Q. Can you give me some information as to the method employed by the Postal Telegraph-Cable Company in bonding its employes to insure fidelity to their trust, etc. I understand that the company has some special form of policy. Will you kindly enlighten me. M. T. B.

A. The company handles this matter in the ordinary way and proceeds just as an individual would. Periodically, it makes up a schedule, giving the names of those employes whom it wishes to bond, together with other data, and presents the schedule to an assurance company which issues one policy covering all of the individuals named. Any interim additions or changes are adjusted in the usual way as they occur, this being simply a matter of bookkeeping. The only difference between this class of business and that of an individual is that it is more in the nature of wholesaling.

Self-Winding Clocks in Winnemucca.

The announcement in our issue for January 16, under the head of "Winnemucca, Nev., Western Union," that Mr. S. J. Mercer, manager of that office, had secured forty-one self-winding clock subscribers during the past year, making the average one clock to every forty-five inhabitants, has evoked some favorable comment and admiration for the man who has accomplished so much in so small a place.

"Any man with such hustling qualities," said one gentleman, "should not be permitted to remain in Winnemucca; the company should give him a position where he would have a wider field of activity. It is constantly on the lookout for such men and I, for one, hope that Mr. Mercer's achievement will not pass unnoticed and unrewarded by his superior officials. A man who can get forty-one subscribers in one year for clocks in a town the size of Winnemucca can certainly make good in the commercial department in any large city."

Steel - Destroying Insects. — Italian engineers have, it is reported from Rome, discovered an insect that bores into and destroys steel rails. The worm lives on iron rust. It is presumed that the worm will make no distinction between iron or steel telegraph and telephone poles and rails, as long as there is oxide of iron to devour.

Telegraph Conditions in South Australia.

Government ownership and operation of telegraphs is not what many operators think it to be, and the experiences of telegraphers in countries where the government controls the service are not very encouraging to American operators. The English operators are dissatisfied, and not for the first time; the French operators struck about two years ago to better their condition, and those in Australia have been agitating for better conditions for the past ten years.

The telegraph service in all countries is secondary to the postoffice, and probably never will be placed on the same footing with the postal service. Those in the United States who are clamoring for government ownership should think the second time before giving utterance to their high expectations. It is not necessary to make any investigation on their own account; all they need do is to study the experiences of other countries and ask themselves if, after all, government ownership is what it seems to be.

The following account of telegraph conditions in Australia will be read with much interest at the present time:

There is a feeling of considerable dissatisfaction among telegraphers in South Australia as a result of the attitude of the Public Service Commissioner toward telegraphers in that Commonwealth.

In 1901 the Commonwealth took over the post and telegraph services of the six States which now compose the Australian Commonwealth. These services had previously been governed by independent laws and regulations in the separate States. The Commonwealth constitution provided that officers transferred from State to Commonwealth should "preserve all their existing and accruing rights." The Federal Parliament in passing the Public Service Act reenacted that provision.

The Act appointed a commissioner and six inspectors (one in each State) to classify the service. The commissioner controls salaries and appointments, but is not responsible for carrying out the functions of the department. In his first classification in 1904 he took the strictest legal view of what constitutes a "right," and, finding himself clothed, by delegation, with the powers of Parliament itself in all service matters, he decided to terminate all rights (except the right a small section of the service had to pensions). The compact between the convention which drafted the Commonwealth constitution and the service was thus abrogated by one man, though the Federal Parliament itself had endorsed the compact.

The Commissioner's grading of the telegraphers also created very great dissatisfaction.

The position became acute in 1907, when a Royal Commission was demanded by the service and by the public. That Commission commenced its work early in 1908 and presented its report in October, 1910.

In December, 1910, the endurance of the South Australian officers reached its limit, and negotiations with the Commissioner were broken off, and the Government was appealed to. The deputations which waited upon the Postmaster-General put a clear and strong case.

While the representations to the Government have not resulted in redress of the special South Australian grievances, they secured the abolition of the proportional grading of telegraphers and raised the fifth class maximum to $1,000 for telegraphers, postmasters, clerks and clerical assistants throughout the service, about 4,000 officers being benefited. The fight put up by the South Australian Association also galvanized into vigorous life the branch associations of the "general divisions" and concessions were granted which the government say made a grand total of $1,010,000 for this year. The concessions are very substantial, particularly to the lower grades.

The Royal Commission's recommendations have been largely adopted, but its suggested reform in the system of service control has been turned down by the government. The Commission recommended a board of three directors, one of whom should be a business man of the highest qualifications, the other two to be experts in telegraph and telephonic matters, and in postal affairs respectively, this board to have the responsibility of administration as well as the power to control the staff. Safeguards were suggested whereby the interests of the officers appeared to be protected against mere autocratic action by the Board. The proposal besides involving the abolition of the present commissioner and his inspectors, gave promise of better results both from the public and from the service points of view. The government, however, has decided to continue the present system in spite of the trouble it has given rise to. To meet the demands of the staff for better conditions, it has passed an act placing the service under the jurisdiction of the Conciliation and Arbitration Court.

The position now is that if any dispute arises between the service and the Commissioner, and that official is adamant, the only remedy is to hale him before the Arbitration Court. The Act forbids any costs being granted by the Court. It also provides that any award which conflicts with Commonwealth law or regulations may be set aside by the Parliament. The Parliament therefore is the court of appeal for the Commissioner, but the Act allows no appeal for the officers. An unsympathetic government may easily provide regulations at any time that will anticipate any award likely to be given by the Arbitration Court. From the Commissioner's side it appears to be a case of tossing with a double-headed coin—the officers have so much to contend against that it is doubtful if they will ever take a case to the Court.

The persistency with which the Commissioner decries the work of the telegraphers is one of the chief difficulties the latter have to contend with.

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February 16, 1912.

The International Wireless Treaty.

The United States, alone of the great nations of the world, has so far failed to become a party to the treaty of the International Radio-Telegraph Conference held in Berlin in 1906. The responsibility for this lies with the Senate for failing to give its assent, the matter having been brought before that body at the time the treaty was adopted by the Conference. It is hardly conceivable that such an important matter as this is should have been so neglected.

The situation as far as the United States is concerned is an extremely unfortunate one. This country has no standing in the conference and has no voice in its affairs, although its delegates were largely instrumental in framing the treaty at the Berlin Convention of 1906. Whatever recognition is accorded to this Government is due to international courtesy and not to right. The treaty is based on the principle of mutual help and protection, and it is a serious matter for the United States to be out of harmony with so important a movement.

The United States, instead of being a stranger in the family of nations, wirelessly speaking, should be a leading member of the family, and a ship flying the American flag cannot by right demand or expect to receive aid in time of need. It has no standing and what help it may receive is through the courtesy or charity of its neighbors, so to speak.

There is good reason to believe, however, that the treaty which has lain in the Senate pigeon-hole for so many years will be taken up for consideration and receive confirmation. It is important that this should be done without unnecessary delay in order that the United States may participate in the radio-telegraph conference to be held in London on June 4, on an equal footing with the other nations who have adhered to the treaty. The powers of this conference will be plenary and the United States should by all means possible be in a position to participate in its deliberations.

Corporation Taxation.

The definition of a bright school boy that a politician is one legalized to make trouble seems to have some basis of truth when we contemplate some of the results of these gentlemen's activities. A politician has also been defined as one who follows up business corporations and makes it as unpleasant and expensive as possible for them to exist, and this, too, seems to be tinged with truth. This idea seems to be contagious, for we find these pernicious activities in most all States of the Union and the railroad, telegraph and telephone companies suffer in consequence and are compelled to be on the defensive to protect their rights. Each State has its own way of oppressing business enterprise and the result is that in an interstate commerce business the situation is decidedly unpleasant for the operating companies. Cities and smaller political divisions also add to the general turmoil by joining in the campaign of unreasonable taxation of business enterprise and their zeal sometimes borders on the ludicrous. It would seem that a federal franchise law, under which all interstate commerce corporations should be organized, might simplify the situation, but the States would object to such a law because it would deprive them of large revenues from taxation, etc.

The outlook is not all dark, however. There is an evident reaction in public sentiment toward corporations and we may hope to see the day before long when the State legislatures will deal fairly with public service enterprise.

Universality of the Telephone.

The wonderful development of the telephone and its manifold uses challenges the admiration of every thoughtful person, and it must be a dull mind that does not dwell upon the vast possibilities yet undiscovered. The telephone is revolutionizing social relations and business methods and the time will come no doubt when it will be considered as much a necessity in the family as it is now in business—indeed this time may be considered to have already arrived.

It is difficult for the mind to grasp the idea of the immensity of the telephone industry, especially of the commercial and plant departments, and it is probable that the public does not realize and appreciate what the telephone has done and is doing for the public welfare. It is possible to conduct business and social affairs by telephone and even our spiritual needs are ministered to by its use. Those who are confined to their homes for any reason can listen to church services over the telephone, and many other special uses of the instrument could be cited. One of the latest applications of the telephone is in providing boxes at convenient points along the street, and by carrying a pocket receiver, it is an easy matter to secure a telephone connection wherever one may happen to be.

The possibilities in the use of the telephone seem to be unlimited and each time a new idea is brought forward the question that naturally comes to mind is, "What next?"

How to Study Our Telegraph Lessons.

A student in the Course of Technical Telegraphy now running in this journal makes a statement that is well worth special emphasis for the benefit of all other students. He states that when he read the lessons in arithmetic and algebra for the first time he felt much discouraged to think that he knew so little of what he ought to know, and ascribed his feelings to his own dulness. He laid the papers aside for the time being and later re-read the lessons. The second reading brought additional understanding, and the third, fourth and fifth readings shed such a flood of light upon the lessons that every point involved therein came out clear to him. From this experience he concludes that the lessons should be read and re-read many times in order to get the real benefit of them.

We are very glad indeed that this student has so honestly declared his experiences and feelings in this matter, as it brings to light a highly important fact in connection with study in general—in other words he has simply discovered for himself the underlying truth in regard to study.

It is taught in schools and iterated and reiterated in books that, in order to read understandinglv, it is necessary to read over and over again the subject under consideration. Each reading brings to light points that eluded our attention before, and finally when we have gone over the subject a sufficient number of times we experience a feeling of satisfaction in the knowledge that we have appropriated to our own use about all of the truth the lesson contains.

Many persons are willing to learn but they are not willing to exert themselves to learn. They want knowledge handed to them all ready for use and done up in packages tied up in blue ribbon, but that is one thing that man has never yet succeeded in doing and never will. Knowledge cannot be bought, it must be acquired by systematic and conscientious study. There is only one way to learn and that is to observe and study.

One reading of any article gives us a view of the surface of the subject, that is all. We must dig down underneath the surface to get at the facts, and the deeper we go down the more gems we bring to the top.

Our student's experience is not, by any means, an exceptional case, it is an extremely common one, unfortunately, but he has discovered for himself where the difficulties lay and now he knows his work hereafter will be much easier. This man will unquestionably succeed in his studies, and his experience should form a valuable lesson to others.

Relations of Capital and Labor.

In a recent interview Mr. Theo. N. Vail, president of the American Telephone & Telegraph Company and the Western Union Telegraph Company stated that in his opinion the greatest question before the country today is the question of the relations between the different classes of people.

"The problem is to allay this class prejudice," he said, "and I think it is a simple matter, after all, if taken hold of in a sensible way.

"When one complains about a man having $10,000,000 or $15,000,000, let him stop and ask where is it? It is of course invested in enterprises employing thousands of people; it is not idle cash in a bank which a man can check out at will. This one thought carefully considered ought to answer many complaints.

"Evolution will settle all difficulties between capital and labor and all class questions in this country, I think, without any great trouble. All sorts of experiments will be made, but we shall come out all right in the end."

Highest Wireless Tower for San Francisco Exposition.

A memorial tower, 1,350 feet above sea level, is to be erected in Lincoln Park, San Francisco, Cal., as one of the features of the Panama-Pacific International Exposition in 1915, and its possibilities as a wireless station has led Secretary of the Navy George von L. Meyer to refer to the subject as follows:

"The Navy Department is taking steps towards erecting a high-power station on the California coast, in connection with its chain of wireless stations across the Pacific and for communication with ships in the eastern Pacific Ocean. Since the range of wireless depends principally upon the height of the aerial wires above the ground, and since the location of this station at San Francisco would be most advantageous to that city, it would seem that the Memorial Tower should be erected with a view to its use for supporting one end of an aerial of the most powerful wireless station in the world. The Eiffel Tower in Paris, 1,000 feet high, has produced wonderful results in long distance wireless work, and the proposed tower, 1,350 feet above sea level, would insure even more remarkable results.

"A site near the ocean beach at San Francisco will give ideal wireless conditions, there being no tall buildings or trees in the sending direction, and I strongly recommend that, before the exact site of the Memorial Tower is selected, the Navy Department be consulted as to the needs of the proposed wireless station. Such a station would in no way interfere with the use of the tower as an observation station for visitors, or for its use as a weather station. The small wires of the aerial could not detract in the slightest from the appearance of the tower, while adding greatly not only to its utility, but to its attractiveness for visitors."

Course of Instruction in the Elements of Technical Telegraphy—IX.

(*Copyrighted.*)

(Continued from page 80, February 1.)

[We began in our issue for October 16 the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Electricity.

POTENTIAL, CURRENT, RESISTANCE.

(*Continued.*)

In any combination of metals used to develop a difference of potential the metal which has the greater affinity for, or tendency to combine with, the electrolyte becomes the positive element. With any two in the following list of metals the first will be the positive, and the other the negative element. For example, using zinc and copper, the former being the first on the list becomes the positive or generating element, and the copper the conducting or negative element. If copper and silver were used, however, the copper would have the greater affinity for the electrolyte and would become the negative pole of the cell.

TABLE I.

1.	Zinc	7.	Bismuth
2.	Cadmium	8.	Antimony
3.	Tin	9.	Copper
4.	Lead	10.	Silver
5.	Iron	11.	Gold
6.	Nickel	12.	Platinum
13.	Graphite		

In a simple voltaic cell the effect of the momentary current resulting from a metallic connection of the poles is a decomposition of the electrolyte. The water of the solution is decomposed, its oxyated and appears on the surface of the copper in the form of bubbles of gas. As a result the copper plate becomes in a short time coated with hydrogen bubbles which have the effect of raising the potential of the copper to nearly the same electrical level as that of zinc and thereby seriously diminishing the current strength. This formation of hydrogen on the copper plate is known as polarization, and its removal by any means, mechanical or chemical, is called depolarization.

In the form of cell generally used for telegraph purposes depolarization is secured by surrounding the copper plate with a solution of copper sulphate, with which the free hydrogen may combine. This combination usually merely disposes of the hydrogen and prevents the detrimental effects of an accumulation of this gas on the copper plate.

So far we have seen that a difference of potential constantly maintained will generate a continuous current, but the strength of the current is affected by another important factor, namely, Resistance.

Resistance is the opposition, or resistance offered by all bodies to a flow of electricity.

A body which offers a small resistance to the current flow is termed a Conductor. A body offering a very high resistance to the current is termed an Insulator.

Table II gives a few substances arranged in the order of their value as Conductors and Insulators.

TABLE II.

Conductors.	*Insulators.*
Silver	Dry Air
Copper	Ebonite
Other Metals	Shellac
Charcoal	Gutta Percha
Saline Solutions	Silk Glass
Ordinary Water	Porcelain
	Dry Wood

Units, or fixed standards for measurement, are required in electrical work, so that all observations, wherever made, may be comparable. Thus, using the pound as a unit of pressure, the pressure of an engine can be expressed as so many pounds; using the mile as a unit, a distance can be expressed as so many miles; or, in the case of a fluid using the gallon as a unit, a quantity as so many gallons.

To express electrical pressure, or difference of potential, the volt is used as the unit; to express resistance, the ohm; to express current, the ampere.

The volt is that pressure, which, in a circuit of one ohm resistance, will generate a current strength of one ampere.

It may assist the student to a more thorough comprehension of the terms electromotive force, resistance and current, if we illustrate these three by some familiar figure, such as a cyclist.

Suppose, in a given run, the cyclist's speed to be uniform and to be entirely due to his strength, and the condition and length of the road, then electromotive force might be represented by the rider's strength at starting, resistance, by the length and quality of road, and current by his uniform speed.

In using speed as a comparison to current, it must not be considered in any relation to time, but simply as a quantity, the magnitude of which depends on the cyclist's strength, and the road conditions.

The exact relationship which electromotive force, or difference of potential, bears to resistance and current will be given in the chapter on Ohm's law.

(*To be Continued.*)

Telephone Pioneers of America.

ANGUS S. HIBBARD.

Mr. Angus S. Hibbard, the subject of this sketch, was one of the leading spirits in bringing about the organization of the Telephone Pioneers of America. He was born in Milwaukee, Wis., on February 7, 1860, and received his education in that city and at Racine College. He entered the telephone service in Milwaukee, on July 1, 1881, and has been prominently identified with the business ever since. He has filled successively the positions of superintendent of the Wisconsin Telephone Company, general superintendent of the American Telephone & Telegraph Company, vice-president and general manager of the

ANGUS S. HIBBARD,
New York (1881).

Chicago Telephone Company and now holds a position in advisory relation, executive department, American Telephone & Telegraph Company, with headquarters in New York.

Mr. Hibbard is thoroughly familiar with the work of all the departments of the company's business, and is the inventor of a number of telephonic appliances and methods now in general use. He is a lover of music, and has much talent in this direction being the composer of a number of excellent operettas and songs. He is much interested in out-of-door sports and is an enthusiastic golfer.

T. B. DOOLITTLE.

Thomas Benjamin Doolittle, Sc. D., of Pine Orchard, Branford, Conn., is one of the earliest of the telephone pioneers, and performed valuable work in the development of the telephone industry.

Apart from his experimental work on apparatus, which resulted in many fundamental appliances still indispensable, Mr. Doolittle was engaged on the broad lines of development of the telephone business into a national and international system, making a local study of every city and state, also of Canada, as to its business relations or trend of business to towns, cities and states, in order that lines should be built not only to meet the requirements, but by the most economical arrangement. He maintained that the fundamental principle of the telephone was unique and unlike that of any other public service in the world, and that for the best interest of the public, every telephone subscriber must be able to connect with every other subscriber in one comprehensive system covering the entire country. Many investors have ignored this principle to their great sorrow.

For many years up to his retirement from active service (June, 1909) he had a corps of able assistants in this work of commercial and traffic engi-

THOMAS B. DOOLITTLE,
Branford, Conn. (1877).

neering. These assistants accompanied him from place to place, were very enthusiastic and worked almost incessantly in season and out of season, as they appreciated the scope and value of the work.

Mr. Doolittle was the father of the hard-drawn copper idea, and he brought the manufacture of this wire to a high degree of perfection. For this work he was awarded the Edward Longstreth Medal by the Franklin Institute of Philadelphia.

Mr. Doolittle entered the telephone service in June, 1877, and his telephone experience is almost as old as the telephone itself. The degree of Doctor of Science was conferred upon him by Dartmouth College on June 30, 1909, his seventieth birthday.

New Year's Greetings from San Salvador.—We are in receipt of New Year's greetings from the officials of the general administration of telegraphs and telephones at San Salvador. The Salvadorean telegraph and telephone department is a progressive branch of the government and the officials are bringing it up to the highest standard of efficiency.

Why Aluminum Is Not Good for Telephone Wire.

A bulletin of the National Electric Light Association, New York, contains an interesting discussion of the conductivity, tensile strength and other properties of aluminum wire.

Some of the physical constants of aluminum as it is now manufactured commercially for electrical purposes, says the *Electrical World*, are as follows: Melting point, 1,157 degrees F.; elastic limit, 14,000 lbs. per square inch; ultimate strength, 26,000 lbs. per square inch; modulus of elasticity, 9,000,000; electrical conductivity, 62 per cent; specific gravity, 2.68; coefficient of linear expansion, .000,012.8. At present aluminum is used only to a limited extent for large conductors. Its use is thus restricted because of the practical impossibility of employing the ordinary methods of soldering, due probably to the fact that its surface seems to have a coating of oxide on it at all times.

The bulletin of the association discusses the question of cost as follows:

"At the present relative cost of the two metals, aluminum is about 10 per cent to 15 per cent cheaper than copper of the same resistance. The weight of a unit length of aluminum wire is only 47 per cent of a copper wire of the same length and resistance. Consequently, aluminum can cost 2.13 times as much as copper per pound and still cost the same as copper per unit length from the standpoint of electrical resistance. As a matter of fact, however, the price of aluminum at present is less than 2.13 times that of copper per pound, so that it is actually cheaper to use aluminum as an electrical conductor than copper, where other considerations do not enter."

Investigations made into the subject by other authorities, however, seem to indicate that there is another factor entering here which would throw the conclusion in the opposite direction. This is the fact that the aluminum market is so centralized under one common control that there is no market for aluminum junk, and this monopoly feature makes it impossible for operating companies to figure that aluminum has any junk value.

The bulletin goes on to say that expansion and contraction with changes in temperature is greater than in copper. A solid wire of small size gives a great deal of trouble through breakage due to crystallization of the wire from swaying in the winter. The greater expansion and contraction make it necessary to be especially careful to avoid stringing lines too tight in warm weather. The increased sag necessary for aluminum makes the liability to crosses unduly high.

Joints between copper and aluminum wire give a great deal of trouble due to electrolytic action.

A Famous Singer and Old-Time Telegrapher in Want.

A Chicago dispatch of January 24, published in the New York newspapers, states that Mr. Jules Lumbard, a forty-niner of the telegraph and a celebrated singer of patriotic songs during the civil war, is living in that city in dire poverty. He was a brilliant man in his day and was associated with John A. Creighton, of Omaha, who built the first telegraph lines in the West during the days when the Indians were numerous and warlike.

Fifty years ago Mr. Lumbard and his brother Frank, toured the country singing "The Battle Cry of Freedom." They made famous all of George P. Root's songs and made "The Battle Cry of Freedom," so great an instrument for the inspiration of patriotism that Abraham Lincoln once said at a public banquet:

"Let me tell you that two men—and they are not military men—by their singing have got more men to enlist in the United States Army than fifty times one hundred and fifty of our best recruiting officers ever addressed."

In the sixties Mr. Lumbard sang in Henry Ward Beecher's church in Brooklyn, N. Y., and in 1905 he attended the old timers' reunion at New York on which occasion he delighted the members with some of his famous songs.

Like most men of his kind, however, he never appreciated the value of money and his purse was always open for the aid of others. Although he is now eighty years of age he is a man of commanding presence and well preserved.

New Book.

TELEPHONY. By Samuel G. McMeen and Kempster B. Miller. 948 pages, 671 illustrations. Chicago: American School of Correspondence. Price $4.00.

This latest addition to the literature on the telephone has a decided advantage in being the product of two men whose knowledge of and experience and reputation in telephony are unquestioned. They are both among the most active and leading telephone men of the time, and what they say regarding the art may be accepted as authoritative and up to date.

The book is designed with the care that comes from knowledge and experience, and is a complete exposition of the art of telephony, both in theory and practice. Every drawing used was especially prepared for this work, and each one has the valuable merit of being clear and distinct.

The work has fifty-three chapters, Chapter forty being devoted to telephone train dispatching. A partial list of other subjects treated of in the various chapters includes: History and development, acoustics, lines, transmitters, receivers, primary cells, electromagnets and inductive coils, condensers, selective and non-selective party-line systems, protective means, switchboards, private branch exchanges, intercommunicating systems, traffic; phantom, simplex and composite circuits, lines, cables, poles, etc., underground construction, wiring, testing, etc. From this list an idea may be gained of the scope of the work, and railroad men will be especially interested in the book by reason of the special chapter on telephone train dispatching, which describes in a general way the various systems in use.

Copies can be procured of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, on receipt of price.

Efficiency of Accumulators*.

BY W. HIBBERT.

If the efficiency of an accumulator is compared with an engine or dynamo, it seems to be low. The difference is not so pronounced if the operations of charge and discharge are of small duration and follow each other at once. But where a discharge runs on for seven or eight hours and is then followed by a corresponding charge, the efficiency found is somewhere near 80 per cent. Now, the work done in charge or discharge depends on three factors—volts, amperes and hours—and under favorable conditions a good battery will return almost as many ampere-hours as were put into it. The loss in the quantity of electricity will not be more than 3 or 4 per cent.

This is only another way of saying that the chief factor in determining efficiency is the difference of voltage during charge and discharge. During charge, the average volts are nearly 2.2, while during discharge the average figure is about 1.95 volts. This factor alone, therefore, would determine an efficiency of about 88 per cent. It is evident that any appreciable improvement in efficiency must arise from a closer approximation between the charge and discharge voltage. The latter must be raised or the former diminished. Resistance accounts for less than half of the 12 per cent. loss in volts. It may be responsible for about 5 per cent. of the total. That it does not cover the whole loss is shown by the fact already mentioned, that short cycles (a few seconds charge or discharge) show improved efficiency.

To account for the unallotted remainder, we must go to the fact that the electromotive force is also different in the charge and discharge, and the question arises whether there is any chance of diminishing this difference. Since the researches of Dr. Gladstone and the present writer it has generally been admitted that changes in E.M.F. depend on differences in acid strength in the pores of the plates, and known effects of electrolysis enable us to see how such differences arise.

During discharge the acid is abstracted from the liquid in the pores, which is therefore necessarily weaker. During charge, the electrolytic wandering of the ions makes the acid stronger in the pores of the positive plate, where it is most efficacious in raising the voltage.

In thinking of these things it occurred to the writer that this source of loss might be lessened by the following device. The efficiency of two similar cells was determined by charging the plates in weak acid and discharging them in stronger. In other words, at the end of a charge the plates were lifted from a box containing weak acid and put into another containing strong acid. made. The current was kept at a predetermined value, and the potential difference read on a sensitive voltmeter.

At the end of a cycle the readings of the voltmeter were plotted against ampere-hours in the usual way, and the work put in during charge and that given out during discharge obtained from the enclosed areas.

It was thought that it would be too laborious to go through the usual repetition of cycles until constant results were obtained, and the early results were therefore compared with two similar cells in which the acid remained unchanged. In the final result, however, the experiments were repeated often enough to show that constant figures were being obtained.

All the cells were charged and discharged in series, so that the ampere-hours were the same for all. The voltage limits laid down were 2.4 for charging and 1.8 for discharging, as shown by the ordinary cells.

By the change in acid, a lower voltage sufficed to charge, this advantage being somewhere about 0.06 volt. Similarly, a higher voltage was obtained in discharge, though the advantage here was only about 0.02 volt. The net result was of such an order that the efficiency was raised by about 5 per cent., say, from a value of 85 to one of 90 per cent. This is not quite so large as theory would suggest, but the reason is soon found. The method adopted is able to change the strength of the acid in the body of the cell at the appropriate times, but it is the liquid in the pores of the active material which determines the E.M.F., and this is changed merely by the slow process of diffusion. Hence the mechanical changing of the acid only partly accomplishes what was proposed, and so far fails to give the full effect desired.

We are brought once more to see what was asserted in Gladstone and Hibbert's paper, that an increase in the rate of diffusion would help. If diffusion could be so expedited that the acid in the pores could never differ much from that outside the plates, the charging voltage would not exceed the discharging value by more than $2\,I\,R\,i$ As a matter of fact, there is no chance of making diffusion take place rapidly enough, but as its rate increases with rising temperature, some efficiency cycles were taken at 30° or 40° C.

Two cells were placed in a water bath kept at about 37°, and placed in series with two similar cells standing in the ordinary air at an average temperature of 19°. Many cycles were taken, and gave practically the same result. (In these experiments the acid had the same strength in all four cells: temperature was the only difference.) The following table shows the general nature of the results:

Effect of temperature on the efficiency of an accumulator. Discharge current, 1.5 amperes; charge, 1.3 amperes:

	Ordinary Temperature	37° C.
Discharge watt-hours.....	14.0	14.84
Charge watt-hours........	17.16	16.67
Efficiency	81.5	89.0

The average voltage of the warm cells exceeded that of the cold cells by about 0.07 volt. During discharge the difference was small.

*London "Electrical Review."

The net result of these experiments shows that the efficiency of accumulators can be increased by two distinct methods. Both of these methods depend on the same theory, and, so far, they afford additional verification of the theory.

Whether either of the methods is capable of being used in practice is a moot question. Changing the acid twice in every cycle is an impracticable process. Keeping the temperature up is comparatively easy, but before it could be seriously proposed, the effect on "life" would have to be considered. Such evidence as is already to hand indicates that local action increases rapidly with temperature, and, therefore, that disintegration of the positive plates would probably be accelerated. Such a result would more than counterbalance any good accruing from increased efficiency. For the moment we must be content to look on the foregoing results as interesting demonstrations of the losses arising in accumulators. We are confronted by the facts that an increased rate of diffusion increases capacity and efficiency, but if it depend on higher temperature it will probably shorten the life of the cells.

An Extensible Mast for Wireless Telegraphy.

An extensible metallic mast which possesses some novel features is being tried in Germany. The apparatus is called the Fontana mast, and it was designed to provide a metallic mast which can be quickly raised or lowered, but without the disadvantages of a telescopic mast.

The Fontana mast is of interest owing to the new principle involved, and it is claimed that the design overcomes most of the drawbacks which up to the present time have limited the appplications of such masts in electrical work. A four-sided hollow mast is formed of four flexible steel strips. The edges of these strips have teeth cut in them in such a way that the teeth of one strip interlock with the recesses of the adjoining one, so as to join the four strips at their edges. The teeth project to some extent. This makes up a hollow column. In order to brace it thin sheet-steel brace plates are placed at frequent intervals.

The mechanism for raising or expanding a mast of this kind is simple. The steel strips are wound upon drums and a second set of drums is mounted below to feed out the strip and guide it properly. These latter drums have projecting teeth around the center which engage in holes in the steel band. A chain drive connects both drums, and the lower or feeding rollers are driven by a hand crank or in other cases by an electric motor.

As the four steel bands pass up through the guide plate they become interlocked and form the steel tube. Upon the guide plate is a pile of section disks. The top head of the mast carries the first of a set of links which go to join all the section plates. When the head rises in the first place, it picks up the first section disk by means of the first four links placed on the four sides, so that the disk is automatically fitted around the column. As the mast continues to rise, the second disk is taken along in the same way; the result is that the section disks are situated all along the mast, their spacing depending on the length of the link which is determined according to circumstances. A light portable mast, such as is used for wireless telegraphy, can be raised to sixty-five feet in height using a base about three and a quarter feet square. When lowered, the height of the apparatus is only six feet and it weighs 385 pounds. The bending stresses are taken up by a short column, which projects up the center and transmits the stresses to the base. Means are provided for clamping the base of the mast tightly against the bottom column.

A crank attached directly to one of the drums, or by gearing, can be used for raising and lowering the mast and the remainder of the drums do not need gear drive, as the rest of the strips are drawn along by means of the interlocking teeth.

The Fontana masts are made in sizes to reach a height of eighty feet and carry a load of two tons. The manufacturer is the Fontana Maste und Träger Gesellschaft, Berlin, Germany.

Telegraphers of Today.

The Telegraph in Ye Olden Days.

BY T. J. CUSACK, NEW YORK.

At a recent book sale I purchased a copy of an old history of the telegraph, published in 1852, giving information and statistics that are interesting and somewhat amusing to the telegraph man of today. A few extracts might be worth reprinting, to show by comparison the wonderful strides made in this important branch of industry within the memory of many, in fact within a space of years encompassed by the telegraphic careers of some who are now engaged in the business.

In a chapter showing the cost of building and operating the telegraph lines in the year 1851, the historian states: "The aggregate cost of materials consumed in working all the telegraph lines on the continent for one year may be summed up about as follows: Metallic zinc, say $3,000; nitric acid, $2,000; mercury or quicksilver, $600; breakage, wastage, etc., $500; total, $6,100. By this statement it will be seen at what comparatively small expense of materials the electric fluid is daily sped to all parts of this vast country. Further improvements will likely reduce the present cost of materials."

The cost of construction of lines is estimated at from $150 to $200 per mile. There were four principal companies in the field at that time, Morse's, Bain's, House's and O'Reilly's, with many lesser companies, connecting lines, throughout the country, comprising a total mileage estimated at from 12,000 to 15,000 miles and extending east to Halifax, west to St. Louis, and south to New Orleans by two routes, one via Richmond, Savannah, Montgomery and Mobile, the other by way of Pittsburg, Cincinnati, Louisville and Nashville.

A prediction is that: "As soon as the Indians are brought into peaceable subjection and a good highway is established from Missouri to California, electric telegraph lines will be built over the entire route.

"The offices in New York," the story continues, "employ on an average of four young men in each, as operators and clerks. Those acting as clerks are generally also capable of writing with the instruments. In country offices, or in places of small note, one or two operators are sufficient. The wages paid for their services differ in different places. The chief operator receives the highest wages—varying from $1,000 to $1,200 per annum.

"Some companies also employ a person known as the superintendent of their lines, who has the immediate control and supervision of the whole. It is customary with the most, if not all the offices, when the operators have reached the hour for closing, or have finished their day's work, if required by the press or other parties, to keep open for a longer period to charge those giving the order, extra for their services. As two have to sit up in each office, the usual charge is 50 cents per hour, for each person, or $1 per hour for each office.

"The offices in New York manage the delivery of their own messages. For this purpose they employ on an average about five boys each, for twelve offices, making an aggregate of about sixty boys. The wages paid these boys is from two to three cents for each dispatch delivered, if below Canal street, or within about a mile from the offices. If beyond that distance or after night, the charge is 12½ cents for each dispatch. If in distant parts of Brooklyn or Williamsburg, the charge is 25 cts.

"Besides the help previously referred to many offices employ what may be termed a batteryman whose duty it is every night to remove the zinc cups from the acid cells or cups, and, after cleansing them in clear water, to set them by until they are required for use the next day.

"The telegraph is used to a great extent in conveying secrets of rise and fall of markets; for instance, a man may be purchasing goods in New York, gives his reference to the merchant and by the aid of the telegraph he can know the standing of his customer, even before the purchase is completed.

"There are bankers, brokers, etc., in Wall street, that receive and send, on an average, six to ten messages per day, throughout the year."

The *Herald* of May 9, 1851, is quoted "to illustrate the speed with which news is sometimes transmitted" as follows: "The 'Europa' reached her wharf yesterday at half past six a. m. Her news was at the O'Reilly telegraph office, 181 Broadway, somewhere before 7, previous to the office being opened. The Pittsburg office got to work about 8 a. m. and the dispatch commenced going to New Orleans ten minutes past eight, and was received and put up in the Exchange before 9 a. m. and the acknowledgment of its receipt, as at foot, reached the O'Reilly telegraph office, New York, at quarter past eleven, thus having travelled from New York to New Orleans and back in three hours and five minutes.

"O'Reilly's Telegraph Office,
"New Orleans, May 8.

"To Smith, Chief Operator,
"New York Office:

"The foreign news per 'Europa,' signed 'Jones,' was received here before 9 o'clock a. m., New Orleans time.

"(Signed) Zook, Chief Operator."

This news, in its transmission, as will appear from the following note from Mr. Baily, clerk in the O'Reilly telegraph office, was only rewritten three times:

"181 Broadway, May 8.

"I have to state that the foreign news by the 'Europa' was forwarded from this office at 8h. 10m. a. m. It was only rewritten at Pittsburg, Louisville and Tuscumbia before reaching New Orleans, where it was received and hung up in the Merchants Exchange before 9 a. m., New Orleans time. The message acknowledging its receipt as above was received at this office at 11:15 a. m.

"(Signed) Baily, Operator."

The *Herald* would whistle a different tune if this sort of service was passed out to it today and a communication would be forthcoming from our old friend Peter Flynn.

Telephone Service in New York City.

The number of telephones in New York City increased about 10 per cent. during 1911, according to Mr. R. S. Scarburgh, special agent of the New York Telephone Company, New York, During the past twelve years the total increase has been 700 per cent., until today there are in service in New York City 440,000 telephones. These telephones are served through sixty-four central offices, and are connected by 1,196,821 miles of wire. An average day's telephone business in New York City means 1,900,000 messages. This is about four messages per day from each telephone.

A new type of public telephone, known as the multi-coin prepayment machine, has been perfected and is now being installed in all of the boroughs. This new type of instrument is superior to the old type of prepayment telephone because it eliminates a great deal of the time that was consumed formerly in getting connection and then calling back to the patron to drop the coin in the proper slot before the connection was completed. The new telephones take nickels, dimes and quarters, and can be used to send any class of telephone messages, local, suburban or long distance, and also to send telegrams.

During the past year a change was made in the method of calling Philadelphia subscribers over the long distance wires, with the result that service between New York and Philadelphia is now on what is known as a "two-number" basis, that is, a person can call for a number in Philadelphia in the same manner as he would ask for a local call. This method serves to cut down the time of making connections between New York and Philadelphia to less than one minute.

Telephone Consolidations in Northern New York.

At the annual meeting on January 19 at Saranac Lake, N. Y., of the stockholders of the Mountain Home Telephone Company, the independent telephone company operating in that vicinity, formal steps were taken to bring about the consolidation of the telephone systems of the independent companies and the New York Telephone Company operating in the entire mountain, lake and St. Lawrence districts of northern New York, with the result that the 240,000 inhabitants of this section will be given a comprehensive service, both local and long distance, and the duplication of telephone systems eliminated.

The new service is to be under the direction of representative business men in each locality in which the new company will operate, and these men will make up the new board of directors to the number of fifteen.

In the new arrangement approximately 12,000 telephones are involved and about 900 miles of toll lines. The property values are in excess of $2,225,000.

The properties involved in this new enterprise are the Mountain Home Company, of Saranac Lake, the Clinton Telephone Company of Plattsburgh, Dannemora, etc., the Adirondack Home Telephone Company of Malone, Norwood, Canton, Potsdam and neighboring towns, and the properties of the New York Telephone Company in the four counties. Ogdensburg and Gouverneur, in which there are no competing telephones, are to be included in the new company's territory.

The toll line users in this area will all have access to the toll lines of the New York Company and the long distance lines of the American Telephone & Telegraph Company, in addition to the comprehensive county and inter-county systems now operated by the independent companies.

It is expected that the unification of service will be well under way by May.

Wireless Examinations.

In answer to many inquiries regarding the qualifications of wireless telegraph operators who wish to enter the government service, *Wireless News* prints a portion of a United States Civil Service bulletin, showing in a general way what the government examination requires applicants to know. The examination covers the following subjects with the percentage rating given to each:

Subjects.	*Percentage.*
1. Spelling (20 words of more than average difficulty)	5
2. Arithmetic (fundamental rules, fractions, percentage, interest, discount, analysis, and statement of simple accounts)	5
3. Penmanship (the handwriting of the competitor in the subject of report writing will be considered with special reference to the elements of legibility, rapidity, neatness, general appearance, etc.)	5
4. Report writing (test in writing in letter form a report of from 150 to 200 words in length, summarizing and arranging in logical order a series of facts included in a given statement of 400 or 500 words)	5
5. Copying and correcting manuscript (test in making a smooth corrected copy of a draft of manuscript which includes erasures, misspelled words, errors in syntax, etc.)	10
6. Practical questions	20
7. Practical experience as wireless telegraph operator	50
Total	100

Wireless Telegraphy on the Atlantic Coast of the United States.*

BY JAMES L. CHARLTON.

On the Atlantic seaboard of the United States there are fifty-four wireless-telegraph stations fully equipped, all of which are operated by the United States army and navy, the United Wireless Telegraph Company, the Marconi Company and the United Fruit Company, divided as follows: Twenty-two by the navy, seven by the army, sixteen by the United Wireless, seven by the Marconi Company and two by the United Fruit Company. In addition to these the navy operates five stations in the West Indies and Central America, the United Wireless three and the United Fruit Company six. The government stations are primarily for departmental service, although under certain conditions some of the naval stations—for instance, Key West, San Juan and Colon—are also open for commercial business. In addition to the above there are a number of stations used for experimental purposes or operated by other companies and by private individuals, but their influence is wholly local. At best they are of little importance except to cause interference with the transaction of government and commercial business. To this statement there is one exception, namely, the station of the *New York Herald* situated at the Battery in New York harbor, which stands ready at all times to give aid to navigation and twice daily sends out weather reports and news items. By constantly improving and weeding out defects, the stations mentioned are today in first-class operation and do an amount of work daily that would no doubt surprise the average person.

The naval stations extend from Cape Elizabeth, Me., to Key West, Fla., with two on the Gulf Coast —one at Pensacola, Fla., and one at New Orleans, La. There is also a high-power station at Guantanamo, Cuba, the winter base of the Atlantic fleet, and there are two stations at the Isthmus of Panama, situated one at Colon and one at Porto Bello. By relaying a message may be sent from one extreme of the navy circuit to the other without the slightest doubt that the message will reach its destination. The speed of transmission and the amount of relaying vary at different times of the year, due to the influence of atmospheric electricity during the summer months in the southern zones. Although this obstacle has been overcome to some extent by increased efficiency of operation and the use of high-frequency sparks, it is still a source of great annoyance.

Besides handling the official business of the navy and keeping war vessels anywhere within 500 miles of the coast almost constantly in touch with the department at Washington, the naval stations send out a noontime signal each weekday, followed by the weather report for the vicinity in which the station is located, and also, when storms are brewing, warnings received from the Weather Bureau. Ships in distress can always call these stations.

The equipment of the navy stations varies and numerous types of apparatus are used, although the receiving is almost entirely done with perikon detectors and transformer, telescopic-type tuning coils, a carborundum or silicon detector being cut in when there are strong static effects or a ship close by is signaling.

The high-power stations at Key West, San Juan, Guantanamo and Colon are equipped with high-frequency sending sets of 35-kw. rating, and were designed to be intercommunicative; in fact, they are so during the night and under favorable conditions during daylight. The navy-yard stations located at Brooklyn, Washington, Charleston and Pensacola are of from 10-kw. to 15-kw. rating, and have an effective range of about 500 miles. Sending sets of 3-kw. to 5-kw. rating were installed in the other naval stations, while most of the fortifications and lightships have 1-kw. sets.

The Navy Department is gradually developing a standard transmitting unit, which will overcome some of the defects in the present equipments and be capable of transmitting with a wide range of wave lengths. A transmitter capable of a wide and quick change in wave lengths is very desirable; for in case of war and with the enemy trying to interrupt wireless communication, the wave lengths could, by a prearranged schedule, be changed until communication is established. In some of the sets being tried out on shipboard this is done with a very loose coupling and by plugging in sections or individual turns on the closed circuit helix. A variation of wave lengths from 300 meters to 1,100 meters and in some cases 2,000 meters has thus been used in cases of strong interference with good success.

The Navy Department has now a standard mast or tower for antenna suspension and will gradually replace the old wooden poles at all of the important shore stations. It is constructed of light angle iron and built in the form of a pyramid, being 9 feet square at the base and tapering to 2½ feet at the top. Surmounting the top is a short wooden mast to which the antenna insulators are attached. The mast from base to extreme top is 200 feet high and rests on a wooden insulated platform. The recent equipment of the Newport station with two of these towers placed 550 feet apart has made that station one of the most important on the coast and has greatly extended its range of operation, with a record of communication with Colon, Panama, a distance of nearly 2,000 miles.

The new naval station now under construction at Arlington, near Washington, will have three towers, one 600 feet and the others 450 feet high. The equipment of this station will be ideal in every respect and when completed it will be one of the most powerful in the world. A twenty-four-hour watch is stationed at all naval shore stations year in and year out, there being, as a rule, four operators with a chief operator in charge.

Since the passage of the wireless-telegraphy act, which took effect July 1, 1911, there has been necessarily a large increase in installations on ships of all descriptions, and a great many of these installations

*Electrical World, New York.

have been by the United Wireless Company, which, in conjunction with the United Fruit Company, controls nearly all the commercial wireless business to and from steamers operating on the Atlantic coast of the United States, Mexico, Central America and the West Indies. Twenty-one of the United Fruit Company steamers carry wireless stations, and the Atlantic division of the United Wireless Company operates some 240 stations aboard vessels. An effective chain of commercial stations extends from Eastport, Me., to Galveston, Tex., the average distance apart being 200 miles, consequently coastwise shipping is at all times within range of shore communication. It may be added that the Key West naval station handles the messages in that vicinity for both the United and the Marconi Company.

The United Wireless equipment for ships is a standard set of 2-kw. rating with direct-coupled transmitter and tuning coil, the receiving being done with carborundum detectors. The more important commercial shore stations, such as Eastport, Sparrow's Point, Cape Hatteras, Tampa, New Orleans and those in Central America, are of 5-kw. to 10-kw. rating, while the intermediate stations are of 2-kw. rating. Taking into consideration the rating of the sets, this company does excellent work and has a system of relaying that is very satisfactory.

When at sea, ships with United Wireless equipment make daily reports of their 8 a. m. and 8 p. m. position, and handle messages from ship to shore or vice versa. A news bulletin is published once or twice a day, and on ships that are at sea for a day or more at a time these bulletins are inserted in an attractive booklet and sold as a souvenir. The press items for the bulletin are sent out by Atlantic City, Norfolk, Hatteras and Key West stations between 8 and 10 o'clock each morning, and at night by Atlantic City at 8:30, and by the *New York Herald* station at 9:15, which repeats at 12:30 a. m.

While the United Wireless Company monopolizes practically all the north and south commercial wireless business of the Atlantic coast, the Marconi Company similarly monopolizes the transatlantic business. This company has seven stations on the Atlantic coast: four of these are bunched close together between Cape Cod, Mass., and Sea Gate, L. I. Of the others, one is at Cape May, N. J., one at Virginia Beach, Va., and the other at Palm Beach, Fla. These last three stations have only lately been installed. The Marconi Company does a large business in messages and works very effectively. There are about eighty transatlantic ships which have Marconi installations, none being in excess of 2.5 kw. These ships do not individually do much long-distance sending, such communication being by relay, as there is practically always a chain of ships stretching across the Atlantic.

Three stations handle the New York business, namely, those at Siasconset, Mass.; Sagaponack, N. Y., and Sea Gate, N. Y. Cape Cod handles the Boston end, Cape May the Philadelphia end and Virginia Beach and Palm Beach handle the business from any Marconi ships that happen to be bound south. There are also three stations on the southern coast of Nova Scotia which receive or transmit messages to the United States by land wire.

With the exception of Cape Cod, none of these stations is of high power. At Cape Cod (Wellfleet, Mass.) there are two stations, one of high and the other of low power. The low-power station is used for local work during the day and the other, which is of 75 kw. and has a wave length of 1,800 meters, is used for press and long-distance messages at night. The large antenna of the high-power station is used only for transmission and not for receiving messages. This station has a duplicate at Poldhu on the western coast of England, and each station has a maximum radius of transmission of about 1,500 nautical miles. When midway across and when there is no abnormal static effect, the liners often copy the press messages from both sides during the same night.

Marconi operators are furnished with a magnetic detector for medium-distance work, and for long-distance work the Fleming vacuum-tube rectifier is used. This detector was brought out some years ago, but met with little success until lately, when improvements were made, and it is now equally sensitive with the perikon detector, although not nearly so simple. This rectifier consists essentially of an incandescent lamp of about five candle power, the filament of which is brought to incandescence by a battery, usually of storage cells giving from twelve to eighteen volts, there being a certain critical point which is controlled by a variable resistance placed in series with the filament. Surrounding the filament is a platinum plate connected to a leading-in wire fused in the opposite end from the filament. When one lead from the receiving circuit is connected to one terminal of the filament and the other lead to the platinum or cold electrode, the oscillations in the antenna are caused to pass only in one direction through the rectifier, thus producing a direct current, which is made to act upon a telephone in the receiving circuit.

In all Marconi calls there are three letters and all begin with an "M," except in the cases of German subscribers to the Marconi service, whose calls begin with a "D." About eighteen months ago the navy also inaugurated a three-letter call system, as the similarity in many of the two-letter calls was causing great confusion. Now all its shore stations on the Atlantic coast have calls beginning with "NA" and on the Pacific with "NP," the ships' calls beginning with "NB," "NC," "ND," etc. The United Wireless stations for the most part use two-letter calls. Marconi operators use the Continental code exclusively, the United Wireless operators the American Morse, and the navy operators must know both.

Mr. W. R. Williams, manager of the Western Union Telegraph Company, Elizabeth City, N. C., writes: "I hope you will pardon this stock expression, but Telegraph and Telephone Age is 'Fine Business' which we all, even to the messengers, greatly enjoy."

Entertaining Chicago Telegraph Messengers.

On December 18, 1911, the messenger boys of the Western Union Telegraph Company in Chicago were given a vaudeville entertainment by the Young Men's Christian Association. Prior to the entertainment the Western Union Company furnished the boys with a substantial supper. They marched from the main Western Union office through the crowded down-town streets to the Y. M. C. A. building, headed by a brass band. There were 340 uniformed messengers in the parade, and as they marched through the streets they attracted much attention and elicited considerable applause on account of their general neat appearance, and manliness. Several of the boys carried a large banner reading:

"Western Union Telegraph Messengers.

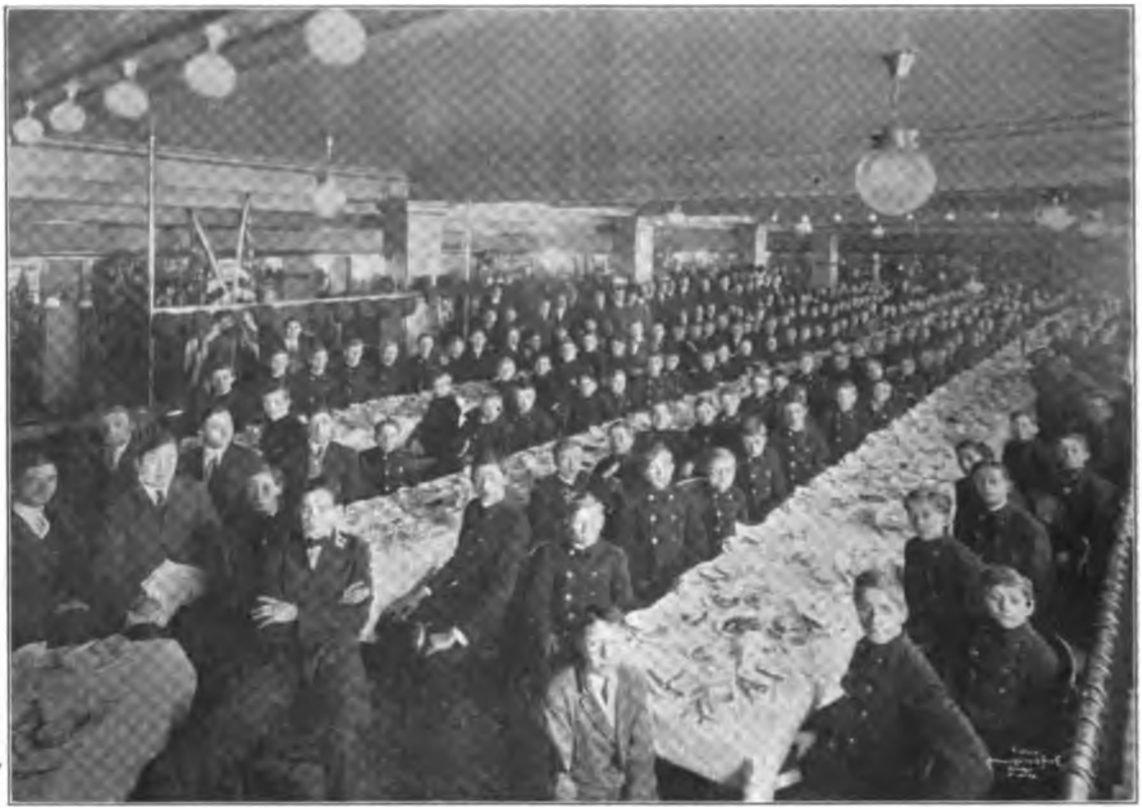
"Christmas Treat Given by Y. M. C. A. and the Western Union Telegraph Company."

During the supper, which was greatly enjoyed by the boys, the orchestra played popular airs and several "request" numbers, the messengers and all others present singing together.

Both the supper and entertainment were attended by the higher officials of the Y. M. C. A. and by the following Western Union officials: Mr. M. T. Cook, division commercial superintendent; Mr. W. J. Lloyd, division traffic superintendent; Mr. A. B. Cowan, district commercial superintendent, and Mr. John Fitzpatrick, district commercial superintendent.

Mr. Fitzpatrick is conferring with the Y. M. C. A. officials with a view to securing scholarships for some of the messengers and to devise ways and means of otherwise helping them.

The accompanying illustration shows the messengers at supper.



ENTERTAINING CHICAGO MESSENGERS AT SUPPER.

Economy and Efficiency in the Government Departments.

In a recent message to the Congress regarding economy and efficiency in the government departments, President Taft enumerates various subjects yet to be inquired into, including telephone, telegraph and commercial messenger service, electricity purchased and electrical equipment and supplies. "From what has already been ascertained concerning certain of these different objects of government expenditure," he states, "it is evident that large savings will result from such an examination."

Telegraphs and Telephones in Australia.—The government of Australia has appropriated $6,326,450 for extension of the telegraph and telephone services, and $81,757 for wireless telegraph stations.

Mr. W. S. Metzler, of the Canadian Pacific Railway Company's Telegraph, North Bay, Ont., in renewing his subscription for another year, writes: "You are always safe in renewing my subscription. TELEGRAPH AND TELEPHONE AGE is useful and interesting to me."

Government Control of Telegraphs in England.

The argument of postmaster-general Hitchcock and other theorists that the telegraphs in this country could be operated by the government at a profit, thus reducing taxation, is not supported by facts and experience in countries where the government controls the telegraphs. The experience of England is usually cited as an example. Everything there was promising at and before the beginning of government control, but in practice the theory did not work that way.

The London *Spectator* recently reviewed the subject and gave some plain facts in regard to England's experiences with the telegraph. The facts given are matters of record and they should be pondered by those who advocate government control. The *Spectator* characterizes the experience as a costly financial failure. It says:

"Forty-five years ago, in 1866, the proposal for the purchase by the government of the British telegraph lines was first advanced, and an allegedly conservative estimate set the cost at $11,500,000. It took nearly three years to complete the negotiations, and in 1869 Parliament appropriated $35,000,000 for making the purchase—nearly three times the original estimate; but in addition to that the government was called upon to pay the railway companies for their freehold interest in the telegraph equipment running along their lines, the right of way having been only leased by the telegraph companies; that meant another $20,000,000—so the acquisition of the business stood the British government $55,000,000. It was still predicted that within twenty years the net revenues would materially reduce the tax rates on the properties of the people. The disillusionment came quickly. For the first two years of the government operation there was a small net revenue, but after that the returns could not be made to meet the interest on the capital investment, and for thirty-nine years this enormous interest has been paid out of the exchequer—the pockets of the people. Then telegraph rates were reduced under the popular cry that reduced rates would increase the business and that increase would produce profits—but just the reverse was the result. The cost of maintenance and operation increased enormously under government ownership; and the revenues falling far below this and the upkeep and necessary improvements constantly calling for more money, the drain on the exchequer became increasingly heavy.

"When all these facts are taken into account—namely, the original capital which has never been repaid, the advances from Parliament upon which no interest is charged, and the annual deficiencies on working expenses—it will be found that the aggregate commercial loss to the country by the state purchase of the telegraphs is not less than $175,000,000. Nor can we console ourselves with the reflection that for this $175,000,000 the state has a valuable asset, for that asset, such as it is, involves every year on its working an additional loss of over $5,000,000. From a commercial point of view the purchase has been an unmitigated failure. To reply, as the advocates of state action invariably do, that the public has received compensation in the shape of a more efficient and a cheaper service, is plausible but unconvincing. For even if we make the large assumption that the service is better and cheaper than it would have been if it had remained in private hands, we are entitled to ask by what right the taxpayer is deprived of his money in order to subsidize persons who send telegraphic messages? The latter are a minority of the population; they are mostly well to do, and they are principally represented by two classes—purely commercial men, who look upon telegraphing as a business expenditure; and the racing fraternity, who certainly have no special claim to the charity of the taxpayer.

"The working cost per one thousand words telegraphed in Great Britain today is actually more than it was thirty years ago. The fatal incapacity of the British government to conduct a business enterprise has here been demonstrated beyond all question or cavil. It is to an experience like this that thousands of well-meaning reformers are seriously inviting the people of the United States today."

Pennsylvania Railroad's Telegraph School.

The Pennsylvania Railroad Company's school of telegraphy at Bedford, Pa., is equipped with the most modern appliances for teaching every branch of railroading with which a telegraph operator should be familiar. The library contains text-books on electricity in all of its branches, and is very complete. Students are also instructed in the use of the telephone in connection with telegraphy and the duties of the station agent, and taught to keep accounts.

An automatic sending machine with a transmitter that can be set at any speed has been installed to teach students to receive messages.

All graduates of the school are given positions on the Pennsylvania Railroad with the assurance they will have steady employment if they are faithful to their duties, and will be eligible for promotion to higher positions.

A careful selection of applicants for admission is made in order that they may fully meet the company's requirements. In the preparatory course all students are instructed and examined daily on the book of rules and in the graduate department practical demonstrations of train operation are given by means of a "miniature railroad."

Experienced instructors are employed in the school, and it requires from six to eight months to complete the course, according to the ability of the student to learn.

Any young man between the ages of seventeen and twenty-five years, having good eyesight and hearing, good health and a fair knowledge of the English language, mathematics and geography, is eligible for admission. Mr. Thomas Saddington is manager of the school.

Mr. R. R. Lamkin of Memphis, Tenn., in renewing his subscription, writes: "I thank you kindly for keeping TELEGRAPH AND TELEPHONE AGE coming, as it has become a necessity to me."

Mutual Investment Association, New York.

At the third annual meeting of the members of the Mutual Investment Association held on February 1, at 253 Broadway, New York, the following resolution was unanimously passed:

"*Resolved*, That the members of this association unite in expressing to Mr. Edward Reynolds, their treasurer, their admiration for the highly successful manner in which he has managed the association's affairs from the beginning, and voice their gratitude for the results accomplished not only during the past year, but during all of the time since the association was started. All understand and appreciate that these highly gratifying results are due to his intelligent and devoted interest in the association's affairs.

"Not only have we reason to feel pleased with the financial showing, but it is gratifying also to know that the sphere of the association's good work extends beyond its membership and that its operations have worked in a beneficent way for many others who are not members."

This resolution was beautifully engrossed and illuminated on parchment in book form and presented to Mr. Reynolds. The signatures of all the members appear on the pages, and the book is handsomely bound in soft leather. Naturally, Mr. Reynolds is highly pleased with this token of appreciation. Through his efforts, the association has grown to large proportions.

In his report to the members, Mr. Reynolds says, with reference to remedial loans, that there has not been a single instance of dissatisfaction with the association among any of those to whom loans have been granted.

In addition to encouraging the habit of systematic saving, the association assists worthy employes with loans in times of need at the rate of 6 per cent per annum, no bonus in any form being required.

"In making loans to employes," says Mr. Reynolds, "we have been governed entirely by our belief in their honesty. We never take an assignment on wages, thereby placing the borrower upon his honor. Perhaps the most gratifying feature of our experience is, that, notwithstanding the fact that we have made no attempt to protect ourselves from loss by assignment of wages, our 'bad and doubtful accounts' to date, spread over a period of three years, will not exceed $500. Of this one hundred dollars has been lost through the death of the debtor, and I am confident that $200 of the remainder will be collected.

"I have found no disposition whatsoever on the part of the borrowers to evade their obligations. We have treated them fairly and they have shown their appreciation of it by paying their loans. Some who have left us to go to distant parts and to the employ of other concerns have voluntarily paid up their debts, although we were not in a position to compel them to do so. We can afford to be optimists in the continuance of the business."

Mr. Reynolds' thought, time and labor are given to the association without compensation, and he has accomplished much good in behalf of the employes. Professional money-lenders find no encouragement among the Postal people, and they are practically unknown as such. Many employes who had questionable reputations have been taken in hand by Mr. Reynolds and lifted up to a higher plane of self-respect, and now they are men of high character.

The report includes some correspondence between vice-president and general manager Mr. E. J. Nally of the Postal Company and Mr. Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, New York, on the subject of the loan-shark evil, which has been completely eradicated from the Postal service. Mr. Nally, in his letter, explains the details of the Mutual Investment Association's successful method of dealing with the problem.

The Railroad.

Mr. W. H. Wilmont, formerly division operator for the Pennsylvania Railroad at Belvidere, N. J., has been appointed assistant division operator on the newly organized Trenton division, with headquarters at Trenton, N. J.

Mr. G. C. Kinsman, superintendent of telegraph, Wabash Railroad Company, Decatur, Ill., has returned to his office after spending the month of January in Southern California where his family is passing the winter.

Continental Telegraph Company.—The Continental Telegraph Company, organized a few years ago, operates on the Chicago, Milwaukee & Puget Sound, Tacoma Eastern, Gallatin Valley and White Sulphur Springs and Yellowstone Park railways, comprising a total of 2,137 miles. The main line of the Chicago, Milwaukee & Puget Sound Railway, from Mobridge to Seattle, consists of three copper and three iron wires over the entire distance, and there are several additional iron circuits between various points.

Meetings of Railway Telegraph Superintendents.—A joint meeting of the Eastern and Western divisions of the Association of Railway Telegraph Superintendents will be held in Chicago on March 20. Mr. E. A. Chenery, superintendent of telegraph, Missouri Pacific Railway, St. Louis, Mo., is chairman of the Western Division and has charge of the arrangements for the Chicago meeting. A special meeting of the entertainment committee of the Association of Railway Telegraph Superintendents is called for February 16 in New York, when plans will be outlined and discussed for the entertainment of the members and their families who will attend the next annual convention which will be held in New York June 24. Mr. L. B. Foley, superintendent of telegraph of the Lackawanna Railroad, New York, is acting chairman of the committee during the absence of chairman L. S. Wells, superintendent of telegraph of the Long Island Railroad, New York.

The Turner Monument Fund.

The fund for the erection of a monument at Harriman (Turner), N. Y., to commemorate the sending of the first train order by telegraph, has been materially increased since the last acknowledgment by a contribution of $500 from Mr. Andrew Carnegie.

The fund now stands as follows: Previously acknowledged, $1,776.99; Mr. Andrew Carnegie, New York, $500; interest from Washington Trust Company, New York, $13.10; total, $2,290.09.

Telephone Train Dispatching in 1911.

(*Continued from page* 87.)

The following reports from railway telegraph superintendents, in addition to those published in our issue for February 1, have been received, showing what was done on their respective lines during 1911 in the extension of telephone train dispatching:

Mr. W. W. Ryder, general superintendent of telegraph, New York Central Lines, Chicago, Ill., says: "A considerable mileage of telephone train dispatching circuits has been installed during the past year, as well as some telephone circuits for the handling of way office messages. In detail, the situation at the end of the year on the various roads under my jurisdiction is shown in the accompanying statement. You will note a little more than two-thirds of the entire railroad mileage is now dispatched by telephone. It is our intention to make considerable further extensions of this service during the present year, particularly for way-message business, it being clearly evident there is as much improvement in the handling of this class of business by telephone as there is in the dispatching of trains."

TELEPHONE CIRCUITS ON NEW YORK CENTRAL LINES.

		Mileage.
Lake Shore & Michigan Southern Railway.	(Total)	1657
Dispatched by telephone		1602
Way office railroad messages by telephone		546
Telephone used exclusively for all way office messages		348
Michigan Central Railroad.	(Total)	1731
Dispatched by telephone		862
Big Four Railway.	(Total)	2391
Dispatched by telephone		1263
Way office railroad messages by telephone		109
Telephone used exclusively for all way office messages		69
Chicago, Indiana & Southern and Indiana Harbor Belt Railroads.	(Total)	351
Dispatched by telephone		351
Way office railroad messages by telephone		351
Telephone used exclusively for all way office messages		351
Lake Erie & Western Railroad.	(Total)	886
Dispatched by telephone		574
Toledo & Ohio Central and Zanesville & Western Railways.	(Total)	482
Dispatched by telephone		279
Lake Erie, Alliance & Wheeling Railroad.	(Total)	87
Dispatched by telephone		87
Dunkirk, Allegheny Valley & Pittsburgh Railroad.	(Total)	90
Dispatched by telephone		90
Telephone used exclusively for all way office messages		90
Cleveland Short Line and Lake Erie & Pittsburgh Railways.	(Total)	47
Dispatched by telephone		47
Telephone used exclusively for all way office messages		47

[The table shows a total railway mileage of 7,722. On 5,155 miles of road or nearly 70 per cent. of the total, trains are dispatched by telephone, and way office messages are handled by telephone on 1,560 miles. Compared with the figures of the Atchison, Topeka & Santa Fe system as given in the table published in our issue for June 16, 1911, the length of the telephone dispatching circuits on the New York Central Lines seems to slightly exceed that of the Santa Fe system, but inasmuch as the data of the two systems are not uniform an exact comparison cannot be drawn. General superintendent Ryder has always been a strong advocate of train dispatching by telephone and the results of his activity in this direction are shown in the record. In Canada, the Canadian Pacific Railway leads in the matter of telephone train dispatching. The figures given in the table published June 16, last year, show a total mileage thus operated of 3,952. This was increased during the year following. Mr. W. J. Camp, assistant manager of the Canadian Pacific Railway's Telegraph, Montreal, has also always been a firm believer in telephone train dispatching and is active in introducing the system over his lines.]

Mr. W. P. Cline, superintendent of telegraph, Atlantic Coast Line, Wilmington, N. C.: During the year 1911 the Atlantic Coast Line Railroad Company added 180 miles of wire to its telegraph system and made further provision for 210 miles which were in course of erection at the end of the year. Three hundred and forty miles of additional telephone circuit (metallic) for train dispatching and 275 miles of similar circuit for message work were put into service and at the end of the year 331 miles of telephone dispatching circuit and 331 miles of telephone message circuit were in course of erection. The superiority of the telephone in train dispatching service was demonstrated so clearly by the operation of the initial circuit established two years ago on this line that, notwithstanding no successful attempt has been made by this road (or, so far as the writer is informed, by others) to state the advantages in terms of dollars and cents, it was decided to equip that portion of the main line from Richmond, Va., to Jacksonville, Fla., with complete telephone facilities for each district, consisting of a dispatching circuit, a message circuit and a block circuit. The greater portion of this equipment was put into service during the past year and the remainder is rapidly nearing completion.

Mr. C. L. Lathrop, superintendent of telegraph and signals, Pittsburgh, Shawmut & Northern Railroad, Angelica, N. Y.: "The Pittsburgh, Shawmut & Northern Railroad has just completed a telephone train dispatchers' circuit from St. Mary's, Pa., to Brookville, Pa., 47 miles, strung with 210-pound copper and equipped with Western Electric apparatus, using six selectors and eight siding telephones. During 1911 forty miles of new pole line were built, covering an extension of the road south from Knoxdale, Pa., to Mahoning, Pa., which connects the new mines of the Allegany River Mining Company. This line is equipped with telephone service."

(To be continued.)

Legal.

Destruction of Telegrams, Etc.—According to a decision of the Interstate Commerce Commission a telegraph company is permitted to destroy all original telegraph messages transmitted by it at public tariff rates after having preserved them for one year after the date of the messages. Free messages, government messages at reduced rates, or any other messages at reduced rates, are not included in the order, however. These latter classes of business will be passed upon in a further order of the Commission.

Obituary.

Fred E. White, aged 54 years, an operator, died in North Adams, Mass., on January 30.

Edward L. Graul, aged 41 years, operator for the Philadelphia & Reading Railroad at Reading, Pa., died February 9.

Richard Powers, an old-time and military telegrapher, aged 71 years, well known in many sections of the country, died in New York on January 19.

W. S. Chapman, aged 69 years, an old time and military telegrapher and formerly secretary and treasurer and a director of the Central Union Telephone Company in Chicago, died in that city February 6. He entered the telegraph service in 1862 and was cashier for the United States Military Telegraph Corps, Department of Missouri, under Col. R. C. Clowry, until the close of the war. In 1879 he entered the telephone service.

Colonel Beverly W. Wrenn, aged 68 years, president of the Auto-Transportation Company, New York, and an old-time and military telegrapher, died on February 7. Colonel Wrenn was a telegrapher in the Confederate Army during the Civil War and after the cessation of hosilities filled many railroad positions in the South. He had been a resident of New York for several years and was identified with many business enterprises all of which were successful.

James A. Dunn, aged thirty years, formerly an operator, and son of Harry J. Dunn, an old-time telegrapher at 195 Broadway, New York, died February 8 in a sanatarium in Liberty, N. Y. For the past ten years Mr. Dunn, who was an expert banjoist, had played in vaudeville, and had toured the United States as well as many European countries. He begun his theatrical career at the age of 15 years and was known on the stage as James D. Polk. Deceased was 30 years of age and had a host of friends in and out of telegraph circles who will regret to learn of his death.

Telephone Train Dispatching on a Southern Electric Railway.

One of the electric traction systems of the South, the Piedmont & Northern Lines has placed orders with the Western Electric Company for telephone train dispatching equipment to be used on two of its lines.

The first of these, the Piedmont Traction Company, is to operate its cars over a twenty-four-mile stretch of line extending from Charlotte to Gastonia, N. C. There will be seven way stations located along the line as well as eight semaphores of the new Western Electric selectively operated type.

The second line is that of the Greenville, Spartanburg and Anderson Railway, which will install telephone equipment over approximately fifty-eight miles of road from Greenville to Greenwood, S. C. Eleven way station equipments and eight semaphores will be installed.

The equipment to be used is of the very latest type throughout. The selectively operated semaphore is a new development and is operated by the dispatcher by means of a selector key in the same manner that a way station is signalled. An "answer back" or audible signal informs the dispatcher when the semaphore has operated.

J. W. Young With the Kerite Company.

Mr. J. Warren Young has resigned his position as chief signal inspector of the Erie Railroad Company to take a position with the Kerite Insulated Wire & Cable Company, New York. Mr. Young was born in New York City on November 3, 1877, and entered the service of the Central Railroad of New Jersey in April, 1896, as signal maintainer's helper, remaining with that company until November, 1899, when he resigned to take a position with

J. WARREN YOUNG.

the Delaware, Lackawanna & Western Railroad as maintainer and inspector of signals. Later he went with the New York, Susquehanna & Western Railroad to take charge of its signal work. In September, 1904, he was appointed supervisor of signals of the terminal division of the Erie Railroad, and in November, 1905, was appointed signal inspector in the signal engineer's office, which position he held until January 1, 1907, when he was promoted to the position of chief signal inspector.

The Mecograph Premier.

Ten years ago the Mecograph was introduced to the telegraph fraternity as an improvement in telegraph transmitters, and since that time it has undergone eight changes for the better. The Mecograph Premier represents the latest development in this machine and is meeting the most exacting requirements. It is easily and simply adjusted and works all the time on good and poor wires alike, and in any kind of weather. The tension against the dash-and-dot arms is uniform at all times and is furnished by only one straight spring, and is regulated by a thumbscrew. The instrument has a great range of operation and the dots can be made as heavy as desired on the poorest of wires. This transmitting instrument has saved the day for many telegraphers afflicted with the "glass arm," and placed them in the first class as senders where, before, they were in the lower grades, on account of their affliction. It also lightens the strain upon normal muscles. The Mecograph Company, 321 Frankfort Ave., Cleveland, Ohio, will be glad to explain the merits of this instrument to all interested.

New Italian Post and Telegraph Building.—A new central post and telegraph office is being erected in Florence, Italy, at a cost of $386,000. The central telephone exchange will also be housed under the same roof.

LETTERS FROM OUR AGENTS.

Los Angeles Western Union.

An electrical class has been organized in this office and has a membership of thirty-six students. It meets every Friday night. Mr. G. C. Terry is president and Messrs. G. E. Palmer, T. W. Kane and P. G. Tompkins constitute the committee on instruction.

Omaha Western Union.

Among recent visitors at this office were Messrs. J. C. Nelson, general superintendent; C. R. Fisher, district plant superintendent; E. E. McClintock, commercial district superintendent; B. L. Brooks, district traffic superintendent; W. C. Titley, division plant superintendent, and B. P. Meyers, chief operator, all of Denver, Col.; A. B. Cowan, commercial district superintendent, and M. J. Duggan, overland chief, Chicago, Ill.

Mr. J. S. Owens, chief operator, has returned from a tour of inspection in this district.

W. H. Smith, who had worked in this office for the past twenty years, died recently and was buried January 7.

The operating room in our new quarters in the Woodmen of the World Building [see page 68, issue of February 1] will be on the sixteenth floor. A feature of the room will be its wide aisles and strictly up-to-date equipment. It is claimed this will be the most modern telegraph office in the United States. The lease was closed through general superintendent J. C. Nelson, Denver, Col., and Mr. F. E. d'Humy of the office of the Engineer of Equipment, New York. The old office has been in the present building for thirty years and has outgrown its quarters.

District plant superintendent W. Salisbury has returned from Chicago, where he went on company business.

Philadelphia Postal.

Mr. R. A. Barton has resigned as manager at Lancaster, Pa., to enter other business, and Mr. H. A. McCanna, manager at Lebanon, Pa., has been appointed to succeed him. Mr. McCanna is well known in Lancaster, having been previously connected with that office for many years under Mr. Barton. Mr. Claude Harkins, operator from Bethlehem, Pa., will succeed Mr. McCanna as manager at Lebanon. Mr. Ray H. Horn of the Western Union at South Bethlehem, Pa., will take up the duties as operator at Bethlehem.

Among recent visitors were Messrs. H. L. Krum and G. D. Wilkinson, both on business connected with the Morkrum printer.

Assistant manager A. E. Zintl was the recipient of many congratulations upon the birth of a son recently.

Mr. Frank Gallico of this office was recently married to Miss Madelenna Chicocelona. His office associates presented the couple with a handsome parlor suit.

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 $1,650,000, at an average annual cost per $1,000 of about four cents a day, and has also accumulated $328,000 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.

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. 5. NEW YORK, MARCH 1, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Proper Care and Operation of Storage Batteries.

The storage battery is probably the most efficient battery ever devised and for that reason many are led to conclude that no rules of importance govern the method of charging and discharging it.

In fact a prevalent impression exists that after the battery is once started it will take care of itself and yield all that its indicated capacity calls for. Such, however, is not the case.

Like every other electric device, a storage cell will yield its maximum output only under conditions which will permit the accumulation and discharge of energy to develop at a rate which is no greater than the material and elements which compose the cell can properly take care of. When this normal rate is exceeded there is necessarily a waste of energy, and because of such losses manufacturers of commercial storage batteries, particularly those of 40- to 60-ampere hour capacity, construct the cells on the basis of a normal 8-ampere-hour rate of discharge. For instance a cell of 100-ampere-hour capacity is expected to yield a current of twelve and one-half amperes for eight hours. The general impression is that this cell will also give out one ampere for 100 hours, twenty-five amperes for four hours, fifty amperes for two hours or any other value similarly obtained. Theoretically, it should do so, but practically, it will not do anything of the kind. The greater the drain is over the 8-ampere-hour rate, the greater will be the shrinkage of the full or indicated accumulation. In other words, the energy will be exhausted before the rated number of hours have expired.

Those regularly employed to charge storage batteries of course understand the situation, but laymen often subject the plates to a great strain by continuing to charge them for too long a time at or near the finish of the charge, at which time the wear on the plates is greatest, and also by renewing partly exhausted cells unnecessarily frequently.

The latter tendency is particularly prevalent with laymen who use storage batteries for the operation of automobiles and motor boats. They are so afraid that the battery will become exhausted some time while out on the road that it is the rule with some of them to "fill up" the cell by a recharge after one or two trips have been made, as one would a gasolene tank. The result of this action subjects the plates to unnecessary strain and wear.

For example, suppose we have a battery capable of running a car eighty miles on one charge. We then run it ten miles and recharge the battery, after which we run it thirty-eight miles more and again recharge it. Now give it a final run of say, twenty miles, and recharge as before; what is the result? A little figuring will show that the car has actually been run sixty-eight miles altogether, yet the battery has been recharged three times although the original charge was more than sufficient for the distance covered.

An expert informs the writer that he gets maximum results from his motor battery consisting of twenty-four cells by proceeding as follows: Begin recharging with a current of about nineteen amperes and maintain that rate until the E. M. F. reaches sixty-one volts. Then reduce the current to eight amperes and keep it there until the voltage, which dropped when the current was reduced, again reaches maximum. This method, it is claimed, minimizes the strain on the plates and also insures a maximum charge of the cells.

The time required to fully charge the battery, when, say two-thirds of its full capacity has been exhausted, he claims, is about three hours, with a current of nineteen amperes and from one and one-half to two hours with an 8-ampere rate. When seventy-five per cent of the charge has previously been used up about six hours' recharge will be required.

In case of an emergency where it becomes necessary to obtain a quick recharge the starting current should not exceed fifty per cent of the cell's capacity; nor should one expect a very satisfactory recharge at that, under the circumstances.

It is a difficult task to determine just how much of a cell's capacity has been used up after many trips have been made, but one need have no anxiety concerning the remaining supply so long as the E. M. F. is above 1.7 volts per cell. When it reaches that value it indicates that about seventy-five per cent of the charge battery has been used. In fact a storage cell should not be recharged until the voltage drops to that figure.

In measuring the voltage the battery must be in active operation, otherwise the reading would be of no value whatever. A storage cell in almost any degree of exhaustion would show nearly two volts if not working.

Telegraph and Telephone Patents.

ISSUED JANUARY 30.

1,015,768. Automatic Telephone Circuit and Repeater. To C. Adams-Randall, Augusta, Me.

1,015,769. Telephone Circuit and Repeating apparatus. To C. Adams-Randall, Augusta, Me.

1,015,770. Multiple Repeating Telephone System. To C. Adams-Randall, Augusta, Me.

1,015,881. Means for the Transmission of Energy by Electromagnetic Waves. To R. A. Fessenden, Pittsburgh, Pa.

1,016,003. Means for Transmission of Intelligence. To W. E. Frow, Lisbon Falls, Me.

1,016,036. Signaling and Telephone System. To H. O. Rugh, Chicago, Ill.

1,016,131. Telephone Disconnector. To C. G. Fields, Bucklin, Mo.

1,016,202. Telephone and Telegraph Combination System. To C. L. Bopp, Hawkeye, Iowa.

ISSUED FEBRUARY 6.

1,016,277. Lockout Device for Party Telephones. To D. W. Kneisly, Dayton, Ohio.

1,016,546. Telephone-Ringing Apparatus. To W. E. Butler, David City, Neb.

1,016,564. Break Key. To J. L. Hogan, Jr., Pittsburg, Pa.

1,016,567. Spring-Armature Relay. To W. Kaisling, Chicago, Ill.

1,016,617. Telephone System. To W. A. Fricke, Chicago, Ill.

1,016,670. Listening-Detector for Telephone Lines. To E. Burgener, Wellesley, and C. Burgener, Linwood, Ont., Canada.

1,016,699. Signaling Device. To R. H. Manson, Elyria, Ohio.

1,016,847. Terminal Plate for Telephone Desk Stands. To G. Nelson, New York.

Personal.

Mr. N. Hucker, the veteran telegrapher of Buffalo, has the sympathy of his many friends in the death of his wife which occurred recently.

Mr. R. Sardaneta, of the Federal telegraph service, Vera Cruz, Mexico, was engaged during December and January in installing wireless telegraph stations in the Quintana territory.

Mr. Kent Cooper has been appointed to fill the newly-created position of superintendent of traffic of the Associated Press, with headquarters in New York. Mr. Cooper will have entire charge of the leased wire service.

Mr. T. D. Lockwood, general patent counsel of the American Telephone & Telegraph Company, Boston, Mass., is in London where he will spend a few weeks. He will then take a trip through the Mediterranean and thence to Rio Janeiro, Brazil, and Buenos Aires, Argentine, before returning home.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange February 24:

Amer. Telep. and Teleg. Co.	141⅞
Mackay Companies	83¼
" " pfd.	70½
Western Union Tel. Co.	84½

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. H. A. Tuttle, president and general manager of the North American Telegraph Company, Minneapolis, Minn., accompanied by Mrs. Tuttle, spent the month of February in Nassau, Bahamas.

Mr. E. B. Pillsbury, general superintendent, New York, has returned from a three weeks' trip to Panama and the West Indies. He reports having received hospitable treatment from the cable officials at Havana, Kingston, Colon and Panama, and found the cable offices at each port to be fine examples of up-to-date cable stations, each one rendering service of the highest type of excellence as to speed and workmanship.

Mr. Edward Reynolds, auditor of the company, has returned to his office after a western trip, visiting many of the principal cities between New York and Minnesota.

Mrs. M. M. Davis, wife of Mr. Minor M. Davis, electrical engineer and chief engineer of telephones, New York, died at her home in Brooklyn, N. Y., February 16. The funeral services were held on Sunday, February 18, and were attended by all the officials of the company, from vice-president and general manager E. J. Nally, down. Much sympathy is expressed for Mr. Davis by his associates and friends.

Mr. N. I. Taylor, cashier of the Washington, D. C., office was a recent executive office visitor.

Mr. W. J. Fowler, manager of the Cedar Rapids, Iowa, office has been appointed manager of the Lincoln, Neb., office, vice W. W. Morrison transferred to the managership at Oklahoma City, Okla.

Mr. M. J. Supple, operator in the Cedar Rapids, Iowa, office has been advanced to the managership to fill the vacancy caused by the transfer of Mr. W. J. Fowler to Lincoln.

Mr. C. W. Soules of the Boston staff has been permanently transferred to the Providence, R. I., force.

Manager J. A. McNichol and cashier J. H. Wilson of the Philadelphia office, recently visited Washington on company business.

This company has completed its underground installation at Binghamton, N. Y.

This company's new office at Newark, N. J., was opened for business on February 25.

W. I. Capen, Fourth Vice-President Postal Telegraph-Cable Company.

Mr. Welcome I. Capen, whose appointment as fourth vice-president of the Postal Telegraph-Cable Company, New York, was announced in our issue for February 16, has for nearly four years occupied the position of general superintendent of plant with headquarters at the same point. His wide experience in executive and construction work eminently fit him for his new position.

Mr. Capen was born at Brattleboro, Vt., July 25, 1854. He has been in the telegraph service all of his business life, his record beginning as a messenger boy at ten years of age, in his native place,

W. I. CAPEN.
Fourth Vice-President Postal Telegraph-Cable Company, New York.

with the Vermont, Boston & Montreal Telegraph Company. Later he became an operator for the same company, afterward entering the employ of the Western Union, and in turn serving many of the old opposition companies, eventually reaching the managership of the Automatic Telegraph Company at Baltimore, Md., retiring therefrom when that company passed under the control of the Atlantic & Pacific. Subsequently he served the Western Union at Cincinnati, Ohio, as wire chief, resigning to accept the managership of the Baltimore & Ohio office in that city. His appointment as manager of the Postal Telegraph-Cable Company at Cincinnati, began his connection with that company. His abilities were early recognized, and from Cincinnati he went to Indianapolis, Ind., there to become a superintendent of his company, and in April, 1906, was promoted to the general superintendency of the western division of the company with headquarters at Chicago.

Magnetic Club Spring Dinner.—The spring dinner of the Magnetic Club will be held at Moquin's, on Fulton Street, New York, on April 24. Hon. William A. Prendergast, Comptroller of the City of New York, will be present as the guest of honor, and will address the Club. The St. Denis hotel, on Broadway, which has been the meeting place of the club for many years, is to be torn down to make way for a modern business structure.

Postal vs. Western Union.—The Postal Telegraph-Cable Company has filed a complaint with the Interstate Commerce Commission against the Western Union Telegraph Company alleging discrimination and unreasonable charges by the Western Union on messages transmitted part way by the Postal Company and then necessarily turned over to the Western Union for further transmission to points not reached by the Postal Company. This involves the same question as to interstate messages that was decided recently by the Public Service Commission of New York State in favor of the Postal in regard to interstate messages.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Messrs. T. W. Carroll, assistant to the general manager, New York; H. C. Worthen, general superintendent, Atlanta, Ga.; L. J. Maxwell, district superintendent, Jacksonville, Fla., and J. P. Edwards, special agent, Atlanta, Ga., were in Havana, Cuba, recently on company business.

Mr. W. E. Athearn, engineer of equipment, New York, is in Havana, Cuba, on company business.

Among recent executive office visitors were: Mr. H. C. Worthen, general superintendent, Atlanta, Ga., Mr. J. C. Calvert, district superintendent, Richmond, Va., and the following superintendents of the American District Telegraph Company: P. G. Kern, Southern Division, Louisville, Ky.; R. C. Baker and G. McGann, Western Division, Chicago, Ill., J. M. Maddox, Pacific Division, San Francisco, Cal., and F. V. Sackett, engineer, Chicago, Ill.

Mr. M. E. Barrett, superintendent of construction of the American District Telegraph Company, Chicago, has been transferred to New York in a similar capacity.

Mr. Emil Zilly, manager of the marine observatory of the Western Union Telegraph Company, at Sandy Hook, N. J., was married to Miss Isabella Pape at Long Branch, N. J., February 15.

Mr. L. P. Grover, traffic chief at Helena, Mont., has been promoted to be chief operator at Salt Lake City, Utah, vice J. W. Dudley transferred to Omaha, Neb., in a similar capacity, vice J. H. Owen, promoted.

Senator W. L. Ives, of the operating department at 195 Broadway, who has been in the hospital for some time has recovered sufficiently to be able to leave the institution.

Mr. W. G. Peebles has been appointed manager of the Atlanta, Ga., office, vice W. J. Francis appointed district manager of the second district.

Mr. J. S. Calvert, district superintendent, Richmond, Va., announces the appointment of managers in his district as follows: R. N. Pfaff at Blackville, S. C., vice H. L. Dorrity; D. F. Barnett at Suffolk, Va., vice J. W. Stephenson, Jr., who leaves the service; Chas. Knott at Manning, S. C., vice Miss M. S. Bookman; Mrs. M. R. Thompson at Statesville, N. C., vice C. J. Jones who leaves the service.

A conference of district commercial superintendents was held at 195 Broadway on February 17, at which matters of general interest to the service were discussed. Those present were Messrs. E. M. Mulford, division commercial superintendent, New York, and the following district commercial superintendents: C. W. McKee, St. John, N. B.; C. F. Ames, Boston, Mass.; W. A. Sawyer, J. F. Nathan and E. P. Griffith, New York; J. W. Reed, Philadelphia, Pa.; A. C. Terry, Pittsburgh, Pa., and A. C. Kaufman, commercial agent, New York.

The Telephone.

Birthday of the First Telephone Patent.—February 14 was the thirty-sixth-anniversary of the filing of the first Bell telephone patent.

Speech by Telephone.—At the banquet of the Yale Alumni Association in Chicago, February 17, each diner listened to a speech by President Hadley of Yale University, transmitted from New Haven, Conn., by telephone.

Receiver's Sale of Illinois Tunnel Company.—The receivers for the Illinois Tunnel Company of Chicago, which operates the automatic telephone system in that city, have been ordered by United States Judge Kohlsaat to sell the property of the company on March 19.

Pacific Telephone & Telegraph Company's Report.—The annual report of the Pacific Telephone & Telegraph Company for the year 1911 shows revenues of $16,070,112, and expenses, including $3,217,000 for depreciation, as $12,607,838, leaving a total net revenue of $3,462,274. Interest and dividends on the preferred stock made a deduction of $3,276,647, leaving $185,627 earned on the $18,000,000 of common stock, or about 1 per cent.

Wireless Telephone.—It is stated that the national government has accepted the wireless telephone installations at Mare Island, Goat Island, Farallone Islands, Table Bluff and Point Arguello, Cal., and on two cruisers. Tests were made of the system, which is that of the National Wireless Telegraph & Telephone Company, between Mare Island and Point Loma, San Diego, Cal., a distance of 450 miles, and they gave satisfactory results. A dispatch from San Francisco states that conversation was successfully carried on with the U. S. transport "Sherman" 1,300 miles out on the Pacific, on February 15th.

New York Telephone Society.—At the meeting of the New York Telephone Society on February 19, Mr. S. M. Williams, manager press service, Western Union Telegraph Company, New York, made an address on the transmission of news by telegraph and telephone. The paper was discussed by Mr. W. J. Dealy, general superintendent Commercial News Department, Western Union Telegraph Company, New York; Mr. A. S. Hibbard, advisory capacity executive department, of the American Telephone & Telegraph Company, New York; Mr. Gerard Swope, of the Western Electric Company, New York; Mr. B. Gherardi, engineer of plant, American Telephone & Telegraph Company, New York, and Mr. George C. Allen, superintendent of plant, New York Telephone Company, New York.

Telephone Merger in St. Louis.—The Bell Telephone Company of Missouri was merged into the American Telephone & Telegraph Company at a meeting held in St. Louis, Mo., February 20. The new directors chosen are Union N. Bethell, vice-president of the American Telephone & Telegraph Company, New York; E. D. Nims, vice-president of the Missouri & Kansas Telephone Company, St. Louis, Mo., H. J. Pettengill, president of the Southwestern Telegraph & Telephone Company, Dallas, Tex.; C. H. Wilson, general superintendent Long Distance Lines Department, American Telephone & Telegraph Company, New York, and F. H. Hamilton, secretary and treasurer of the Frisco Railroad.

The Cable.

Mr. J. H. Carson, manager of the Anglo American Telegraph Company, London, England, sailed for home on the steamer *Olympic*, on February 21. He attended the dinner of the Morse Electric Club, New York, on February 17, and was delighted with the American hospitality on this occasion. He arrived in New York February 8. Mr. Carson's previous visit to America was in 1889.

Cables Between England and Belgium.—There are four separate cables between England and Belgium, two for telegraph and two for telephone, one of the latter being loaded. The lengths of the cables vary between 47 and 58½ knots. All telegraph circuits are worked on the Hughes type printing system. Through these cables London and Liverpool work direct with various German and Belgian cities.

Extension of Deferred Cable Service. — The Commercial Cable Company announces the extension of the deferred plain-language message service to Belgium, Egypt, the Sudan and the French colonies of Madagascar and Senegal. The Egyptian and Sudanese Administrations have declared English to be the language of the country of destination (L.C.D.) for their territories. The British Administration announces that the language of country of destination (L.C.D.) for any British Dominion is English, but for the Straits Settlements and the Malay States, the Malay language may be used instead of English and for the South African Union the Dutch language may be used instead of English.

The Central and South American Telegraph Systems.—A recent number of the Panama *Star and Herald* contains an interesting description of the development of the Central and South American Telegraph system, which was projected and carried out by Mr. James A. Scrymser, president of the company. Manager G. W. Miller, of the company's Panama office, also gave an interesting description of the operation of laying submarine cables.

New Panama Office of Central and South American Telegraph Company.

The new offices of the Central & South American Telegraph Company in Panama, are located in one of the most imposing buildings in the city. The floor space occupied is equivalent to 5,000 square feet. The office is separated from the public waiting room by a counter surmounted by iron lattice work. The manager's private office is at the left of the main entrance, and the arrangement of the quarters is entirely up-to-date, everything, including apparatus and fixtures, being of the most modern design.

Messages are sent direct from Panama to New York, without relaying, the new office being connected directly with the company's main office at 64 Broad St., New York.

The staff of the Panama office consists of Messrs. G. W. Miller, superintendent, W. Butterfield, E. Berg, F. Wright, L. Dyer, J. Milne, W. King, E. Clare, C. Canter, T. Yates, A. de Souza, J. Taylor, J. Clarke, A. Beecroft, E. Lassen, J. Alvarado, and E. Rees.

The headquarters of the Central & South American Telegraph Company are at 66 Broadway, New York, Mr. Robert L. McCann being the general manager.

Dinner to Mr. J. H. Carson.

Mr. Theo. N. Vail, president of the Western Union Telegraph Company gave an informal dinner in honor of Mr. J. H. Carson, manager of the Anglo-American Telegraph Company, London, England, at the New York Yacht Club on February 16.

Besides the host and guest the following gentlemen were present:

Messrs. Newcomb Carlton, J. B. Van Every and G. W. E. Atkins, vice-presidents; Belvidere Brooks, general manager; A. R. Brewer, treasurer; E. Y. Gallaher, auditor; S. M. Williams, manager press service; Rush Taggart, general counsel; G. M. Yorke, engineer; R. E. Chetwood, engineer of construction; Henry A. Bishop, director, Western Union Telegraph Company, New York; G. G. Ward, vice-president and general manager Commercial Cable Company, New York; James A. Scrymser, president, and R. L. McCann, general manager, Central & South American Telegraph Company, New York; Clement Lee, superintendent Direct United States Cable Company, New York; E. C. Sweeney, traffic manager, French Cable Company, New York; F. H. Nicholls, acting superintendent, Anglo-American Telegraph Company, New York; J. J. Carty, chief engineer; B. Gherardi, engineer of plant, and J. G. Waterson, engineer of traffic, American Telephone & Telegraph Company, New York, and Mr. R. T. G. Tangye, London, England.

A few remarks were made by Mr. Carson and all present drank to his health.

Rapid Cable Service.

In our issue for February 16, reference was made to the visit to this country of Mr. J. H. Carson, manager of the Anglo American Telegraph Company, London, England, and it was stated in that connection, that Mr. Carson's forte was the rapid handling and transmission of messages.

In an interview with Mr. Carson on the subject of fast work, we obtained some interesting facts from that gentleman. He produced statements showing the volume of stock exchange business passing over the Anglo American Cables when the markets are excited, and the number of messages exchanged in a few hours between members of the stock exchanges in New York and London. Cable capacity of 1,000 messages an hour is placed at the disposal of these exchanges, other cables, equipped with Wheatstone apparatus, being reserved for other classes of traffic.

A table showed the number of messages sent by certain firms, mostly between 3 and 8 p. m., London time (10 a. m. and 3 p. m., New York time), September 25-28, 1911. The total number of messages exchanged during these four days was 11,865, the highest number in one day being 3,208, and the lowest, 2,869.

"This," said Mr. Carson, "is probably the most rapid telegraphic service in the world, the time occupied in transmission being, in the majority of cases, less than one minute. The first sender, for instance, was able to correspond with New York, a distance of 4,000 miles, at the rate of over 130 messages an hour, and other senders a lesser number."

Obituary.

Robert Moses Talbot, a member of the United States Military Telegraph Corps, died at Cleveland, Ohio, on February 17.

Augustus G. Davis, aged 78 years, a well-known old-timer and manufacturer of electrical apparatus at Relay, Md., died recently at Elkridge, Md. He settled in Baltimore in 1870. He established the first telephone exchange, and operated the first electric car in that city. He was a cousin of Professor Morse, and was a forty-niner of the telegraph.

Miss Mary Mallen, sister of Mr. D. F. Mallen, assistant manager of the operating department, of the Postal Telegraph-Cable Company, 253 Broadway, New York, died on Friday, February 16. Miss Mallen was a frequent visitor at the conventions of the Old Time Telegraphers' and Historical Association and was well known and highly esteemed among a wide circle of friends and acquaintances.

John T. Joyce, who died at Buffalo, N. Y., on February 1, was born at Oswego, N. Y., seventy-one years ago. He was an old-time telegrapher and a member of the United States Military Telegraph Corps during the Civil War in the department of the Tennessee. After the war he studied law, and was a member of the legal profession in Buffalo from 1867 to 1889, when he was appointed pardon clerk at Albany for the state, which position he occupied until he retired two years ago.

Radio-Telegraphy.

Mr. Jack R. Irwin, the well-known wireless telegrapher, is now in charge of the Wanamaker wireless station in Philadelphia, Pa.

Wireless Convention Ratified. — The governments of Portugal and the Argentine Republic have ratified the Berlin radio-telegraph convention of 1906.

The Wireless Treaty Reported to the Senate.—The United States Senate Committee on Foreign Relations on February 21 authorized a favorable report on the radio-telegraph treaty.

Wireless from Flying Machine. — What is thought to be the first radio-telegram sent from a flying machine was transmitted by Horace Kearney at Oakland, Cal., on February 14.

Navy Wireless Telegraph School.—A bill has been introduced in Congress authorizing the establishment of a wireless telegraph school at the League Island Navy Yard, Philadelphia, Pa. An appropriation of $175,000 is asked for the purpose.

Wind Power for Wireless. — The power required to operate the three wireless stations at Curaçao, Dutch West Indies, is supplied chiefly by wind power. When there is not sufficient wind, which occasions are rare, gasoline engines are used.

Wireless in Portugal.—The Portuguese government has signed a contract with the Marconi Wireless Telegraph Company for the establishment of wireless service in that country. Stations will be erected at Lisbon, Oporto, Sao Miguel in the Azores, Funchal, Madeira, and at St. Vincent, Cape de Verde Islands.

Wireless Weather Reports.—The Marconi Wireless Telegraph Company of America has arranged with the United States Weather Bureau to exchange with the Weather Bureau at Washington, weather reports dispatched via steamers, for reports as to the weather conditions prevailing at the coast stations in the United States.

Wireless in Uruguay.—The War Department of Uruguay has completed an extensive installation of wireless stations connecting the Government palace, the residence of the president, the military posts, and the vessels of the navy. The instruments are of German make, and the installation was made under the direction of a Danish engineer.

Compulsory Wireless in Spain.—A bill has been introduced in the Spanish Cortes providing that after January 1, 1913, passengers will not be allowed to embark at Spanish ports in vessels not provided with wireless telegraphy. The maritime authorities are in each case to give an authorization after certifying that such apparatus is in good working order. This regulation is also to be obligatory on foreign vessels which touch at Spanish ports.

Wireless News-Letter to Isolated Islanders.—Postmaster-General Pelletier of Canada is arranging to send a weekly news letter by wireless to the inhabitants of the Magdalen Islands, in the Gulf of St. Lawrence, who are cut off from the world all through the winter months. The letter will be 1000 words long and will be sent at the expense of the Dominion Government. The news will be sent to the clergy who will read it at the close of the Sunday services. It will be written and read in French, which is the language of the people.

Wireless Telephony Between Germany and Canada.—Herr Kiebitz, of the German Postoffice Department, has, it is reported, successfully carried on telephonic communication between Berlin and Canada, by means of Hertzian waves through the earth, no aerial being employed. The impulses are transmitted by means of a special generator giving 100,000 cycles per second. The wires connected to the transmitting instrument are carried to two plates imbedded in the earth at a definite distance apart equal to one-half wave-length of the electric waves employed.

Germany to America by Wireless.—The wireless station at Nauen, Germany, has been improved recently and is now able to communicate direct with America, according to a Berlin dispatch. The station has an operating range of between 3125 and 3750 miles. The main tower is 650 feet high and is surrounded by thirteen other masts each 128 feet high. There are 450 German wireless stations under the control of the national postoffice department, but they are not permitted to handle commercial traffic; they are used for military and experimental purposes only.

Wireless Station at Pittsburgh.—Plans are being prepared for the installation of the most powerful wireless-telegraph station in the country outside of those in seacoast cities, in connection with the completion of the new building for the departments of mechanical and electrical engineering at the Carnegie Technical Schools, Pittsburgh, Pa. The equipment will be up-to-date in every particular, and it will be possible to communicate with the wireless stations on the Atlantic seaboard. A course in wireless telegraphy will be added to the curriculum in the department of applied science in addition to the classes in telegraphy and telephony.

Wires Cut by Meteorite.—The telegraphic apparatus in connection with the signal station at Finisterre was destroyed on January 25 by the fall of a meteorite.

Annual Report of Mackay Companies.

The annual report of President Clarence H. Mackay of the Mackay Companies, for the year ended February 1, states, in the opening paragraph, that the companies were never in better condition physically, financially or in the efficiency and enthusiasm of the staff.

The gross income of the telegraph and cable companies in 1911 was almost exactly the same as that in 1910 when it was the largest in the history of the company. The expenses, the report states, have increased principally by the higher wages paid to the skilled operators and other employes.

Referring to the night letter service the report reads:

"A 'night letter' service was inaugurated by the Western Union Company two years ago. The Postal Telegraph Company is giving this kind of service but is not seeking it. Careful study of its cost to the telegraph company as compared with the average toll received, convinces your trustees that it is carried on without a profit and probably at a loss. The night letter originated in France. It has been in use in that country for several years. The results there correspond with our estimate of it here. They have been unsatisfactory."

The Postal Telegraph Company declined to adopt the "day letter," although recognizing the fact that it was really a cut rate for long telegrams. "The Postal Telegraph Company's objection to it," the report continues, "is partly the same as to the night letter. It encourages a wasteful use of words and slows down the service by reason of the time required for its transmission. It is unprofitable in itself and detrimental to the regular traffic. This would have been fatal to the very fast service which the Postal Telegraph Company believes is the proper object of a telegraph company."

Referring to the reduction of cable rates on plain language cablegrams the report says: "The Commercial Cable Company does not regard this as a new source of traffic. It does not expect that the traffic will be either large or profitable. This expectation is borne out by the returns to date. The reduced rate is proper because there is a large class of persons of limited means whose needs of the cable service is only occasional, and who have no "codes" to compress their messages. They will find the new cable rate of advantage, when in times of stress or domestic affliction their need of cable communication with friends abroad is urgent.

"As a general proposition, however, reductions in present cable rates cannot be expected. Cablegrams are necessarily expensive. The cost of providing the means of transmission and of operating the means of transmission is so great as to preclude the possibility of cheapness. The mercantile community by the use of highly specialized 'codes' compress into a few words a mass of necessary and important matter and the expense is part of the merchant's operating expense and is taken into account in his transactions. The net cost per word is extremely small."

The relations of the Texas Postal Company to the Western Union-Bell Telephone interests are then referred to, owing to which the trustees of the Mackay Companies decided to extend the Postal Telegraph Cable Company's land lines throughout the territory of the Texas Company, "which has been done with phenomenal speed," the report states. "A first-class line has been built from Wichita, Kan., down through the State of Oklahoma and the State of Texas, through Fort Worth, Dallas and Houston to Galveston, nearly a thousand miles. Another line has been built from Baton Rouge, La., westward to Houston, Tex. Still another line is rapidly approaching completion from a point opposite Memphis, Tenn., to Little Rock, Ark., and Dallas, Tex. Connection has been made with Austin and San Antonio, Tex. Numerous spurs and branch lines have also been completed. The result is that that vast territory has been covered with a network of Postal lines and wires, and competitive service is now given in the full sense of the word. "With the completion of that system," the report continues, "the receipts of your land line system from telegraph business to and from that part of the United States are increasing rapidly and those receipts are no longer divided with a connecting company, as was formerly the case.

"Among the extensions and improvements commenced by the Commercial Cable Company during the past year is the change of its cable landings adjacent to New York City, from Manhattan Beach to Far Rockaway. This was rendered necessary by reason of the United States Government proceeding to dredge for harbor purposes at the point where the cables landed at Manhattan Beach. The changing of these cable landings from Manhattan Beach to Far Rockaway, it is expected, will be completed in the course of a few months. The Commercial Cable Company has completed the removal and enlargement of its terminal facilities in London."

"As to the telephone situation," Mr. Mackay states, " your land line system proposes to work out a comprehensive plan, by which it will string heavy copper wires on its poles in any part of the country, where independent telephone companies care to lease telephone circuits between cities and towns, and where such wires will be useful to your land line system for telegraph purposes, in case any of such independent telephone companies should discontinue such leases by reason of their being purchased by Bell telephone interests. Considerable progress has already been made in this direction, thereby utilizing the space on the poles of your land line system, and at the same time bringing in substantial revenue, and rendering aid and assistance to the independent telephone companies."

Postmaster-general Hitchcock's scheme for government acquisition of the telegraph lines in this country is thus referred to:

On January 15, 1912, the Postmaster-general of the United States announced that in his opinion the Government should purchase all the telegraph lines in the country and operate them through the Post Office Department. This announcement has not met the approval either of the President of the

United States or of the American people. It undoubtedly would involve sooner or later the taking over the telephone lines also, the same as has happened in Great Britain, and this in the United States would mean the incurring of a national debt of something over two billions of dollars, the present value of the telegraph and telephone lines, to say nothing of necessary extensions which are required in the telephone business from year to year at an appalling rate. The Postmaster-general's plan has met with little public response.

"The Mackay Companies has no debts," continues the report. "Its outstanding preferred shares ($50,000,000) have not been increased during the past five years. Its outstanding common shares ($41,380,400) have not been increased during the past seven years. No bonds, notes or stock have been issued and no debts incurred during the year and yet there has been substantial growth of your ocean and land line systems. During the present year important extensions and improvements to your system will be made on land and sea.

"The income of the subordinate companies of the Mackay Companies is greater than is required to pay the dividends of The Mackay Companies, but its policy is to obtain from its subordinate companies only enough money to meet those dividends. The physical properties of the subordinate companies are maintained in excellent condition. All reconstruction is charged to operating expense. All extensions and improvements have been paid for from annual receipts, including the new lines in Texas and adjoining states. No debts have been incurred. Your trustees feel that your system is in so strong a position that the stability of your investment is assured."

"The employes of the Commercial Cable and Postal Telegraph systems continue to invest their savings very largely in the shares of the Mackay Companies, their holdings being over two million dollars par value."

Following is the statements of accounts:

PROFIT AND LOSS ACCOUNT

RECEIPTS:		
Income from investments in other Companies		$4,128,490.61
DISBURSEMENTS:		
Dividends paid on The Mackay Companies		
Preferred shares	$2,000,000.00	
Common shares	2,069,020.00	
Operating expense, including Transfer Agents', Registrars', Auditors' and Trustees' compensation, office rent, salaries, stationery, engraving of certificates, etc.	32,091.72	
Balance carried forward	27,378.89	
		$4,128,490.61

BALANCE SHEET

ASSETS.

Investments in other Companies	$91,919,338.66	
Cash	411,899.85	
		$92,331,238.51

LIABILITIES.

Preferred shares issued	$50,000,000.00	
Common shares issued	41,380,400.00	
Surplus	950,838.51	
		$92,331,238.51

New Book on Wireless Telegraphy.

THE WIRELESS TELEGRAPHERS' GUIDE AND LOG-BOOK, by W. H. Marchant, of London, England, has just been issued by the Macmillan Company, and while it is not an exhaustive treatise on the subject of wireless telegraphy it will be found extremely useful by the practical wireless operator.

The first portion of the book is devoted to a description of the various pieces of apparatus which go to make up a radio-telegraph installation and to the principles which guide in their construction and erection, this being followed by a description of the leading systems of wireless telegraphy. The Brown telephone relay is well described and illustrated in one chapter, and in the succeeding chapters descriptions are given of methods of measurements; regulations and instructions for the working of ships and stations, together with other information of value.

A feature of the book is a set of log sheets at the back to enable the operator conveniently to keep a record of his voyages and working.

The book is illustrated in a manner that will be found very helpful to wireless operators, the diagrams being very clear.

The price of this book is $1.50 net and copies can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Patent Treaty Ratified.—The United States Senate on February 7 ratified the convention for international protection of patents and other industrial property. The main provision reads as follows: "The subjects or citizens of each of the contracting countries shall enjoy in all other countries of the union, with regard to patents of invention, models of utility, industrial designs or models, trade marks, trade names, the statements of place or origin, suppression of unfair competition, the advantages which the respective laws now grant or may hereafter grant to the citizens of that country." The signatories are Great Britain, France, Italy, Germany, Austria-Hungary, Spain, Portugal, Norway, Denmark, Sweden, Mexico, Cuba, Brazil, Belgium, Netherlands, Japan, San Domingo, Servia, Switzerland, Tunis and the United States.

Annual Dinner of the Morse Electric Club.

The Morse Electric Club of New York held its annual dinner on the evening of Saturday, February 17, at the Hotel Savoy, and it was without doubt the most brilliant and successful event in the history of the club. The affair was made particularly notable by the presence of many of the highest officials in the telegraph and telephone industries and the railroad and bench were likewise represented.

The dinner of last year was to have had as the guest of honor Mr. Theo. N. Vail president of the Western Union Telegraph and the American Telephone and Telegraph Companies, but as he was called to Europe on urgent business just before the time set for the dinner much regret was felt at his absence. At this year's dinner, however, he was present as the guest of honor.

Mr. Vail gave evidence of special delight at meeting so many of the officials and employes of the telegraph company, and seemed to enjoy the relaxation from business cares that the occasion afforded. He was also surrounded by many members of his telephone official family and was altogether quite at home among his telegraph and telephone people. He met personally many friends of his early telegraph days and interesting reminiscences of the olden times in the west were recounted—the days when there was only one overland telegraph wire and the buffalo and indians roamed over the prairies.

The beautiful banquet hall was brilliant in the light of hundreds of electric lamps and the scene during the dinner was indeed a charming one. There were 265 persons present and they were seated at twenty-eight tables, the tables having eight and ten places. The guests' table or dais, set across one end of the room, had accommodations for fourteen and in front of Mr. Vail's seat, at the centre, was a large bed of beautiful roses.

At each plate on the tables was a small silk American flag which was used in the place of a boutonnière and as the national anthem and other patriotic airs were sung these flags were waved overhead in time with the music.

The seating arrangements were perfect. Each person was provided with a printed list of names, opposite each name being a letter corresponding with the letter which marked the table to which the individual was assigned.

There was no confusion whatever in the seating and the reception committee is to be congratulated on the excellence of their arrangements in this regard.

After all were seated a flash light picture was taken and then the main feature of the evening's programme—the dinner—was undertaken. While the dinner was in progress excellent instrumental and vocal music was discoursed. A fine menu was served and enjoyed by all present.

Seated at the head table at the right of Mr. Vail who occupied the middle position, were, in the order named: Mr. E. T. Jeffery, president Denver & Rio Grande Railway, New York; Mr. C. H. Wilson, general superintendent, American Telephone and Telegraph Company, New York; Mr. H. F. Thurber, vice-president, New York Telephone Company, New York, and Mr. Angus S. Hibbard, advisory relation executive department, American Telephone & Telegraph Company, New York. On Mr. Vail's left were Mr. Belvidere Brooks, general manager, Western Union Telegraph Company, New York, (who acted as toastmaker,) Judge Victor J. Dowling of the Appellate division of the Supreme Court, New York; Mr. J. H. Carson, manager of the Anglo-American Telegraph Company, London, England; Mr. F. H. Bethell, president Bell Telephone Company of Pennsylvania, New York; Mr. Newcomb Carlton, vice-president Western Union Telegraph Company, New York; Mr. J. B. Van Every, vice-president Western Union Telegraph Company (and president of the club), New York; Mr. Charles Selden, general inspector of transportation and superintendent of telegraph, Baltimore & Ohio Railroad, Baltimore, Md., and Mr. Frank D. Giles of the Western Union staff, New York. Mr. Brooks acted as toastmaster and performed the delicate duties of that position with tact and skill.

At the conclusion of the dinner Mr. Brooks announced an intermission of ten minutes for social intercourse, but this feature proved to be so interesting that it was fully half an hour before the regular order was resumed.

In introducing the first speaker of the evening, Mr. Brooks expressed his pleasure in being able to welcome so many distinguished guests to this, the fifth annual dinner of the Morse Electric Club, and paid a warm tribute to president Theo. N. Vail, the guest of honor, and the chief of those loyal and earnest workers who are striving together under a community of interest in the service of the Western Union Telegraph Company. He then proposed the health of Mr. Vail which was pledged by all, standing, followed by three hearty cheers.

Mr. E. T. Jeffery, who has been present at every gathering of the Morse Club and is known as a witty and eloquent speaker, was then introduced and gave an outline of conditions in this country from the early pioneer days of sparse population and limited financial standing, yet with boundless possibilities and natural resources, through the stages of the development of transit and communication facilities, to the present time when the advantages of rapid transportation and intercommunication are enjoyed by all. During this period of growth, and in fact during the world's history there has been no such accessory to business development as the telegraph and telephone and president Vail stands at the head of those men of superhuman energy and unlimited confidence who have made possible the development of this most important factor in our country's success.

In touching upon the popular attitude toward the corporations and so-called trusts, Mr. Jeffery sought to show that such great combinations of business interests are a natural outgrowth of present conditions: that they are necessary to carry on the enormous business of the country and that they make eventually for the benefit of all the people. A corporation is a cooperative society and means the progress and elevation of mankind in general in spite of what the demagogues say. Publicity, however, is the true foundation upon which the corporations will rest, when all the ramifications of these huge commercial enterprises will be open to the scrutiny of the public, whose good sense must be trusted to overcome their present antagonistic feeling.

Mr. F. H. Bethell spoke in humorous vein, declaring that, personifying the telephone interests, he felt somewhat like the lost child which had been brought home by the great father, but upon closer analysis believed that he was better entitled to be called the child that had stayed at home while his wandering brother, the telegraph, had been brought under the paternal roof. He added that there were perhaps other lost brothers waiting to be taken home by the great father.

Mr. Angus S. Hibbard, was here called upon to favor the company with some of his character songs. He gave two selections which met with loud applause.

Hon. Victor J. Dowling was the next speaker. He referred to his pleasant friendships with telegraph officials and his many acquaintances among the workers in the ranks, congratulating Mr. Vail on his ability and devotion of these men. This loyalty, he believed, has come from careful and sympathetic management, which promotes harmony and accord. The progress of the facilities for communication between man and man has kept pace with the growth of civilization and has been closely related with all other factors which have assisted the march of progress. The power of the press would be nothing without the improved facilities of the telegraph. Judge Dowling concluded with the expression of his hearty wish that the prosperity of the telegraph company would be as great as all its officials and co-workers could wish, and congratulated the company on the spirit of good fellowship, loyalty and devotion which exists throughout its organization.

Mr. J. H. Carson was next introduced. He prefaced his remarks by a complimentary allusion to TELEGRAPH AND TELEPHONE AGE, saying that everyone present ought to be a subscriber, and that one could hardly read the paper for a year without finding something about himself in its columns. Mr. Carson took as his text the statement in TELEGRAPH AND TELEPHONE AGE for February 16 that rapid handling and transmission of messages was his forte. He then outlined the importance of the duties of telegraph men, dwelling upon the fact that the duty of rapid handling of messages devolved upon them and that upon this feature of the service rested the commercial prosperity of the country.

The evening's entertainment was brought to a close by the singing of the Ode to Morse led by Mr. Marion H. Kerner, the author.

The dinner of the Morse Electric Club may come but once a year, yet the memories of good cheer and good-fellowship carried away from one of these gatherings are more than sufficient to last until the next reunion comes around.

Following is a list of those present:

Albany, N. Y.—Van Zandt, W. H.

Atlanta, Ga.—Beck, L. H., Worthen, H. C.

Auburn, N. Y.—Wooster, J. B.

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Wireless Storm Detectors and Indicators.

The coherer and other wave detectors are very successfully used by Professor Turpain, of the Potiers University, France, in order to observe and record the electrical state of the atmosphere, says the *Electrical Review and Western Electrician*. A very practical use of his apparatus is to foretell approaching storms, and these can be observed as much as four hours before they arrive. At La Rochelle, France, Professor Turpain has erected a storm-observation post, and he uses an aerial based on the same principles as for wireless work. The aerial is mounted at a point about eighty feet above ground, and is brought down on a slope to a second point and thence into the station, giving a total length of 300 feet in all. In order to make a record of the waves he uses a coherer made up of a set of crossed steel needles, using four parallel needles having three others laid on them. The proper pressure is given by using small weights on the upper needles, and thus six contacts are obtained in series by this method. Such a coherer is mounted on a light board and underneath is mounted an electromagnetic tapper of the usual kind which strikes the board.

The first form of instrument has a storm indicator combined with a Richard aneroid barometer, and both give a record upon a common revolving drum. One cell of Leclanché battery is used with the coherer. Each of the latter's six contacts receive 0.25 volt per contact, which is found to be the best condition. The electromagnet has an armature carrying the tapper and also the light arm for the recording pen. In this way the atmospheric discharges are recorded on the drum parallel to the barometer record. The present instrument is designed to observe the frequency of the atmospheric discharges and from this there can be made deductions as to the electrical state of the atmosphere.

A second instrument is used by Professor Turpain in which the indications are more precise. The apparatus is a very sensitive one and needs special precautions to secure the proper mounting. It consists of the same coherer as already described combined with a sensitive milammeter, this being connected in series with the battery and tapper. With this instrument, the variations in the current through the coherer are recorded on the drum, and it gives reliable indications as to approaching storms. To this effect one observes the current variations up to the point where the cohering action takes place. When a storm cloud acts on the aerial, the successive states of cohering of the contacts allow a greater or less current to pass in the circuit, and these values are recorded on the drum. This action occurs until the atmospheric discharge becomes of such strength that it produces a greater cohering action and this is enough to bring the tapper into play. The coherer thus comes back to normal and the apparatus is ready to make a new record, and so on. The drum thus carries a series of such records following each other. As the instrument needs to be well protected from shocks, it is found best to suspend it by stout rubber bands.

Professor Turpain finds that the energy of the atmospheric discharges is best measured and recorded by another apparatus in which the bolometer principle is used.

International Telegraph Contests.

Mr. Ferdinando Geronimi, minister of posts, Rome, Italy, writes us that the great success of the Turin telegraph contest last year, during the exposition in that city, has suggested the advisability of holding annual international contests and for that purpose it is proposed to form an International Bureau at Milan, under the auspices of a national committee.

Most Northern Telegraph Line on American Continent.—What is thought to be the furthest north telegraph line on the American continent has just been completed by the Canadian government to Dunvegan, Alberta.

The Modern Way to Send a Telegram.—It is now common to see a person enter a telephone booth for the purpose of sending a telegram. The message is dictated over the telephone, the tolls deposited in the coin box and the transaction is complete.

Sending Chinese by Telegraph.

The following interesting story by Mr. Jeff W. Hayes, an old time telegrapher, is reprinted from the *Oregonian* of Portland, Ore., of which city Mr. Hayes is an old resident. Life in the early telegraph days was varied by the occasional initiation of an innocent "tenderfoot," in the Far West this form of diversion often taking Chinese characters as the bases of operation.

Prior to coming to Portland, Mr. Hayes says, "I had passed two years in Nevada in the high Sierra Mountains, and Arizona.

"'When the cruel war was over' among the Apaches in Arizona, I returned to San Francisco and accepted a position with the Western Union Telegraph Company in that city, as operator. I was assigned to the Portland wire at nights with young George H. Thomas, recently a candidate for Mayor of the City of Portland, at the northern end of the line.

"J. M. Baltimore was the Associated Press agent in San Francisco, exercising a sort of censorship over the news he received from the East. It was his duty to cull news that came over the overland wires sending anything that he thought would be interesting to the Portland people and performing the same office for the people south of San Francisco.

"On account of the inadequate telegraphic facilities the *Oregonian* could not publish a full telegraphic report and Mr. Baltimore's services were enlisted for the purpose of giving the *Oregonian* readers only the matter which would be of interest to them.

"I found Mr. Baltimore a very courteous and pleasant gentleman. He had, however, a joke that he endeavored to play upon any newcomer in the telegraph office.

"I was sending the *Oregonian* special and the Associated Press news to young Thomas over the only and lonely and dilapidated wire that connected San Francisco with Portland, when I espied a peculiar-looking sheet of report. A quick glance showed that it was addressed to the *Oregonian* and was dated Pekin, China, and started out 'Wing Foo Lum Ling Sam Wing,' etc., which was followed by a lot of Chinese hieroglyphics. As I glanced over this sheet I took a quick look at Baltimore, who was taking in the situation, and coming over to me asked if I was in trouble.

"'O, that is all right, Mr. Baltimore, I have lived on the Coast a few years—suppose you work that off on that young fellow over there in the corner from Sacramento, Bert Worthington,' I got five minutes' relief and Worthington sat down in my chair. Mr. Baltimore handed him a short special for the *Oregonian* and the next item on tap was the one dated Pekin.

"Worthington studied over the item, turning the sheet up and down, diagonally, and crossways, finally calling Mr. Baltimore to ask what this meant. The press agent asked if he couldn't send Chinese characters by telegraph and Worthington said he couldn't. Another operator who was in the joke came in to send the item. He elaborated on the wire all the Chinese lingo he had ever heard, using such expressions as Sam Ling, Tate Bott, Fat Ching, Fat Duck, Wing Sing, etc. George Thomas, at the other end of the line, was making spasmodic efforts to 'bk bk bk.'

"Worthington retired to the Sacramento wire and I resumed sending to Portland and all was serene.

"That evening in the sanctity of our room I told Worthington of the joke that we played upon him and he was eager to see it worked off on some other newcomer, which, of course, was done.

"I left for Portland shortly afterward and Mr. Baltimore soon followed and we were steadfast friends for many years. Bert Worthington also left San Franscico for Sacramento, where he took up the study of railroad business, beginning at the bottom.

"The results of his efforts can be shown in the success he has achieved. Three years ago he was appointed general manager for the Harriman lines in Oregon and Washington, which he resigned to accept the position of general manager and vice-president of a railroad in the middle West."

Sound Not Transmitted by the Telephone.

Many people think that when they speak over the telephone that the transmitter, battery and wire in some way carry the voice to the ear of the listener. This is not the case. The transmitter and the battery are a sort of miniature transforming station in which the vibrations of the air caused by the sound of the voice are caught upon the diaphragm and turned into electrical energy. As the diaphragm vibrates in front of the pole piece of the transmitter it may assume many shapes. The vibrating areas and the nodes or non-vibrating lines are at one time star-shaped, at another like the spokes of a wheel; they are generally geometrical figures, but the various forms of vibration cause varying pulses of electrical current flow to traverse the wire. At the receiving end the varying electrical flow attracts the diaphragm so as to cause, in similar sequence, the geometrical figures to be formed by it, and thus give out the very tones of the speaker's voice. What traversed the wire was not sound but current, and the ear piece or sounder re-transformed this energy back into the form of sound.

Hobbies of Well-Known Men.—The New York *Times* of February 18, published an interesting article entitled, "Well-known Men with Hobbies—and Proud of It." Mr. Theo N. Vail, President of the American Telephone & Telegraph Company and of the Western Union Telegraph Company, is a member of the Hobby Club of New York, his hobby being farming. Many other well-known men are members of the club.

Tracing Stolen Wire by Bloodhounds.—A lot of copper telephone wire was stolen recently from a pole line in St. Louis, Mo., and by the aid of a couple of Russian bloodhounds the theft was traced to a junk dealer.

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March 1, 1912.

President Taft Not in Favor of Government Ownership.

President Taft on February 22 sent a special message to Congress in which he positively disapproves Postmaster-General Hitchcock's recommendation that the telegraph lines be acquired and operated by the government. He believes in the principle of permitting private enterprise to carry on public utilities under due regulation as to rates by proper authority. This view of the situation is the one held by many prominent authorities as the most satisfactory way of dealing with the subject. It is really in the nature of a compromise in safeguarding the interests of the operating companies and the public. Government ownership of public utilities is not compatible with the principle of American government and the wisdom of the American people can generally be counted upon to do what is right at the right time. President Taft objects to government ownership of the telegraph because it would greatly increase the body of public servants.

A high compliment is paid to the management of the telegraph companies. Mr. Taft states that he does not believe from the evidence at hand that the telegraph properties could be managed any more economically or any more efficiently, or that the government could furnish service at any lower rate than the public are now required to pay by private companies.

All-Night Telegraph Offices in Small Towns.

It is remarkable how many villages there are in the United States which demand all-night telegraph service, and yet how rarely any of the inhabitants thereof find any use for it when they get it. Such demands usually arise from the urgent necessity of an individual to send a telegram in the middle of the night and he finds the telegraph office closed. Then an agitation among the other villagers is aroused and finally pressure is brought to bear upon the telegraph company to keep its office open. Such a thing as there being a reason for not keeping the office open never occurs to them. The fact is many such all-night offices are kept open at considerable cost to the company with no adequate returns for the service. In many instances the records show that not one message a month is offered for transmission after 9 p.m., and yet the companies are asked to maintain all-night service in places where the business does not warrant it.

It is a difficult task to make the average villager believe that every other one of his neighbors is not sending telegrams at some hour of the night, even if he has no particular use for the service himself.

The Error of Self-Satisfaction.

Is the standard of intelligence among the rank and file of the telegraph service deteriorating? This may seem a strange question to ask, and yet few individuals can answer it satisfactorily. We regret to state, however, that the indications are that it is not as live a force as it should be.

The average operator of today does not realize or feel the necessity of increasing his knowledge along the lines that yield him his living. We do not make this statement altogether from personal knowledge and observation; many of our agents report the existence of this state of things in their respective localities, and these reports are of sufficient number to lead to the belief that the attitude is quite general.

Of course, there are many ambitious employés all over the country who eagerly seize every opportunity to learn more about their business, and they are to be commended; they are the ones who will succeed in life.

One great trouble with many of the younger men who have ambitions to occupy higher positions is that they will not make any effort to improve themselves intellectually so that they can fill such positions. Some, in their earlier years, yearned to become operators, and now they are operators, they are possessed with the belief that there is nothing more to learn. In some cases a few years' experience brings them to the realization of their error. There is hope for such, and they generally cut loose from the deteriorating influence of such belief and live in a more progressive atmosphere. But the man who will not learn, because, as he imagines, there is nothing more to learn beyond what he already knows, is in a sad plight.

Young telegraphers of today have every opportunity to rise in their profession; educational facilities are unlimited, and there is abundant encouragement and aid for those who wish to forge ahead. The first thing to do is to forget self and keep before the mind the object for which one is striving, then work hard for its realization.

Conservation.

Americans, as a class, are notoriously prodigal. The country is so rich in natural resources that the people have never, until late years, been brought to realize that there is a limit to nature's bounty, and that the sources of supply of natural products are being rapidly depleted.

The subject of conservation has loomed up in large proportions in the business world, and men in all lines of activity are beginning to realize that economy must be practiced in all things, and there is a general movement in this direction.

Conservation in little things is as important as in large things and much attention is being given to this subject at the present time.

The articles under the head of "Conservation Talks," which we begin publishing in this issue, will no doubt be read with interest by those who have the matter at heart. They are timely, and Mr. Higgins seems to have a good grasp of the subject. He points out the importance and necessity of preventing waste of materials, and in various ways conserving resources.

Telephone Service in England.

The London *Electrical Review* says:

"Since the transfer of the National Telephone Company's undertaking to the Post Office, there has been a singular outburst of complaints against the service in the public press, and it is freely asserted that it has greatly degenerated in efficiency. Specific instances of delay in connection and other faults are quoted, and a Telephone Users' Association has already been formed for the protection of the subscribers.

"We have," the article continues, "throughout consistently opposed the absorption of the company's system by the State, holding that efficiency and progress were more likely to be achieved by the former than the latter, and that the multiplication of civil servants was a grave error. Our attitude on this question is unchanged, but we cannot help feeling that the present agitation is grossly unfair to the Post Office. Be it remembered that the staff, the operators and the apparatus so recently taken over from the company are, with few exceptions, absolutely the same as under the old régime. Are we to believe that the Government service is so demoralizing that within one month the system has been reduced to a state of chaos, and that the operators have become utterly indifferent to the efficient performance of their duty? Surely this is an incredible and unworthy suggestion.

"We have for years used both the National Telephone Company's service and that of the Post Office, and while we have certainly found the former quicker and more satisfactory than the latter, we have not detected the slightest difference between the service in December and that given in January. It is no better—but it is no worse.

"It is, we believe, generally admitted that State service, like municipal service, is not conducive to the display of energy and smartness on the part of the employés; we do not wish to cast aspersions on the character of a large body of our fellow-citizens, but the fact is notorious, and is the inevitable outcome of the conditions of service, in which, as a rule, reasonably good conduct and a moderate output are sufficient to enable an employé to remain on the establishment for life; but we cannot suppose that in one month the habits of years can be changed, and that the company's staff has lost its keenness so quickly. In common fairness, at least a year should be given to the Post Office to show its mettle; the present attacks can only be ascribed to political or other extraneous motives."

Wireless Bill.—The bill introduced in the United States Senate by Senator Nelson of Minnesota, forbids any person, corporation or company within the jurisdiction of the United States to use or operate any apparatus for radio-communication as a means of commercial intercourse among the States or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the receipt of these messages, the effect of which extends beyond the exclusive jurisdiction of the State or Territory of origin or where interferences will be caused thereby with messages from outside, except under and in accordance with a license granted by the Secretary of Commerce and Labor. Violation of the bill is made a misdemeanor, subject to a fine of $500, suspension of the license and forfeiture of the apparatus. The bill is being sharply opposed by the wireless interests in the country particularly because it practically puts all the power in drafting regulations, etc., in the hands of the Secretary of Commerce and Labor.

A B C of the Telephone.

There are several excellent books on the telephone and its practice, but all men do not know the rudiments of the telephone. It is well, therefore, in order to gain an understanding of this instrument, as in everything else, to begin the study at the beginning. The telephone is no harder to know than any other electrical device and it becomes extremely fascinating on better acquaintance.

A B C of the Telephone is a good book for the student to start with. It explains the subject in non-technical language and the main facts connected with the telephóne industry are stated in a clear and simple style. Although it is elementary in character it covers the whole subject of telephony so comprehensively and completely that after a careful study of the book the student will have a good working knowledge of the instrument and its many uses. The book is rendered particularly valuable by reason of the great many illustrations, each one of which tells a story. It has 350 pages and nearly 300 illustrations. The author of the work is Mr. James E. Homans and he is a master of the subject.

The price of this book is $1.00 per copy and copies can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Course of Instruction in the Elements of Technical Telegraphy—X.

(*Copyrighted.*)

(Continued from page 111, February 16.)

[We began in our issue for October 16 the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Gravity Battery.

The Gravity cell is generally used in this country for telegraph purposes, and, since it is easy of access to all our students, a brief description of it will suffice.

The copper plate is at the bottom of the cell, and is in three pieces, riveted together in the middle, forming a kind of star in appearance. The zinc is usually the shape of a crow's foot, and is hung from the rim of the glass jar.

About three pounds of bluestone (copper sulphate crystals) are placed in each cell, on top of the copper plate, and the cell filled up with water until the zinc is submerged.

Without entering into all the different chemical changes in the cell, we may remark that two distinct solutions are formed; one, a solution of copper sulphate, the other a solution of sulphate of zinc. If these two solutions were of the same specific gravity, that is if a pint of one solution weighed exactly the same as a pint of the other, a porous pot, or some such contrivance, would be required to prevent them mixing together; but the copper sulphate, being the heavier, remains at the bottom of the jar, with the other lighter solution over it. It is this difference in bulk-for-bulk weight that gives us the name, "Gravity Battery."

As the battery is not ready for use until a certain amount of zinc sulphate solution is formed, it is usually kept on short circuit—that is, with its two end leads joined together—for 24 hours, and should not be left open afterwards for any length of time.

The white flaky salts, which creep down the exterior of the cell, are called creeping or white salts, and being in reality evaporated sulphate of zinc, form a good conductor; so that, if allowed to creep unchecked, these salts will gradually make a path from cell to cell, and tend to short circuit part of the battery.

One of the best preventives against creeping salts is to cover the surface of the electrolyte with some good oil, made from petroleum. This will, besides remedying the creeping salts, protect the electrolyte from evaporation, and save the labor of adding water to the cells at frequent intervals.

Another method is to smear the upper edge of the cells with paraffin; this will remedy the creeping salts, but will not, of course, affect the evaporation of the electrolyte.

The copper solution in a cell in good working condition is a bright blue color; the blue changing to the color of water, as it nears the zinc. A cell with a pale or dirty brown colored solution, requires renewing.

A local gravity battery will usually last about five weeks; a main line battery, about ten weeks.

We have stated that all substances offer more or less resistance to a flow of current, so, as the current passes through each cell, the plates and solutions, of which the cell consists, must offer a certain amount of resistance, depending a good deal on the nature of the electrolyte, since the resistance of a liquid is much higher than that of a metal. This resistance is called the internal resistance of the battery.

The internal resistance of a Gravity, or Crowfoot (derived from the shape of the zinc), cell is about two ohms, and the difference of potential (Electromotive Force) a little over 1 volt (1.07).

As we have likened the voltage of a battery to the strength of the cyclist, we may as well notice other points of resemblance. Look at the physical condition of the cyclist when he lines up, fresh and with his full strength, to run a race. His strength before starting is due to his build and constitution; it is in no way affected by the length of the race before him or the speed he will maintain, although it of course diminishes in proportion to his exertions after he has started.

Similarly, the strength, power, force, potential, whichever you like to call it, of a battery is due to its build or the number of cells it contains, and its constitution, or the kind of cells used, but is in no way affected by the resistance of the circuit or the current flow, although as in the case of the cyclist, this power diminishes as the resistance of the circuit is overcome. It is, in short, the motive power which drives the current through the circuit against the resistance, and is only affected by changing the arrangement or number of the cells of which the battery is composed.

The Volt being the unit of pressure, the battery strength, or potential difference, is the magnitude of the pressure, expressed in volts.

NOTE.—Potential, Pressure and Electromotive Force, are synonymous terms in this course.

A correspondent has suggested that some examples of the application of algebra to practical problems in connection with our course of study of technical telegraphy, might be appreciated. We have therefore prepared a few typical examples, and invite any of our readers and students to make further suggestions with a view to aiding the student to master the problems encountered in the study of these lessons.

The formula:

$$C = \frac{E}{R}$$

is a familiar one to every electrician, but in its modern form it has become

$$I = \frac{E}{R}$$

I representing current (in place of the former C) E for electromotive force (E. M. F.) and R for resistance.

This expression is known as Ohm's law, and is read: "The current is equal to the electromotive force divided by the resistance."

Example:

Let the value of E = 150
" " " " R = 300

then performing the operation indicated

$$\frac{(E)\ 150}{(R)\ 300} = I = .5$$

hence .5 is the value of the current flowing in a circuit of 300 ohms resistance and with an E. M. F. of 150 volts.

In the formula:

$$I \times R = E$$

the E. M. F. is the unknown quantity. The expression, however, shows it to be equal to the resistance (R) multiplied by the current (I).

Using the same values as in the former example we have

$$I \times R = .5 \times 300 = 150$$

which is the value of the E. M. F.

In galvanometer measurements this rule is given:

To find the necessary shunt resistance to make the multiplying power of the shunt any desired amount, divide the resistance of the galvanometer by the multiplying power less 1.

The multiplying power is usually expressed as N + 1, then according to the statement the multiplying power less one is (N + 1) — 1 = N therefore N may be used as the divisor in the algebraic expression of the rule, thus:

$$R\ s = \frac{R\ g}{N}$$

R s representing the resistance of the shunt
R g the resistance of the galvanometer, and
N the multiplying power of the shunt.

Suppose we are using a galvanometer with a resistance (R g) of 1,200 ohms, and the multiplying power (N) of the shunt is 100, what must be the resistance of the shunt? Substituting these values for the letters in the formula we have

$$\frac{1{,}200}{100} = 12 = R\ s$$

12 being the resistance of the shunt.

In measuring resistance, etc., by means of the Wheatstone bridge four quantities are involved, corresponding to the four "arms" of the bridge, problems being expressed in the form

$$X = \frac{A}{B} \times C$$

in which A, B and C are the known quantities and X the unknown.

Example: What is the value of x when

A = 50
B = 100
C = 5,000

substituting, we have

$$\frac{A}{B} \times C = \frac{50}{100} \times 5{,}000 = \frac{250{,}000}{100} = 2{,}500$$

therefore the unknown quantity x is equal to 2,500, which is the answer.

Electrical power, expressed in watts, is equal to the product of the square of the current expressed in amperes multiplied by the resistance in ohms, or

$$W = I^2\ R$$

Example:

In an electrical circuit of 1,800 ohms resistance and in which a current of 15 amperes is flowing, what is the electrical power?

Substituting these values we have

$$15 \times 15 = 225 = I^2$$
$$1{,}800 = R$$
$$225 \times 1{,}800 = 405{,}000 \text{ watts, the answer.}$$

This may be expressed in horsepower by dividing by 746, which is the number of watts in one horsepower.

$$\frac{405{,}000}{746} = 543 \text{ hp.}$$

To find the electrical work expressed in joules performed during a given time multiply the quantity of electricity expressed in coulombs (current × time) which has passed in that time by the drop of potential.

This rule expressed as a formula is

$$J = I \times t \times I \times R$$

I representing current in amperes
t = time of current flow
R = resistance
J = Joules

It will be noticed that the factor I occurs twice in this formula, and as it is multiplied by itself, we can shorten the formula slightly as follows:

$$J = I^2 \times R \times t$$

We have multiplied I by I, therefore this quantity is expressed as I^2 (read I square).

Example: In a circuit in which 15 amperes pass in 2 seconds, and with a resistance of 1800 ohms, what is the work done by the current?

According to the rule, $I^2 \times t \times R = 15 \times 15 \times 2 \times 1800 = 225 \times 2 \times 1800 = 810{,}000$. Therefore, 810.000 joules is the answer.

The rule for calculating the joint resistance of two wires, is as follows:

Joint resistance is equal to the product of the separate resistances divided by the sum of the resistances. This rule expressed algebraically is

$$R = \frac{a \times b}{a + b}$$

a representing the resistance of one wire.
b representing the resistance of second wire.
R = joint resistance.

Example: We have two wires, one with a resistance of 900 ohms and the other 1800 ohms, what will be the joint resistance when both are connected together?

Using these numerical values in place of the letters of the formula we have

$$R = \frac{900 \times 1000}{900 + 1000} = 473.6$$

and performing the operation we get 473.6 as the value of R, expressed in ohms.

(*To be continued.*)

Aluminum for Magnet Winding.—Aluminum is about one-fourth as heavy as copper, has a specific resistivity not quite three times as great, and naturally forms on its surface an oxide which has a comparatively high electrical resistance, so that for winding coils of this metal no other insulation is usually needed. Abroad advantage has been taken of these properties in making magnets and field coils of all kinds, although in America less attention has been given to such construction. Several thousand railway motors are reported in service in England using aluminum field coils. For winding work the natural oxide of the aluminum surface is thickened by a corroding treatment. Even the natural oxide presents good electrical insulation, but with the thickened coating practically no electrical leakage can be discovered. For wires up to No. 16 equivalent carrying capacity aluminum is declared to have considerable space economy over cotton-covered copper wire, while in sizes above No. 16 it occupies nearly the identical volume. The entrance of moisture to such an aluminum coil does not impair the insulation, but actually tends to improve it, since a thicker coating of insulating oxide is formed. This oxide is, of course, fireproof, and withstands high temperatures without injury. An American manufacturer of large lifting magnets is now preparing to build these coils with aluminum windings. Such a magnet can be constructed with about one-third the weight and the same ampere-turns and carrying capacity as the copper coil.—*Electrical World.*

Protection for Inventors.

The "Inventors' Guild" has sent a petition to President Taft complaining that the patent laws of the United States, as they have been built up, interpreted and applied, not only fail to accomplish their theoretical purpose, but they have come to be a means of robbing inventors and discouraging and suppressing the exercise of ingenuity. The Guild asks the President to use his influence to bring about desired reforms.

Mr. Thomas A. Edison, Prof. M. I. Pupin, Dr. Peter Cooper Hewitt and other inventors of prominence are members of the Guild.

Mr. Edison recently expressed himself on the general subject as follows:

"The worst thing about 1912 is the number of hoggish men it will have to tolerate—men, I mean, who are so greedy that they'll starve an inventor so hard he can't work. That's just what we suffer from now. The inventor can't produce. Why, there is no end—absolutely no end— to the things that 1912 could produce to make life easier and better and happier. But the inventors can't produce. They're starved down. The men that handle their inventions starve them. That's why the greedy men are the year's worst blight. That's why 1912 won't do anything near what it might be able to do in producing things for the world's good.

"What should we do this year? Jack up the man who produces—the man who works. That is, support the man and make his job easier. I tell you there is something wrong—deeply, sadly, fundamentally wrong—with our social system when so many greedy men ride the backs of the men who are the producers. The men whose opinions of 1911 I thought best of were the men who can produce. Jack up that kind of man. That's the year's best message."

Western Union Plant Conference.

On February 14 a conference of plant chiefs and foremen of the first district, Eastern Division, was held at the office of district plant superintendent W. J. Higgins in New York. Suggestions were made for a form to be used by linemen as a general reference table in connection with making measurements for faults with the new bridge-testing sets. With this method faults can be readily located to within a few hundred feet of the seat of trouble.

The matter of methodical and frequent inspection of lines was fully discussed, and, in this connection the benefits derived from the recent changes in linemen's duties on the Delaware, Lackawanna & Western and New York Central routes were fully gone into.

Mr. M. C. Allen, division plant superintendent, addressed the meeting and gave a very interesting and instructive talk on questions of line maintenance and co-operation between departments and department heads.

There were present at the conference: Messrs. H. F. Whetzle, plant chief, and J. G. McNerny, city foreman, Buffalo, N. Y.; W. H. Collins and F. H. Barth, plant chiefs, respectively, at Scranton, Pa., and Syracuse, N. Y.; A. G. Petitt, plant chief and G. R. Craft, district foreman, Albany, N. Y.; F. W. Barth, district plant chief, and S. L. Hayes, district foreman, New Haven, Conn.; B. H. Mallery, district foreman, Binghamton, N. Y.; G. H. Laing, district foreman, C. C. Lever, general wire chief, T. J. Smith, district wire chief, and H. C. Hayes, assistant district wire chief, New York, and T. E. Casey, chief clerk, M. J. Wallace, estimate clerk and F. J. Finn of superintendent Higgins' office, New York.

Railway Telephone Inspection.*

BY JOHN A. KICK.

When a considerable number of men unanimously agree on any subject the lines of reasoning must necessarily be so obvious as to leave little chance for an argument; and this is just the condition today in respect to train dispatching by telephone. There is no longer any chance for an argument as to whether the telephone is the preferable means for handling trains, but there is still room for much discussion as to its proper application; that is, the class of equipment and its maintenance.

Just as long as there are two or more kinds or types of selective signaling systems, transmission systems, and the various accessories thereto, there will be arguments pro and con as to the relative merits of the various systems and accessories, and as there will be arguments concerning the merits of the equipment, just so will there be arguments as to proper methods of maintenance; in fact there is not the least probability of a majority agreeing upon any one method of inspection and maintenance as being the one right one.

Some maintain that the inspection should be made by the station lineman in connection with his regular duties, no special schedule of timing these inspections being necessary; others that the regular man should do the inspection work at intervals not to exceed two weeks; others fixing the intervals at four weeks; and still some others claiming the method of having the regular linemen do the inspection work to be all wrong. Of those having special inspectors and maintainers very few agree as to the proper way in which these special men should handle the work. Further discussion is had as to the amount of territory which one man can satisfactorily handle, and when you consider the fact that the conditions are so widely different, there appear good reasons for the failure to agree, as that which is deemed satisfactory on an unimportant line or division cannot be accepted on an important trunk line system where every minute lost service means delays to a whole fleet of trains. However, there are several phases to the subject which I believe must be common to all; and those are, the thoroughness of the inspection, the ability of the inspector, and his outfit.

Unless an inspector looks carefully over the equipment on his territory, acquaints himself with the location and class of equipment, and generally informs himself as to the physical make-up of the plant, he will be unable to render high-class service.

As an example of the truth of the above statement, we will imagine a telephone reported out of service at any given point and the inspector instructed to get to that point and make repairs. What is the type of telephone at that point? Where is it located? Will he be able to make the repairs with the material in his regular kit? What are the surrounding conditions, and what and where is the trouble? If the inspector is perfectly familiar with all the details of the plant, he will be able to arrive at a conclusion at once, and will know that unless the trouble is out of the ordinary he can make the repairs without delay.

While at a test station recently I met the inspector for that territory, and in conversation asked him if there was a good job of soldering on the leading in wires on the office pole. He informed me that he had some time ago examined them and finding one joint which did not suit him he had resoldered it and that they were now perfect. Pretty good indication of a man being interested in covering all possible chances of trouble, and that he was going to keep just a few laps ahead of trouble.

During several general inspection trips over the lines, a careful observation of the methods of the inspectors proved very interesting. One man was found to be so busy as rarely to find time enough at any station to cover what he wished, and he was really finding and righting minor defects or possibilities of defects at every point, nothing appearing to escape his inspections. Another under practically the same conditions did absolutely nothing except enjoy a holiday spent in riding over the division on the inspection train. The first mentioned man was notified en route of a bell failing to ring at a point down the line and when approaching that station he got some dry batteries ready and in two or three minutes had the bell going. He had recently inspected the station and tested the batteries and knew that they were near the point of renewal, and correctly judged the location and remedy of the trouble.

An inspector was notified of the failure of a yard line due to one office being unable to ring any one at times, and going to this station and finding the circuit working o. k. left, notwithstanding the fact that the failures had been intermittent. The third trip to the trouble resulted in finding the circuit out of service upon his arrival, and after walking over the line and clearing a swinging cross the trouble was experienced no further. Just a case of failure to take the trouble to ask a few questions, the answers to which would have assured him he would find trouble if he looked in the right place.

Regardless of the number of the inspections there cannot be too much care taken to make them thorough and no details can with safety be overlooked.

The inspector here is a general telephone utility man who can be just as good as you like and the better he is the more you will be able to appreciate how indispensable his services are. Be he the regular station lineman or special inspector, a knowledge of the make-up of every piece of equipment and the circuit wiring is necessary to enable him to get quick and intelligent action at all times.

It is recognized that the proper way to learn

*From *Telephone Engineer*.

the make-up of a mechanical or electrical feature of the plant is to attempt as nearly as possible to get the designers' ideas in so constructing or arranging the apparatus or circuit. While the telephone is somewhat new to some of the railway linemen yet I believe with the help of wire chiefs and others able to explain there should be no serious difficulty in qualifying a majority of the linemen to serve as capable inspectors.

There has been some little argument as to whether the inspector need be able to climb and do outside work. While there are some places where the inspector ordinarily will not be required to do outside work, yet there can be little doubt that the man who can capably do both inside and outside repair work is the preferable man for the position, as in emergency cases he is available for either duty. As these men are trusted to work alone there can be little chance for other than a reliable man to succeed in giving good service and retaining his position, as the opportunities to kill valuable time are many and very enticing to the shiftless fellow who would rather ride over the road asleep in the cabin car than get out and go over his work.

In the inspector's outfit should be, first of all, a good serviceable test set, which must be always on the job, as it is the one best means for locating troubles between stations, being as well of much assistance in locating difficult troubles within the stations. An inspector without a soldering outfit is certainly handicapped and it would seem that he could not be expected to accomplish much unless provided with a good soldering torch and iron. Induction coils are small and at least one spare coil could be carried. In fact, I believe that a small kit containing about the following would fill all needs:

Test set, soldering torch and iron (small), one induction coil, one receiver (the head band type without the head-band), one push button (the type used in the transmitter circuit of the high-power transmission circuit), three or four of each kind of cords used, one pair long nose pliers, one pair side cutting pliers, one or two screw drivers, one small screw starting drill, a few assorted screws and tacks, a bit of tape solder and wire.

Of course, there are a few odds and ends of small stuff that the inspector will find serviceable, but the total weight of his kit will not be more than half the allotted weight carried by the soldiers in our army. The inspector does his traveling by train or motor car and really does little transporting of his kit by actually carrying it, so that a fair-sized kit is little or no handicap.

Novel Suit Against a Telegraph Company.—There are many ways for aggrieved citizens to get even with telegraph companies. A messenger boy on a bicycle in hurrying to deliver a message ran into a state official. The official's dignity and equilibrium were disturbed by the violent contact with the speeding messenger and he has sued the telegraph company for $5,000 damages.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(90) Q. Kindly answer the following questions through the "Answers to Questions" column:

(1) What is the "rule of three"?

(2) What is the "KR Law"?

(3) What are Kirchoff's first and second laws?

N. L. O.

A. (1) The "single rule of three" is a rule of arithmetic, and is the same as proportion. It is the process of finding from three given numbers the value of a fourth, to which one of them shall have the same ratio as exists between the other two. For example: If ten men can do a given piece of work in four days, how long will it take five men to do the same work. According to the rule of proportion this is stated as follows:

$$10 : 4 : : 5 : x$$

that is ten is to four as five is to x, the unknown quantity. This is solved by multiplying the "means," 4 and 5, and dividing by the "extreme" 10; thus we have

$$\frac{4 \times 5}{10} = 2, \text{ which is the value of x.}$$

This rule may be found in any arithmetic.

(2) Signals transmitted through long telegraph and telephone cables, submarine and aerial, are retarded by the electrostatic charge, and the time required to transmit a given number of impulses varies in proportion to the capacity (K) in farads and the resistance (R) in ohms of the cable, and is therefore proportional to K R. This is known as the K R law.

(3) Kirchoff's first law is stated as follows: In any branching network of wires the algebraic sum of the currents in all the wires that meet at any point is zero.

The second law is: When there are several electromotive forces acting at different points of a circuit, the total elctromotive force around the circuit is equal to the sum of the resistances of its separate parts each multiplied into the strength of the current that flows through it.

Mr. J. B. Hammatt, an old time telegrapher of Peoria, Ill., writes:—"I am always glad to receive the Age because it keeps me in closer touch with the telegraph fraternity—the business I have followed for so many years. Through it I am often reminded of the struggles and final achievements of that grand old man, Prof. S. F. B. Morse, who, along with Mr. Thos. A. Edison and Dr. Alexander Graham Bell wrought wonderful things for humanity—the grandeur of which will never dim while time shall last. I am therefore thankful to you who has made it possible for the small sum required to enable me to participate in these semi-monthly visits of so good a friend as the Age."

CONSERVATION TALKS—I.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLA.

Economic Efficiency and Waste Prevention.

Preachments are not effective unless accompanied by remedies. "Cut out the waste" is non-constructive criticism and it would seem better to use the phrase or slogan—prevent the waste—which can only be done by cutting out lost motion.

Conservation must begin in the individual unit, either person or thing and thence upward, the medium used being education and system, and the hope of future conservation or prevention lies in the younger element of the telegraph and telephone fraternity. This truism has been demonstrated in religion, politics and fraternalism where the standard is raised through the young.

These same methods will apply to business. Any employe is considered old only when he has ceased to adapt himself to changing conditions, and it is not expected that these articles will prove interesting to any such. To the progressive telegraph and telephone employe the writer simply asks an unbiased consideration of the facts, remedies or methods as presented. These articles are intended to suggest some new practical ways to prevent waste.

The time of reckoning has come, and the future generation will be less wasteful than the past has been; thanks to the present agitation. Few employes realize that everything wasted is not only a tax upon the one who wastes, but on every employe of the company.

I could cite hundreds of cases of negligence and lack of supervision which have come under my notice, resulting in waste. Waste was prevented in an exchange by a rearrangement of the electric lights and using lamps of high efficiency, thus reducing the electric-light bill to one-third. Again, by purchasing the clippings of a printing office, having them padded and furnished to employes for scratch paper prevented the waste of printed stationery. Still another form of waste was prevented by closely supervising correspondence and by writing (where practicable) answers on the query letter, especially between departments and company exchanges; also by having stock letters on specific subjects requiring frequent use of similar reminders, etc. In going over plants we also find a large waste of material in engineering, material in many cases lying idle for years. Truly there is much need for "efficiency engineering." It is unfortunate that more time cannot be devoted to direction and less to supervision and it is the hope of the writer that the education of the future will develop this desired end. It can only be done by developing a higher standard of manhood, willing and ready to assume responsibility, and earnest and sincere in its production of an honest day's labor, then the wage problem will be more satisfactory since net revenue, instead of going to a few, can be distributed to the many.

Briefly, then, the following are a few of the many chances for waste which do not involve a change in method so much as more and better supervision and direction:

First—Closer supervision of supplies sold, used and leased. Second—A detailed postage account. Third—Elimination of dual telephone systems. Fourth—Failure to develop the idle plant. Fifth—Combining pole lines. Sixth—Utilizing lines to full capacity. Seventh—Federal regulation rather than state regulation. Eighth—Closer timing on toll messages. Ninth—Saving lost calls. Tenth—Economizing wasted circuit time. This latter is extremely important as it develops that the time usually consumed in setting up a toll-line connection is about four times as great as the actual time consumed in conversation and can be prevented by closer observation of toll messages by the traffic department. The possibility along these lines for higher and more economic efficiency is very great.

Considerable toll-line economy can also be gained by concentrating the toll business at toll centers and permitting only the most efficient operators to handle the long haul circuits.

The standardization of methods, material and stationery would be a great improvement, as it would prevent waste of time and material and raise the efficiency. Take the case of transposing and we find all kinds and methods used; each change means waste and loss of circuit use. Again, in ordering supplies we find the departments making out requisitions, often copied by the manager, or by the district manager and possibly by the supply department.

We build expensive copper circuits in an effort to increase our transmission efficiency and neglect our local transmission, allowing batteries to play out before giving them proper attention. As a rule no effort is made to give our long distance patrons better facilities then those who do no toll business. We grudge battery expense but put money into larger wire. Adjustment of receiver diaphragms is ignored resulting in poor transmission and the batteries sent out or sold are apparently made for cheapness rather than efficiency. It is advisable to pay more and get a reliable battery. Here is ample room for improvement.

In making up cost units a large waste takes place by having many people carry on this work, and frequently the figures are not what they should be. It would seem much better and more economical to have a statistician to compile the figures of the various departments for the general manager. The practice of constantly watching costs is wasteful; it should, however, be done frequently.

In the matter of filing, it would seem best to have an archive department, where all completed files could be kept. Where the division of labor does not warrant separation departmental work should be combined. This is not always done and results in waste of time.

A stenographic department would also (for large companies) be economic efficiency. This would give the general manager's office close supervision over correspondence, etc., which he does not now have. It is wasteful to allow plants to run down merely to make a good cost showing. The constant changing of employes is a great source of waste, and impairs efficiency, hence much care should be taken to select prospective employes and greater pains taken to educate them; usually they are "hired" and turned loose to perform their duties without any training or instruction. This latter is much easier than the slow process of selection and training.

Another source of waste is that new methods are constantly being tried out, put into use and fail for lack of following up to a successful end or proving that they will not work. The writer has known many cases such as this. The same ideas also occur to different people (in authority) at different places at the same time and we find experimenting going on along similar lines everywhere. If these new methods or ideas could be centralized, tried and passed upon at some central point, great waste would be prevented.

Telephone Pioneers of America.

HENRY W. POPE.

Henry William Pope, secretary of the Pioneers of America, was born at Great Barrington, Mass., November 2, 1848. He was operator and manager for the American Telegraph Company at Great Barrington in the sixties, being transferred to the main office of the company at 145 Broadway, New York, in 1864. In 1866 he went with the United States Telegraph Company under J. W. Stover, manager, in the Old State House, Boston, Mass. This company was absorbed by the Western Union and Mr. Pope was transferred to the night force of the Western Union on which Mr. Thos. A. Edison was then employed as an operator.

Mr. Pope returned to New York in 1868 accepting the position of manager of the Atlantic & Pacific Telegraph Company's office in the Produce Exchange. Afterwards he became inspector for Pope and Edison, New York [firm of F. L. Pope and Thos. A. Edison] and chief operator of the private line department of the Gold & Stock Telegraph Company. He left this company to become assistant superintendent of the American District Telegraph Company under Geo. F. Durant in 1873 and general superintendent in 1875. In the spring of 1877, through Gardiner G. Hubbard, he became interested in the telephone and installed in the organ factory of Hilborne Roosevelt, Sixth Avenue and Eighteenth Street, New York, the first telephone ever placed in New York and from which developed the Roosevelt-Cheever system, later becoming the Bell system of the city. In 1878 he took up the promoting of telephone corporations and with his associates promoted both the Cleveland and Pittsburgh companies as well as others.

On November 1, 1879, Mr. Pope was appointed superintendent of the Bell Telephone Company of New York and was one of the appraisers of the telephone properties of the Bell and Western Union Companies which culminated in the merger of the interests and the incorporation of the Metropolitan Telephone & Telegraph Company, of which he became general superintendent. He was traffic manager of the Southern Bell Telephone Company in the nineties and acting general manager of the Bell Telephone Company of Buffalo during its reconstruction period.

Mr. Pope's successful joint work in bringing about the organization of the Telephone Pioneers of America, is not his first experience in this line. He organized and called to order the first National Telephone Convention at Niagara Falls, in September, 1880. He also organized the Mutual District Telegraph Company in New York and was its vice-president and general manager, and the Mutual District Messenger Company of Boston. He also organized and constructed a number of electric light systems, at Elizabeth, N. J., Morristown, N. J., and other places, together with the Citizens Illuminating Company of Brooklyn, the first to introduce electric light in that city, and of which he was president and general manager.

HENRY W. POPE,
Special Agent, American Telephone and Telegraph Co., New York, and Secretary Telephone Pioneers of America (1877).

Mr. Pope is now a special agent of the American Telephone & Telegraph Company with headquarters at New York.

Mr. J. E. Stevens, newly appointed district manager of the Western Union Telegraph Company, with headquarters at Greenville, S. C., writes: "I wish to congratulate you upon the success of your paper. It is indeed a publication of great value to all telegraph people, and I wish it continued success."

Wireless Telegraphy for Naval Purposes.

BY H. CLIFFORD STROUD.

In an interesting paper read at Newcastle-on-Tyne, England, abstracted in *The Marconigraph,* the author gives a bird's-eye view of the modern practice of wireless telegraphy and its application to present-day needs.

At the present time when crossing the Atlantic, says the author, one is never out of communication with land, and the passengers have issued to them the equivalent of newspapers, giving them the news of the world as soon as, or even sooner than, we read it in our morning papers.

The transmission of electric signals through the ether without the use of wires is effected by means of electric waves or oscillations, and we must consider (1) the generator of these ether waves, (2) the aerial which gives them the necessary send-off—*i.e.,* the radiator of the waves—and the similar structure for collecting them at the receiving station, and (3) the apparatus which detects the waves and makes the signals readable.

To commence with the generator of the electric oscillations, the first arrangement for their production was by means of the ordinary Leyden jar, or condenser, which consists essentially of two metal plates separated by some substance which does not allow an electric charge on one plate to discharge to the other. If the one plate is charged to a high potential with regard to the other, by means of an induction coil or otherwise, and then allowed to discharge itself suddenly through a spark-gap in the connection between the plates, it can be seen by means of revolving mirrors, that what appears to the eye to be a single spark is in reality a series of sparks. This is explained by the fact that the discharge overshoots the mark, or gives up too much of its charge, whereupon there is another spark in the reverse direction, which process occurs several times for each apparent spark.

The electric capacity of the condenser is large, the inductance of the discharge circuit is small. Now the time of oscillation of an electric discharge depends on both the capacity and the inductance.

The arrangement of the coil, condenser and spark-gap circuit is that commonly called the "closed oscillator." In it very little of the energy stored in the condenser is radiated, and so for the purpose of setting up oscillations in the ether it is useless. The simplest type of oscillator which is at the same time a good radiator is the "open oscillator." In its essential form it consists of a spark-gap with two wings of wire in the same straight line. The spark-gap is connected to the terminals of an induction coil. In such an arrangement there is no concentration of the lines of force —as is the case with the Leyden jar—and consequently the energy is rapidly radiated. The energy passes off in the form of electro-magnetic waves, which travel on indefinitely in the ether in all directions. It was with such apparatus that the first experiments in wave telegraphy were performed.

For laboratory experiments this is all that is required, but to transmit signals any distance it was found to be inadequate. In the first place, the length of the wings would have to be enormous to radiate the energy required to send any appreciable distance. The first improvement was to turn this oscillator on end, so to speak—*i.e.,* erect a long vertical wire with a spark-gap at the bottom, the other wing being cut short and connected to earth.

This was called the plain or Marconi sender. It has many latent disadvantages, however, the chief being that the capacity of this antenna or aerial must necessarily be small, and as the energy in the antenna is limited by its capacity and the length of the spark-gap—which cannot conveniently exceed half an inch—the radiation is bound to be rather small.

The improvement in wireless-sending apparatus which made long distance work a practical possibility was the introduction of what is called the "coupled circuits." The spark circuit is separated from the antenna, and a large amount of capacity is put into it, thereby obtaining great concentration of the energy with, at the same time, a small spark-gap.

The actual arrangement consists in connecting the aerial wire to a coil placed at the foot, forming an inductance, and thence to earth. Another coil is placed in close proximity to this, and contains the spark-gap and a condenser in circuit with it. These two circuits are called coupled circuits. The period of oscillation of the antenna circuit is arranged to be exactly the same as that of the condenser and spark-gap circuit.

This is the general elementary form of spark sender as in use at the present time. One modification is, however, sometimes made, and that is to make part of the inductance of the coupled circuits common to both.

The next thing is to understand the apparatus used for receiving the waves transmitted through the ether. As far as the circuits are concerned, there is no great difference between the sending and receiving, but, instead of setting up oscillations by means of a spark across a spark-gap, an instrument to intercept the minute oscillatory currents in the antenna flowing to earth must be suitably placed. A detector in common use is Marconi's magnetic receiver. This form of detector is used almost universally for naval purposes on account of its extreme reliability.

Another form which has recently come into general use is the Marconi-Fleming oscillation valve detector. This depends on the fact that when electric oscillations are arranged to pass between an incandescent metal filament (tungsten is now used) in the ordinary vacuum bulb, and a plate or cylinder sealed into the bulb, it acts like a non-return valve, only allowing the current in one direction to pass from the plate to the filament. In this form, as in all other modern forms of detector, a telephone is used to make these currents audible.

The next point of importance is the antenna or aerial wire. This is actually of the greatest importance, as in wireless telegraphy everything depends on the send-off which the waves are given by its means. The antenna may be one of many varieties, and in many cases its shape depends not upon what would be the most efficient as upon ease of erection. To take a ship as an example, it would be impossible to erect an antenna of the umbrella type, but the antenna must be stretched between the masts. On land, however, these restrictions are to a large extent non-existent; and for land purposes there are umbrella, fan-shaped, cone, and many other varieties of antenna.

The earliest form of antenna was simply a long vertical wire supported by a mast, the idea being to reach as great a height as possible. In the modern forms there is a long vertical wire leading up to the main part of the antenna, and at the top the wires are arranged as circumstances permit, or, if there is any option, in the way which seems to be the most suitable. The umbrella-shaped antenna is, as its name implies, made in the form of the ribs and periphery of an umbrella.

In the design of an aerial the chief point is to get as much capacity as possible at the top, in order to give the waves a good send-off. On ships the support for the antenna must obviously be the masts, and so the shape is in general either T-shaped or inverted L-shaped, depending on whether the operating cabin is amidships or towards the bow or stern. The top part is usually made of six or eight wires held apart by cross-pieces, and in the form of a long cylinder, this is supported by porcelain insulators from the two masts, and two or more wires descend from it to the operating cabin through suitable insulation. This is the form of antenna usually seen on passenger boats equipped with wireless. There are, of course, modifications to suit the individual requirements of vessels, but in general construction they are much the same.

When the vessel had only one mast, as in the case of destroyers, submarines and some battleships, the form adopted is that of an inverted V, the antenna being stretched between erections at the bow and stern and supported by the mast in the middle.

It may be thought that the establishment of communication between two stations is dependent on having no obstruction in the direct line between the two antennæ. That this is not the case can be shown by a simple calculation. Let us suppose the two stations be 3,000 miles apart, as for transatlantic communication. The radius of the earth being taken as 4,000 miles, the heights to which the antenna would have to be erected would be about 330 miles. If this height had to be attained for communication over 3,000 miles, clearly wireless telegraphy would not advance very rapidly. This calculation, however, serves to show that the path of the waves is not in a straight line between the two stations, but must follow the circumference of the earth.

To have a good earth connection is of the very greatest importance, and this is, of course, very easy to obtain on board ship, all that is required being to connect to the hull of the vessel, which is in intimate contact with the sea, itself the best of earths.

As to the sending apparatus, the circuit can be tuned to any given note by varying either the capacity or the inductance of the circuit or both. The waves sent out from any oscillator travel on indefinitely in the ether until they strike some earth connected conductor, and if this aerial is tuned to the same frequency—*i.e.*, has the same wave-length—as that of these ether waves, this circuit will take up the oscillations in the same way as one tuning fork will respond to another of the same note, which has been made to vibrate. If, however, the aerial which intercepts the waves is not of the same frequency, the effect will be very greatly reduced, since it will only respond intermittently to the waves impinging on it.

The wave-lengths used in practice are as follows: The ordinary commercial wave-length for ships is 600 metres, which has a frequency of half a million oscillations per second. Between 600 and 1,600 metres is reserved by the Admiralty for warships in the British Navy, and for transatlantic work such wave-lengths as 2,000, 4,000 metres, or even greater, are used. The Marconi station sends constantly with 6,000 metre wave-lengths at its transatlantic station at Clifden, on the west coast of Ireland, sending to Glace Bay, Nova Scotia. It is found that for the same power messages can be sent longer distances with big wave-lengths than with small ones.

In a sending apparatus there is necessarily an interaction between the two coupled circuits. The primary circuit—*i.e.*, the one containing the spark-gap—sets up oscillations in the secondary circuit containing the antenna, and then the secondary reacts with the primary. This phenomenon can be demonstrated by suspending two similar pendula from a flexible support. If one is set swinging it transfers its energy to the other, which starts to swing, and in doing so stops itself; the second then starts the first in the same way, and so the energy is alternately transferred from one to the other. If the support is very flexible, corresponding to close coupling, two periods of vibrations are obtained; if, however, the support is less flexible, corresponding to looser coupling, the two periods become more nearly identical.

It is thus seen that the wave-length of the radiated waves consists of two components, one of which has a greater wave-length than that to which both are tuned, and the other smaller. Thus the total energy that is radiated is divided between the two wave-lengths, and neither is the same as that to which the coupled circuits are separately tuned This is largely overcome by weakening the coupling. To overcome this difficulty Mr. Marconi has adopted the quench spark.

If the spark-gap consists of very short sparks between cooled discs there is very large damping effect. By this method the primary oscillations are quenched by the damping after but one or two swings, and the secondary circuit continues to oscillate in a single period even with fairly close coupling, which, of course, gives rise to a wave of definite wave-length. In the development of this system a very large number of discharges are produced per second, and thus one very great advantage is obtained in the musical note produced in the telephone at the receiving station, which is distinctive of the station transmitting, and is never confused by the operator with ordinary atmospheric disturbances.

Having thus dealt with the principles of wave telegraphy and the apparatus used for practical work, let us turn our attention to the purposes for which the science is used, and also those for which in the future it is hoped to be used. The foremost of these is the now almost universal fitting of passenger liners with wireless apparatus, so that at all stages of the voyage the ship is in continual communication with the shore and with other vessels at sea. This is so complete that on big liners a daily bulletin of the world's news is published.

The fact that already upwards of 3,000 lives have been saved at sea by the establishment of wireless communication is quite sufficient to show how extraordinarily useful a wireless installation can be on a ship. The use of wireless also for naval purposes is now universal, every ship in the British Navy being equipped.

An application of wireless telegraphy which it is probable will develop greatly in the near future is the "Radio-telegraphic compass." For this a directive antenna is used—*i.e.*, one by means of which signals can be sent in any desired direction, and also by means of it the direction from which any signals come can be determined. A certain number of fixed stations send out distinctive signals at intervals, the ship receives these signals, and thus its position is accurately determined. It is as yet only in its experimental stages, but, I am told, the company promoting the idea offers to fit vessels. It can readily be seen that such a method for determining the position of a ship would be extremely useful.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. The review of Maver and Davis' book, "The Quadruplex," was completed in our issue for February 16, and the next book to be taken up and treated in like manner is "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

CLASSIFICATION OF MEASURING INSTRUMENTS.

Into how many classes may electrical measuring instruments be divided?

What instruments belong to the first class, and what kind of indications do they give?

What kind of instruments belong to the second class?

Name the instruments which give records of currents.

How can a simple galvanometer be made suitable for experimental work?

What is the effect upon the needle of a galvanometer when a current of electricity passes through the coil?

If the current is made stronger, what will be the effect on the needle?

If the direction of the current through the coil is reversed what will be the effect upon the needle?

[Study carefully the causes which effect these results as they are of the utmost importance in the study of electrical measurements. For instance, note the direction of the current through the coil; the effect of this current upon the N pole of the needle; the effect upon the N pole of a current flowing in the opposite direction. Clear knowledge of these facts is highly important in the work of making measurements.]

If a current of a strength of, say, one unit, causes the needle to deflect ten degrees, will a current of two units deflect the needle twenty degrees?

If it does not, give the reason why.

If a given battery strength gives a larger deflection on one galvanometer than upon another, the conditions of the test being exactly alike in both cases, what does the difference in deflection indicate?

How are the deflections of galvanometer needles measured?

Senor Mendez, Director-General Mexican Telegraphs.

Señor Mario Mendez, the new Director-General of Federal Telegraphs, Mexico, was born at Matamoros, Nuevo Leon. After studying in the college of San Juan at Matamoros, he entered the telegraph service at San Luis, Potosi. In 1897, he was made line inspector, and from this time his promotion was rapid. In 1898, he became first inspector in charge of a division, shortly afterward being made constructor of lines in the state of Yucatan. On the completion of the line between Chemax and Puerto Morelos, he received a message from the Secretary of War, congratulating him on the successful establishment of this important line.

Señor Mendez next held a position in the first section of the Director-General's office, where he rendered important services, being promoted successively to the positions of inspector of the second division and inspector-general of all telegraphs. From the latter position, he was promoted to that of chief of the central office, and on January 4, of the present year, he was made Director-General of Telegraphs.

Mr. G. C. Felton, manager of the Western Union office at Laredo, Tex., writes:—"Thanks for keeping my subscription alive. The AGE always looks good to me."

President Taft Disapproves of Government Ownership of Telegraphs.

In a special message to Congress on February 22, President Taft expresses his disapproval of Postmaster-General Hitchcock's plan for the government ownership of telegraph lines. Mr. Hitchcock's recommendation is left in his report which accompanies the President's message. Mr. Taft says in regard to it: "There is only one recommendation in which I cannot agree—that is one which recommends that the telegraph lines in the United States should be made a part of the postal system and operated in conjunction with the mail system. This presents a question of Government ownership of public utilities which are now being conducted by private enterprise under franchises from the Government.

"I believe that the true principle is that private enterprise should be permitted to carry on such public utilities under due regulation as to rates by proper authority rather than that the Government should itself conduct them. This principle I favor because I do not think it in accordance with the best public policy thus greatly to increase the body of public servants.

"Of course, if it could be shown that telegraph service could be furnished to the public at a less price than it is now furnished by telegraph companies, and with equal efficiency, the argument might be a strong one in favor of the adoption of the proposition. But I am not satisfied from any evidence that if these properties were taken over by the Government they could be managed any more economically or any more efficiently, or that this would enable the Government to furnish service at any smaller rate than the public is now required to pay by private companies."

Military Telegraph Pension Bills.

There are two military telegraph pension measures before Congress, i. e., House Bill 2920, introduced by Congressman Edward L. Taylor, Jr., of Ohio, and referred to the Committee on Invalid Pensions of which Representative Isaac R. Sherwood, of Ohio, is chairman, and Senate Bill 4625, introduced by Senator John W. Kern, of Indiana, and referred to the Committee on Pensions of which Senator Porter A. McCumber of North Dakota is chairman. These bills are in effect the same, providing as they do that "any person who served ninety days as a military telegraph operator during the Civil War . . . shall be held and considered to have been mustered into the military service of the United States at the date of employment in said Military Telegraph Corps, and to have been honorably discharged therefrom at the date said employment ceased, *Provided*, That no pension shall accrue prior to the passage of this Act."

The campaign to secure pensions for the military operators who served in the Civil War has been conducted with great vigor. From the different sections of the country the members of the corps have been active in soliciting the support of members of Congress and United States Senators for the bills now before Congress and the response has been very gratifying. Colonel W. B. Wilson, president of the society, spent a week in Washington recently and reports that the sentiment in both Houses was most favorable to action during the present Congress. He says, however, that until the big pension bill (Dollar-a-Day Bill) is out of the way the military telegraphers will have to wait. When that measure is disposed of he was assured by those in positions of authority that action would be taken on the telegraph bill.

Mr. A. A. Zion, of Indianapolis, Ind., is the chairman of the congressional committee of the Society of the United States Military Telegraph Corps, and is doing vigorous work to secure favorable congressional action on the pension bill.

The Turner Monument Fund.

Substantial contributions toward the fund to defray the cost of the monument to be erected at Harriman (Turner), N. Y., to commemorate the sending of the first telegraphic train order, continue to come in. In our issue for February 16 we announced the receipt of $500 from Mr. Andrew Carnegie, and many railway officials are now aiding the project. Mr. W. H. Truesdale, president of the Delaware, Lackawanna & Western Railroad, New York, in a letter enclosing his check for $10 toward the Fund, says, regarding the monument, "It is a most fitting memorial to erect and I am very glad to contribute towards it."

The bronze tablet of the Turner monument is again on exhibition in the window of the Gorham Manufacturing Company's store at the corner of Fifth Avenue and Thirty-Sixth Street, New York. All those who are interested in the monument project and especially those of a high artistic sense should see this beautiful bronze casting. A replica of the tablet is shown in the studio of Charles Keck, the sculptor of the tablet, at 148 West Thirty-sixth Street, New York. The tablet was illustrated in our issue for October 1, 1911.

Mr. David Homer Bates, of New York, member of the Fund Committee, is entitled to much credit for his active interest in behalf of the movement and his work is showing substantial results.

The fund now stands as follows: Previously acknowledged, $2,290.09; W. H. Truesdale, New York, $10.00; D. Colestock, Titusville, Pa., $5.00; Frank N. Dowler, Brooklyn, N. Y., $5.00; Ralph H. Wallace, New York, $5.00; W. H. Woolverton, New York, $5.00. Total, $2,320.09.

Telegraph in Austria.—The Austrian Post and Telegraph Department will make considerable extensions to the telegraph and telephone service during the year. Eleven million krouen ($453,600) have been appropriated for the purpose.

Ocean Wireless Letter-Telegram.

Ocean travellers often wish to send lengthy communications quickly on various business and social subjects, but do not care to go to the expense of sending their message by wireless telegraphy or cable. To meet this demand, the Deutsche Betriebs-Gesellschaft für drahtlose Telegraphie has introduced a form of ocean letter-telegrams.

The message is sent from the steamer by wireless telegraphy to a steamer going in the opposite direction, the operator mailing it on his steamer's arrival at its destination. On the transatlantic trip a letter will, in this way, arrive about seven days before it otherwise would, and on the trip between Lisbon, Portugal, and Rio de Janeiro, Brazil, about fourteen days are gained.

The charge for this ocean letter is $1.25 for thirty words, and 2½ cents for each word in addition. Not over one hundred words can be sent in this way, unless the service is not otherwise in use. Twelve and one-half cents are charged for postage.

This development of the ocean wireless letter-telegram is only in operation on the German steamship lines, on which boats the Telefunken system of wireless telegraph is used.

The Railroad.

Mr. A. L. Edgecomb, superintendent of telegraph, Bangor & Aroostook Railway, Bangor, Me., has gone South for his health. In passing through New York, he called on friends.

Mr. W. S. Tinsman, recently appointed assistant to the president of the Rock Island Lines, at Chicago, was formerly a railroad telegrapher, and has filled many important railroad positions.

New York Visitors.—Several railway telegraph superintendents visited New York recently, viz:—Mr. Charles Selden, general inspector of transportation and superintendent of telegraph, and E. W. Day, assistant superintendent, Baltimore & Ohio Railroad, Baltimore, Md.; W. P. Cline, Atlantic Coast Line, Wilmington, N. C.; S. A. D. Forristall, Boston & Maine, Boston, Mass.; G. A. Cellar, Pennsylvania lines, west of Pittsburg, Pittsburg, Pa., and N. E. Smith, New York, New Haven & Hartford Railroad, New Haven, Conn.

Railway Telegraph Superintendents.

A joint meeting of the Eastern and Western divisions of the Association of Railway Telegraph Superintendents will be held in the assembly room of the Chicago & Northwestern Railway, Chicago, Ill., at 10 a. m., March 20. It has not been fully decided as to what matters will be discussed at that time, but inasmuch as the annual meeting is to be held in New York in June, the date of which may be changed to the first week in that month owing to the national conventions to be held later it was thought best to hold another joint meeting in the West, at which time concerted action could be taken as to the plans for the annual convention. The New York convention will be held at the Waldorf-Astoria which will be the headquarters, and a banquet will probably take place at this hotel.

During the week beginning March 18, the Maintenance of Way Association will meet in Chicago and on March 19 the Signal Engineers will also meet in that city. Several railway telegraph superintendents are members of the latter body. There will also be an exhibit of apparatus and devices of interest to the superintendents held in the Coliseum building and a number of the members may avail themselves of the opportunity to attend.

The Committee on Miscellaneous Matters of the Association of Railway Telegraph Superintendents has issued blank forms to the members for the purpose of gathering information on, 1, Methods for protection of linemen and others handling wires; 2, Protection of telegraph poles against grass fires; 3, Practice as to charge for raising wires to permit house-movers and others to pass under; 4, Key for use in handling code and other messages by telephone. The committee consists of E. A. Chenery, Missouri Pacific Railway, St. Louis, Mo.; Geo. Boyce, Chicago, St. Paul, Minneapolis & Omaha, St. Paul, Minn.: L. M. Jones, Atchison, Topeka & Santa Fe, Topeka, Kan.; E. C. Keenan, Lake Shore & Michigan Southern, Cleveland, Ohio; V. T. Kissinger, Chicago, Burlington & Quincy, Chicago, Ill.; J. B. Sheldon, Union Pacific, Omaha, Neb., and F. T. Wilbur, Illinois Central, Chicago, Ill.

Further information may be obtained from Mr. P. W. Drew, superintendent of telegraph Milwaukee, St. Paul & Sault Ste. Marie Railway, Chicago, Ill., who is secretary of the association.

Telephone Train Dispatching in 1911.

(Continued from page 124, February 16.)

Mr. C. W. L. Mickley, superintendent of telegraph, International & Great Northern Railway Company, Houston Tex.: "We have no train dispatching or long distance telephone circuits in operation on this road and none are contemplated. We installed a duplex circuit between Houston and Palestine, a distance of 150 miles, on January 1, which is giving entire satisfaction."

Mr. F. T. Wilbur, superintendent of telegraph, Illinois Central Railroad Company, Chicago: "We are gradually increasing our telephone facilities, and wherever a new circuit is established there is so much use found for it that we wonder how we have been getting along without it. Like a number of other railroads, we have gone into the long line phantom arrangement to some extent and find that we can increase our facilities considerably at a nominal expense by adapting our circuits to phantom uses."

Mr. F. H. Van Etten, Superintendent of Telegraph, Chicago, Terre Haute & Southeastern Railway Company, Chicago, Ill.: "We have only one division equipped with a telephone train dispatching circuit. This circuit is 155 miles long, and with its use we have been able to handle our trains this winter, with one set of dispatchers, whereas with the Morse circuit, it required two sets. There is no question as to its preference over the Morse for this purpose. We are also using this telephone circuit for a simplex Morse circuit, and also for one side of a metallic composite telephone circuit which practically gives us three different services on this pair of wires. The telephone dispatching circuit was installed September 1, last year."

Mr. W. L. Connelly, superintendent telegraph, Chicago, Indiana & Southern Railroad Company, Gibson, Ind.: "During 1911 we installed one local telephone message circuit which completed the elimination of the telegraph for train dispatching and local message work, the other dispatching and other telephone message lines having been installed prior to 1911. This work is handled in a very satisfactory manner by telephone. At the present time our telephone dispatching and local message lines are utilized for simplex circuits; we expect to phantom these lines for through telephone circuits. We are on a strictly telephone basis and find the arrangement more satisfactory than we even hoped for, and very much better in every way than the telegraph. The Indiana Harbor Belt Railroad Company also installed one telephone line during 1911 to replace the local telegraph. We now do all train dispatching and message work by telephone on this road, having eliminated the telegraph entirely. The other dispatching and other telephone message lines were installed prior to 1911."

Telegraphers of Today.

An excellent opportunity is offered to telegraph people in general to become acquainted with over 600 prominent telegraph officials and others identified with the telegraph, the railroad, the submarine cable and press associations of the past generation, through their portraits and sketches of their careers as published in "Telegraphers of Today."

This work was issued in 1894 and includes biographical sketches of all the individuals connected with the interests mentioned at that period, many of whom have passed away from their earthly labors. The younger generation, however, will find much of interest in looking upon their portraits and reading of their achievements in life. Many of them are still alive and in harness in the telegraph and other fields of activity.

Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York, who recently received a copy expresses his appreciation of the work as follows: "Copy of 'Telegraphers of Today' received. I casually saw a copy of the book when first published, but never had I an idea that it was so beautiful, interesting and historically accurate. It should be of great interest to telegraphers with any sentiment in their makeup. It is magnificent, unique and I truly pity those of the fraternity who fail to secure a copy before the edition is exhausted."

This book, which is 11½ x 14 inches in size, was originally published at $5 per copy, but in order to close out the remaining copies we offer them at $1 per copy by express, charges collect.

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Delegates to National Civic Federation.—Among the delegates designated by Governor Dix of New York to represent the State at the annual meeting of the National Civic Federation, to be held in Washington, D. C., March 5, 6 and 7, are Messrs. Andrew Carnegie, Theo. N. Vail, president of the Western Union and American Telephone & Telegraph Companies, New York, and W. C. Brown, president of the New York Central Lines, New York.

Independent Railroad Telegraph Lines.—The Georgia Railroad Telegraph Company, with a capital stock of $200,000, has filed articles of incorporation. It is organized by officials of the Georgia Railroad for the purpose of building telegraph lines for its own use along its right of way. The headquarters will be at Augusta, Ga.

Trade with Porto Rico.—Shipments of telegraph, telephone and scientific instruments to Porto Rico from the United States during 1911 amounted to $223,713. Trade between the United States and that island for the year amounted to $72,000,000 which is eighteen times as great as it was in 1897, the year preceding the annexation of the island by the United States.

Franchise Taxes in Portland, Ore.—The county court at Portland, Ore., recently ordered the sheriff to seize the tangible property of the Western Union Telegraph Company, the Postal Telegraph Cable Company and the Pacific States Telephone & Telegraph Company because they have refused to pay the franchise tax levied against them. The companies contend that the franchise tax is illegal.

Report of Commissioner of Patents.—The report of Mr. Edward B. Moore, Commissioner of Patents, for the year ending December 31, 1911, shows that 33,927 patents were issued, and 19,875 patents expired.

Mr. J. W. McMahon, district commercial manager of the Western Union Telegraph Company, New York, in renewing his subscription for another year, writes: "I take pleasure in renewing my subscription to TELEGRAPH AND TELEPHONE AGE, which I consider the best medium, if not the only one for the telegraph fraternity, to keep in touch with the practical and progressive side of the profession, not to mention the social and personal notes which make interesting reading."

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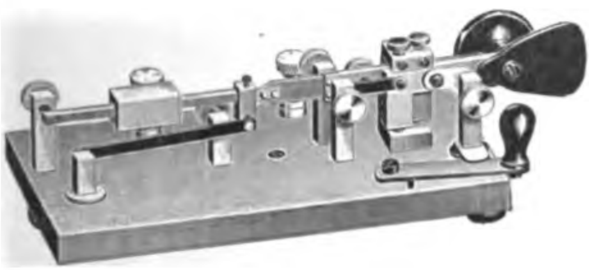

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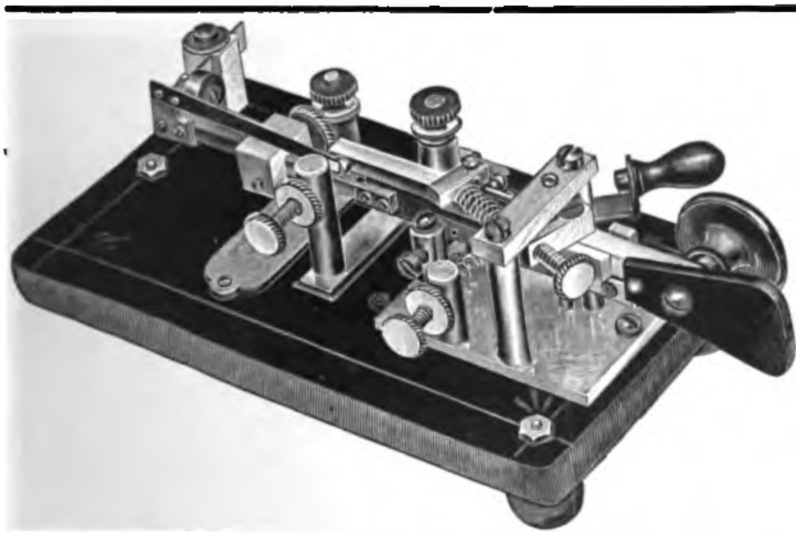

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Recent Experiments in "Wired Wireless" Telegraphy.

Some interesting additional data have been obtained from the office of the Signal Corps, War Department, on experiments in continuation of those that were made on January 21 with the "wired wireless" system invented by Major George O. Squier, U. S. A., says *The Electrical World*. Through the courtesy of Mr. M. M. Davis, chief engineer of the Postal Telegraph-Cable Company, New York, tests were made by Major Squier on Sunday, February 11, on a line extending from the Signal Corps laboratory at the Bureau of Standards in Washington, to 253 Broadway, New York. Both a metallic circuit and a grounded circuit were used in the tests, the line being a mixed commercial line consisting of No. 9 B. & S. copper wire on poles, subterranean cable line in Baltimore, and subterranean and submarine cable lines through Philadelphia and entering New York. The total resistance of metallic circuit was about 3200 ohms. No change whatever was made in this circuit as used in regular commercial telegraph service.

The principal object of the experiments was to determine important data as to the range of frequencies to be employed in reaching the longer distances by the "wired wireless" system and also the order of magnitude of the energy necessary and sufficient for such purposes. The measurements taken at the transmitting end of this line extended over a range from 34,000 cycles per second down to about 22,000 cycles.

The prime importance of tuning such a line to resonance and the comparative case with which this can be done with the commercial wireless apparatus were clearly demonstrated. This tuning of the line, whether a metallic circuit or a grounded circuit, required only a few minutes.

A number of experiments were conducted to determine the most suitable form of coupling between the generator circuit and the line circuit, the generator being directly connected to the line through the tuning elements as well as by the more usual manner of inductive connection. It was found that inductive coupling to the local generator circuit is far more efficient and convenient and, further, enables a number of lines to be operated from one generator with great ease.

At the receiving end the ordinary wireless-telegraph receiving equipment was employed, using the "audion" detector with high-resistance telephone receivers, and the elements were tuned to the particular frequency being transmitted. It was found desirable to tune the line both at the transmitting and at the receiving end and to adjust the coupling to the optimum value in both cases.

The importance of operating these circuits at resonance was strikingly observed since, when the generator terminals were directly connected to the line without the tuning elements, only the smallest readable current was obtained, whereas with proper tuning this current could be multiplied some hundredfold. With a transmitting current of 260 milliamperes at 22,000 cycles per second, signals just audible were heard in New York, thus indicating the lower limit of transmitting power with the particular line and frequency in use.

In the previous experiment with a line to Baltimore, about forty-eight miles long, frequencies up to 44,000 were used with a transmitting current of only 180 milliamperes, giving very loud and clear signals far above what would be necessary in traffic.

A large number of physical measurements were made on February 11 at the transmitting end of the New York line over a comparatively wide range of frequencies, and the results obtained conform to what was expected from previous work on other lines. It appears evident to War Department experts that the range of frequencies for "wired wireless" will extend from about 10,000 per second, as a lower limit, up to about 100,000, which is considerably above the lowest frequency now employed in long-distance radio-communication.

Just as in pure radio-telegraphic work the longer wave-lengths are used for the greater distances, so in "wired wireless" the longer wave-lengths corresponding to the lower frequencies will be employed, it is believed, for the long-distance circuits, reserving the shorter wave-lengths and lower power for the shorter circuits; thus the range from 10,000 to 25,000 cycles per second will be used on the long circuits and the upper region between 25,000 and 100,000 cycles will be used on the shorter circuits.

The proposed high-powered navy station in Washington, which will be in operation next July, uses a power of 100 kw and has a range of 3000 miles with a wave-length of 4000 meters which corresponds to 75,000 cycles per second.

It is clear from the above figures that the great increase in efficiency obtained by directing electric waves along wires to their destination, as shown by the amount of power required to send audible signals over such a circuit as already described, is beyond question. The plant necessary to transmit messages from Washington to New York by pure radio-communication would be of about 5-kw rating. In addition to the advantage obtained by directing waves to their destination, perhaps the greatest advantage is the fundamental one of freedom from interference between messages, which is ever present in wireless communication. The wire system guides the waves to their destination with greater efficiency and practically confines the electromagnetic disturbances between the conductors and prevents the waves from spreading outward in every direction in space, as is the case in radio-communication.

In the opinion of experts in Washington pure radio-telegraphy, which is now an infant art, scarcely more than twelve years old, has no competitor in the marine field, that is, between ship and ship and between ship and shore. On the other hand, on land, especially in congested districts, even if the process of selective tuning should be developed so as to select messages by pure radio methods, radio-communication would still be totally inadequate, in the absence of wires, to handle the traffic of a large city.

The so-called "wired wireless" fills in the gap between the pure radio art and the wire art and indicates lines of development wherein one can apply the principles of wireless engineering to wire circuits and create additional telegraphic and telephonic channels for commercial use without the extra cost of maintenance over the use of such circuits for other electrical purposes.

The English Operator Under Government Operation of the Telegraph.

On page 108 of our issue for February 16 we printed an account of the existing dissatisfaction among telegraphers in South Australia. They have been agitating for better conditions for the past ten years, but the persistency of officials in decrying the work of the telegraphers is the chief obstacle they have to contend with.

A letter from Mr. H. Parker, parliamentary secretary of the Postal Telegraph Clerk's Association of England, on the condition of telegraphers under government ownership of telegraphs in that country, is not very enthusiastic on the subject.

"The rank and file of to-day," says Mr. Parker, "get more money than the rank and file of 1870 or 1880, but our chances of promotion to a superintendent's rank are very much smaller. You can take it that the ordinary man cannot expect more than the maximum pay of his class."

But the conditions are different between America and England, as Mr. Parker goes on to show, in that only in the large towns do telegraph operators work entirely at the wires. In other places they are employed on all other classes of postal work. Still the Englishmen believe they are better off than under a company.

Describing the conditions of employment in England, Mr. Parker says:

"The employes in the cable companies receive slightly higher wages than we do while the telegraphers of the railway companies of this country receive 25 to 40 per cent. less in any town. The employes of the cable companies are few in number, and I doubt if their pension prospects are as good as our own.

"There are two classes of telegraphers," he continues, "established and unestablished. The latter are very much underpaid, but they are employed generally in shops where general post office business is carried on or at times of pressure in seaside resorts, etc. They have small pay and no certainty of continuous employment. We are continually fighting to improve their conditions, with the view of preventing their blacklegging us.

"The situation is somewhat different in England to America, inasmuch as only in the large towns are telegraphers employed solely on such work. In the smaller towns the post office clerk is employed on telegraphy as well as all other classes of postal work.

"I am dealing now solely with established employes, who have continuity of employment, holidays, sick pay, and pensions, the latter being based on one-eightieth of his retiring salary for every year's service, together with one year's salary, which latter is paid to his survivors if he dies while still in employment. If he retires at any time he receives this sum or a proportion thereof.

"In London the telegrapher receives 65 shillings ($15.60) per week, and in other towns, of which there are five classes, the maximum wage ranges from 56 shillings ($13.45) to 40 shillings ($9.60) per week.

"There is very little moving about in England. A man is likely to stop in one town all his life if he so wishes. The only movement is where he desires to shift to a town with a higher maximum.

"The ordinary holiday is twenty-one days, exclusive of Sundays, after five years' established service. A man has to serve two or three years before becoming established. Full sick pay is given for six months and half pay for the next six months, unless the officer is pensioned during that time.

"Whatever our complaints—and they are many—we are infinitely better off than telegraphers in railway employment, who are the only other body of telegraphers in this country.

"We have a good organization and have been very successful, but we suffer one drawback, and that is that all our officers are still in Government employment, and consequently we have not sufficient time at our disposal to do the work we should like."

The Reid Monument.

At the meeting of the Reid monument committee, at 253 Broadway, New York, on February 14, Mr. Charles P. Bruch was elected chairman and W. B. Dunn, secretary. Col. A. B. Chandler was elected treasurer of the fund. Twelve members were present and an executive committee of five was appointed to carry on the work, which is to secure funds for the erection of a suitable monument or a memorial to commemorate the telegraphic career of the late James D. Reid, whose remains are buried in Mount Hope Cemetery, Rochester, N. Y.

The executive committee consists of the chairman, secretary and treasurer of the general committee (ex-officio), David Homer Bates, L. B. Foley, J. R. Beard, R. J. Marrin and W. J. Dealy.

Extending the Telegraph in South Africa.—Two new telegraph lines are to be run from Capetown to Johannesburg, South Africa, and a third from Capetown to Durban, while others are contemplated.

Typewriters in Telegraph Service.

Few things have happened in many years of more interest to telegraphers than the recent purchase by the Western Union Telegraph Company of 10,000 Underwood typewriters.

It means the adoption officially by this great service of one machine to be used universally throughout the country in its many thousands of offices. Prior to today the typewriter question from a company's standpoint has never been taken up by any telegraph company. Operators were encouraged to buy machines, with the result that they purchased makes of every nature. The average telegraph office oftentimes took on the appearance of a second-hand typewriter exchange. One operator would be using the best character of machine, while another would be using a machine of less responsible manufacture.

The great increase in the business of the Western Union Company due to the popularity of the day- and night-letter service is partly responsible for the new innovation which will put the Underwood typewriter in every Western Union office.

The telegraph company believed that the efficiency of the service could be greatly increased by the use of writing machines and would make the telegraphic result positively legible.

The proposition of purchasing the machines was referred to a committee some months ago. This committee took into consideration, not only the necessity for the purchase of typewriters, but the practical and mechanical merits of all machines. The result was a report to the company in favor of the purchase and the adoption of the machine just ordered. Within a year every telegram, and particularly the day and night lettergram received over the Western Union wires, will be typewritten. When the method is fully in force, it is expected that a vast improvement in the character of the telegraph service will be apparent.

Western Electric January Sales.—January sales of the Western Electric Company were about 9 per cent behind those of January of last year, sales being goods billed out, but new business for the month was $500,000 in excess of the goods billed. January's total is at the rate of about $67,000,000 for the year, or approximately the same as 1911, whose total was $66,300,000. Foreign business shared in the decrease but not to the extent of domestic business. Extent of operations and gross business of the company has grown steadily, but the trend of the margins of profit has been smaller in the last few years. The cost of skilled and unskilled labor has increased, as has also the price of raw materials, but the price of manufactured goods has shown almost no advances. Against the proportionately greater increase in cost of operations, the company has set scientific management and the development of its sales organization and in both branches it has attained a high degree of efficiency.

Roebling Catalogue.—The John A. Roebling's Sons Company, Trenton, N. J., has just issued a handsomely gotten-up catalogue of its wire rope and wire products. It opens with a history of the business founded by J. A. Roebling in 1840, and gives a description of the enterprise as it is today. Many pages of the catalogue are devoted to telegraph and telephone wire, and wires of special shapes, and the many products of the well-known concern are very completely catalogued and illustrated. The illustrations deserve special mention for their high artistic merit and many interesting views of bridges, warships, etc., on which Roebling wires and cables are used are shown.

The catalogue bears evidence of careful preparation, and contains useful tables for telegraph and telephone engineers. Any one interested in the use of wire rope and wire can obtain a copy of this catalogue on application to the company's office at Trenton, N. J.

LETTERS FROM OUR AGENTS.

PHILADELPHIA WESTERN UNION.

Mr. Mahlon G. Moyer, traffic manager, has gone on a three months' vacation to the Holy Land. He will visit Switzerland, London, Paris and Berlin.

Mr. Frank Webb, general traffic manager, celebrated his fifty-fourth birthday on February 16 and was the recipient of many presents from the operating force.

Mr. I. D. Maize celebrated his seventieth birthday on February 28.

Telegraph and Telephone Age

No. 6. NEW YORK, MARCH 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

How We Progress. Opportunities Always Waiting.

One of the greatest mistakes the present generation makes is its tendency to believe that the opportunities offered today for advancement in the way of new inventions and the further development of existing means, are very slight compared with the opportunities offered in earlier days.

In plainer words, the idea seems to prevail that the field has practically been about covered and the best fruit nearly all gathered.

Now a little thought concerning the manner in which we progress will show that the period of time has nothing whatever to do with it. The fact is, today, or a hundred years hence, invariably offers the late-comer, with his better facilities and enlightenment, as great, if not greater, opportunities than were ever offered his predecessors. This fact should be obvious to any one who will remember that every "today" stands at the head of "yesterday" and consequently he sees farther ahead. "Today," also, not only possesses all the knowledge and experience of "yesterday" without having to first dig it out, but begins where the latter left off. The field undoubtedly still contains more and better fruit than man will ever be able to gather, so there is positively no excuse for any one to become discouraged.

The layman asks, "Well, what shall I invent? Everything I can think of has already been covered." That is not the way to approach the matter. His thoughts should be something like this: "What is needed, or wanted? or how can I improve the weak spots in some present device?" There is not a person living, possessing average intelligence, that could not name hundreds of things that would be valuable if evolved, or who does not see defects in nearly all industrial devices, the elimination of which would enhance their value greatly. Because a defect of long standing still exists, does not argue that the fault may not eventually be remedied. This is the field the layman should first explore, for it is in this direction that one is most likely to uncover a new quarry. In fact, nearly all our most valuable inventions were stumbled upon accidentally while in pursuit of other objects.

But let us be specific. For example, take the telegraph and telephone and look over the field.

Professor Morse discovered the fundamental principle involved in telegraphy, and invented a device for its practical operation. It was certainly a great discovery and met the wants of that particular "today," yet his invention would not meet the demands of the present "today;" nor would the professor be able to even relieve one of our quadruplex men for lunch were it possible for him to drop in on us again. His knowledge of electricity would be very meagre, indeed, compared with even that of a novice of today, yet had he, or some one else, not made the first step, there would have been no head or shoulder for followers to stand on, and thus see farther ahead.

It was many years after Morse's invention before the duplex and quadruplex were invented, and many more before the dynamo method of generating electricity was evolved, yet the officials of the companies and others knew what was required long before the means arrived.

Chemical batteries were expensive, cumbersome and unavailable for "divided" circuits where great volumes of current were required, but the dynamo solved the problem.

When the dynamo was installed, it was naturally concluded that nothing more could be desired, but it was soon discovered that it was unavailable for long quadruplex circuits requiring high potentials with the style of polechanger then used. How to get a "long" and a "short-end" current from the initial pair of dynamos was another problem to be solved, yet the man on deck at that period saw the weak spot and remedied it. That gentleman's name is Mr. Stephen D. Field, at one time the electrical engineer of the Western Union Telegraph Company. Mr. Field, who installed the dynamo system at 195 Broadway, New York, in 1879, and threw out approximately 100,000 cells of gravity battery, told the writer a very interesting story in connection with the old standard Field-key and walking-beam polechanger system of which he was the inventor.

Mr. Field said, as near as the writer can remember, that but little thought was taken of ways and means for surmounting this difficulty at first, as it had been decided to install a method devised and patented by Mr. F. W. Jones, who was afterward electrical engineer of the Postal Telegraph-Cable Company, New York. Mr. Jones' method was to use four dynamos, two positives, and two negatives, or two pairs of machines connected in series, as shown theoretically in the accompanying diagram.

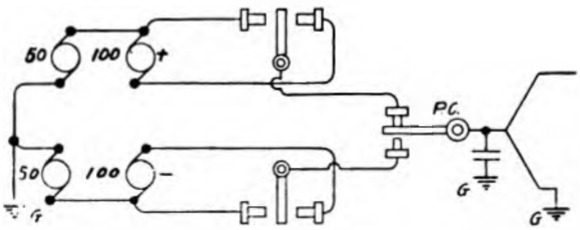


DIAGRAM SHOWING THE THEORY OF THE JONES QUADRUPLEX.

The "short" end was obtained by tapping between the two machines in series.

A few days before the installation was finished, Mr. Field concluded that there certainly was some way by which one machine might be made to furnish both currents and determined to solve the problem then and there. He tells us that for two or three days and nights the problem never left his mind. About four o'clock one morning, he woke from a troubled dream with the "leak" idea in his head, and the very next day set up an experimental quadruplex with resistance coil values obtained by experiment, and soon had the satisfaction of seeing the system in actual operation.

Later, Mr. George A. Hamilton, then electrical engineer of the Western Union Company, worked out the mathematical problem for the resistance coils and developed the formula since used.

This story is repeated here merely to show that there is not only always present needs, but that there is probably a remedy for all defects if one will but persist in the search until it is found.

For example, one of our greatest needs today, is a satisfactory remedy for the harmful effects of "induction." So far, no one has been able to find it, because it is an inconstant quantity, while our magnets are operated by practically constant values of electrical energy. But it is possible that some day some one may utilize this enemy usefully and compel him to lift himself by his own boot straps or keep quiet.

Recent Telegraph and Telephone Patents.

ISSUED FEBRUARY 13.

1,017,054. Telegraph Sending Machine. To J. A. Hulit, Topeka, Kan.

1,017,064. Galvanic Battery. To E. C. Smith and E. L. Marshall, Cleveland, Ohio.

1,017,080. Storage Battery. To J. P. Clare, Stratham, N. H.

1,017,085. Telephone System. To F. M. Davis, Chicago, Ill.

1,017,169. Method of and Apparatus for Transmitting Signals over Telegraphic Circuits. To L. M. Potts, Baltimore, Md.

1,017,362. Sanitary Protector for Telephone Transmitters. To C. Adams, New York.

1,017,398. Telegraph Key. To J. E. Folsom, St. Louis, Mo.

1,017,616. Telephone Repeating Apparatus and Circuits. To C. Adams-Randall, Augusta, Me.

1,017,617. Apparatus for Increasing the Efficiency of Telephone Lines. To C. Adams-Randall, Augusta, Me.

ISSUED FEBRUARY 20.

1,017,680. Sanitary Mouthpiece for Telephones. To M. M. Marcuse, New York.

1,017,967. Telephone Selecting Device. To F. E. Granger, Aberdeen, S. D.

1,018,082. Telephone Transmitter. To C. R. Rogers, Waverly, N. Y.

1,018,115. Telegraphic System and Apparatus. To C. Kinsley, Chicago, Ill.

1,018,182. Telephone Transmitter. To F. Gottschalk, New York.

1,018,226. Telephone Repeating System and Apparatus. To C. Adams-Randall, Augusta, Me.

1,018,375 and 1,018,376. Signaling System. To H. O. Rugh, Sandwich, Ill.

ISSUED FEBRUARY 27.

1,018,646. Automatic Telephone Instrument. To J. Weil, Mansfield, Ohio.

1,018,666. Telephone System. To H. F. Joeckel, Camp Point, Ill.

1,018,730. Mouthpiece for Telephone Transmitter. To C. M. Swingle and A. M. Miltenberg, Chicago, Ill.

1,018,940. Electrical Communicating Apparatus. To T. M. St. John, New York.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange March 11:

Amer. Telep. and Teleg. Co.	146
Mackay Companies	81
" " pfd.	69
Western Union Tel. Co.	84½

Telegraph Statistics of British Colonies.—The telegraph mileage in the British colonies in 1910 as shown by recent statistics was as follows: British India, 72,746; Australia, 43,492; Canada, 36,517; New Zealand, 11,316; Cape Colony 8,466; Rhodesia, 4,404; Nigeria, 6,489.

Mr. J. F. Sheldrake of Philadelphia, Pa., writes: "The receipt of TELEGRAPH AND TELEPHONE AGE is always awaited with eagerness, and, in addition to the valuable knowledge derived from its educational articles, it affords me untold relaxation from the daily routine in its social and personal columns."

Personal.

Mr. Thomas A. Edison has gone to Fort Myer, Fla., to spend a few weeks.

Lena J. Brant, wife of the late John Brant, secretary of the Old-Time Telegraphers and Historical Association, has gone on a trip to the Holy Land.

Mr. A. W. Orton, an old-time telegrapher and a member of the United States military telegraph corps, is now a prominent business man of Rome, N. Y. He is president of the Rome Box and Lumber Company, which is one of the leading industries of that city.

Mr. Melville E. Stone, general manager of the Associated Press, New York, will address the Kansas State Editorial Association at its annual meeting in Leavenworth, Kan., in April.

Dr. Alexander Graham Bell, of Washington, D. C., has been awarded the Elliott Cresson gold medal by the Franklin Institute, Philadelphia, Pa. This medal is the highest gift in the Institute.

Col. R. C. Clowry, formerly president of the Western Union Telegraph Company, New York, accompanied by his secretary, Mr. Frank J. Scherrer, has returned from Jekyll Island, Ga., where he spent a few weeks.

Mr. Arthur Lockwood, who has been connected with the Western Electric Company for some time past, has accepted a position in the sales department of the Brookfield Glass Company, New York.

Mr. B. D. Snyder, second day wire chief of the Western Union Telegraph Company at Dallas, Tex., has resigned to engage in the real estate business in that city. He is succeeded by Mr. C. V. Depew of Omaha, Neb.

Major George O. Squier, of the Signal Corps, United States Army, has been appointed military attaché to the United States Embassy at London, and will leave for London in June. Meantime he will make a trip to the Isthmus of Panama to select sites for five wireless stations.

Mr. George M. Myers, an old-time telegrapher and a capitalist of Kansas City, Mo., is taking a trip around the world on the steamer "Cleveland" of the Hamburg-American Line. When last heard from he was in Honolulu on his way to Japan, where he is at the present time.

Mr. J. Frank Howell, a former telegrapher, and now a prominent stock broker, is a candidate for the presidency of the Consolidated Stock Exchange, New York. One of the conditions of his acceptance of the office, however, is that it be made a non-salaried position as on the New York Stock Exchange.

Mr. Franklin H. Reed has severed his editorial connection with *Telephony* of Chicago and joined the organization of The Traffic Service Bureau, of Chicago and Washington. His time will be largely devoted to the development of The Traffic Service Bureau's paper, *Public Service Regulation*, the official journal of the National Association of Railway Commissioners.

Mr. B. M. Downs, vice-president and a director of the Brookfield Glass Company, New York, has resigned, and will take a rest from business cares before entering upon new duties. Mr. Downs has been connected with the Brookfield Glass Company for over a quarter of a century, and has a host of friends in the electrical field, who will wish him much success in his future business relations.

Dr. A. E. Kennelly, professor of electrical engineering at Harvard University, Cambridge, Mass., and a former telegrapher, on March 1, gave an interesting talk on "Electrical Communication," before the Luncheon Club branch of the New England Section of the National Electric Light Association, Boston, Mass. He dwelt particularly upon ocean cable telegraphy, wireless telegraphy and telephony.

Major W. A. J. O'Meara, engineer-in-chief of the Postal Telegraphs, London, England, owing to ill-health has resigned, and has been appointed engineering special commissioner, charged with the duty of examining and reporting upon the European telegraph and telephone systems for the British government.

Mr. W. Slingo, assistant engineer-in-chief of the Postal Telegraphs, London, has been promoted to be engineer-in-chief, vice Major W. A. J. O'Meara, resigned. Mr. Slingo is a well-known electrical engineer, and is a co-author of a handbook on electrical engineering, published in England.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Chas. C. Adams, vice-president, New York, was in Baltimore recently on business in connection with the coming national convention.

The series of conferences between the general superintendent and the superintendents of the eastern division of the Postal Telegraph-Cable Company, and the president, the vice-presidents and other officers of the company in New York, was held on Monday, Tuesday and Wednesday, March 4, 5 and 6. Mr. Mackay presided over the meetings. He was deeply interested and took an active part in the discussions, which were confined to subjects relating to efficiency of service and economy of operation.

The following-named gentlemen were present at the conference: Clarence H. Mackay, president, Edward J. Nally, vice-president and general manager, Charles C. Adams, vice-president, Charles P. Bruch, vice-president and assistant general manager, Welcome I. Capen, vice-president, Minor M. Davis, electrical engineer, F. F. Norton, traffic manager, J. F. Skirrow, associate electrical engineer, Charles Shirley, assistant traffic manager, Edward Reynolds, auditor, E. B. Pillsbury, general superintendent, Leona Lemon, division superintendent, E. Kimmey and C. F. Leonard, superintendents, New York; C. E. Bagley, superintendent, Philadelphia, Pa., Harvey D. Reynolds, superintendent, Buffalo, N. Y.; C. A. Richardson, superintendent, Boston, Mass., and Henry Scrivens, superintendent, Pittsburg, Pa.

On Monday evening, Mr. Pillsbury gave a dinner at the Crescent Athletic Club, Brooklyn, to his superintendents, and on Wednesday evening, Mr. Mackay gave a dinner at the Hotel Lafayette, followed by a theatre party, to all who participated in the conferences.

A conference of the general superintendent and superintendents of the Southern Division will be held on March 26, 27 and 28. Papers will be read on "Efficiency of the Service," by Jesse Hargrave, division superintendent; "Receipts," by W. C. Daviet, district superintendent, and "Expenses," by G. W. Ribble, district superintendent, all of Atlanta, Ga.

A conference of the general superintendent and superintendents of the Western Division was held in the executive offices, New York, March 12, 13 and 14. Papers were read by Mr. G. E. Paine, superintendent, Chicago, Ill., on "Efficiency of the Service;" Mr. W. C. Black, superintendent, Denver, Col., on "Receipts," and by Mr. H. G. McGill, superintendent, Chicago, Ill., on "Expenses." Mr. Paine's paper was discussed by Mr. J. F. Looney, Chicago, Ill., Mr. Black's paper, by Mr. A. L. Lafferty, Chicago, Ill., and Mr. McGill's paper, by Mr. A. B. Richards, Kansas City, Mo. Those present were Messrs. E. W. Collins, general superintendent; S. H. Mudge, division superintendent; C. M. Baker, division general superintendent of plant, and H. C. Shaw, division electrical engineer, H. G. McGill, G. E. Paine, J. F. Looney, A. L. Lafferty, W. P. S. Hawk and C. A. Comstock, superintendents, Chicago, Ill.; A. B. Richards, superintendent, Kansas City, Mo., and W. C. Black, superintendent, Denver, Col. The superintendents of the Eastern Division and executive officers of the company were also present.

The Postal Telegraph-Cable Company in connection with the German Cable Company has arranged with the government telegraph administrations for telegraphic remittances of money to all points in Germany, Switzerland and Luxemburg, from the United States.

Construction work has begun on the new Broadway subway adjoining 253 Broadway, and it is probable that a station will be established in this building. The barber shop in the basement has been removed in order to make room for the subway.

Mr. Arthur W. Cowles, cashier of the Springfield, Mass., office of this company, was married to Miss Clara Pauline Schortmann of the same place, on February 29.

Mr. E. W. Miller, chief operator at Philadelphia, Pa., was a recent executive office visitor.

The Mackay Telegraph & Cable Company is building its lines in the direction of Alexandria, La., and expects to open an office in that place soon.

Mackay Telegraph Lines in Texas.—The Mackay Telegraph & Cable Company will build a telegraph line along the right-of-way of the Texas & Pacific Railroad from Texarkana to Sherman, Tex., and from Texarkana to Shreveport and Alexandria, La., and along the 'Frisco line from Sherman to Dallas.

Atlanta Postal Club Election.—At the election of officers of the Postal Telegraph Club of Atlanta, Ga., on February 27, Mr. W. C. Daviet was reelected president. The other officers elected were, A. M. Beatty, vice-president; L. A. Minor, secretary; F. F. Pursley, assistant secretary; G. W. Oliver, treasurer; G. W. Ribble and D. C. Delaney, governing committee. The annual banquet will be held on March 23, and it is expected that prominent telegraph men from different sections of the country will be present.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager, accompanied by Mr. T. W. Carroll, assistant to the general manager, and Mr. W. C. Merly, Mr. Brooks' secretary, are on a trip through the South on company business. The trip will take them as far as Jacksonville and Tampa, and they expect to return to New York about March 16.

Mr. W. E. Athearn, engineer of equipment, New York, has returned to his office after a three-weeks' trip through the South, including Havana, Cuba. He was much impressed with the progressiveness in the Southern division, and found equipment and operating staffs at all points, up-to-date in all respects. He was accompanied by Mrs. Athearn.

Mr. William L. Jacoby has been elected vice-president of the American District Telegraph Company of New Jersey. His headquarters are in the Riker Building, corner of Broadway and Dey Street, New York.

Mr. L. D. Beall, formerly chief clerk to Mr. E. M. Mulford, division commercial superintendent, New York, has been transferred to the general manager's office, as assistant to Mr. John C. Willever. Mr. Wilson S. Fowler has been promoted to be acting chief clerk, vice Mr. Beall.

Conferences were held by Mr. A. C. Kaufman, commercial agent, New York, with the local officials in Philadelphia, Baltimore and Washington, during the last week in February.

Mr. E. S. Peterson has been appointed acting chief operator at Helena, Mont., vice L. P. Grover, promoted to be chief operator at Salt Lake City, Utah.

The managers of the eighth district, Western Division, held a conference in Minneapolis, Minn., February 27. Among those present, besides the managers, were W. J. Lloyd, division traffic superintendent, and M. T. Cook, division commercial superintendent, Chicago, Ill.; A. D. Bradley, district commercial superintendent, and L. F. Wise, manager, Minneapolis, Minn. The managers were from Minnesota, North Dakota, South Dakota, Northern Wisconsin and Northern Michigan.

Mr. W. J. Sullivan, night chief operator at Detroit, Mich., has been appointed chief operator vice Charles H. Addison resigned. Mr. E. C. McConnell, assistant wire chief, has succeeded Mr. Sullivan as night chief. Mr. Sullivan was, from 1895 to 1897, assistant day traffic and wire chief, and all-night chief from 1897 to 1905. In 1905, he became day traffic chief and served in that position until 1909, when he became night chief, which position he held until his promotion to be chief.

This company has prepared for distribution among its patrons a leaflet giving tables of tolls for day letters, night letters and day messages. The tables show at a glance the cost of messages of any number of words up to 200 at various rates.

Some quick work was done in establishing a new office at Easton, Pa., at the time of the destruction of the old office by fire, on March 5. The fire started next door to the telegraph office at 5 a. m., and when it was seen that the office would be destroyed, new quarters were opened in a vacant store across the street, and wires were working to New York, Philadelphia and Scranton, from the new office while the former office was still in flames. This feat was accomplished by the united efforts of district plant superintendent W. J. Higgins, of New York; D. Roth, superintendent of construction; T. J. Smith, district wire chief; W. H. Collins, district plant chief, and C. C. Lever, general wire chief, who were all on the ground early, directing the work of establishing the new quarters.

Western Union Cable Unification.

The eight trans-Atlantic cables of the Western Union, Anglo-American and Direct United States companies were consolidated on March 8 under one operating management and will be known hereafter as the Western Union Cable System. This is the result of the recent leasing of the Anglo and Direct companies by the Western Union.

Announcement was also made of the following appointments for the new system: J. H. Carson, London, general operating manager; T. W. Goulding, London, European commercial manager; J. C. Willever, New York, United States manager.

The European headquarters will be in the Anglo-American Building, New Broad Street, London; the American headquarters will be in the Western Union Building, 195 Broadway, New York. The present receiving offices or their equivalent of the three companies in the various large cities of the world will be maintained, but all operations will be conducted by the new unified management.

Poles in Richmond.—About six years ago the Richmond, Va., city council passed an ordinance for placing all electric wires underground, and attached a penalty for each day the provisions of the ordinance were not obeyed after a certain date. The Western Union Telegraph Company not complying because of certain unreasonable provisions in the ordinance litigation resulted and the federal court upheld the legality of the ordinance. The Western Union then appealed the case to the Supreme Court of the United States, which now has the matter before it.

The Western Union in Kentucky.—The County Court of Jefferson County, at Louisville, Ky., has decided that the Western Union Telegraph Company has the right, under the statutes of Kentucky, to condemn property along the Louisville & Nashville Railroad in that State, for the erection of a pole line.

The Cable.

The Commercial Cable Company announces the extension of the deferred cablegram service to Argentine Republic, Spain, Canary Islands, Spanish possessions in North Africa, Morocco (except Casa Blanca, Mogador and Rabat), Senegal, Upper Senegal, Niger, and Mauritania. The rules governing this service are the same as those already announced with reference to the same class of service with other countries.

French Cable to Porto Rico. — The French Cable Company has made application to the United States government for permission to make a landing on Porto Rico of a branch of its Hayti cable.

Alaska Cable Repaired. — The government cable to Alaska which was out of service for several days owing to a break has been repaired by the cable steamer *Burnside*. The damage was caused by submarine slides.

Pacific Cable Repaired. — The break in the Midway-Guam section of the Commercial Pacific Cable was repaired on March 9, thus restoring communication with China, Japan, the Philippine Islands and the Dutch East Indies.

Deferred Cable Service from South Africa.—The Union of South Africa now accepts plain-language cablegrams, deferred not over twenty-hours, at one-half the ordinary charge, for the United Kingdom, all British possessions (except Egypt and the Sudan), the United States, France, Germany, Portugal and the Portuguese colonies.

The Reid Monument.

The Reid monument committee is preparing a pamphlet relating to James D. Reid which will be ready for distribution soon. It will be in the nature of a memorial and will set forth the object for which the committee was organized. It will also contain a reprint of Mr. Reid's biography from the "Telegraphers of Today;" reprints of the accounts of Mr. Reid's death and funeral from TELEGRAPH AND TELEPHONE AGE, and a copy of a letter written by Mr. Reid in which he states that he originated the telegraphic signal "73."

The committee is rapidly getting things into shape so that it can go ahead with its work in raising funds for the proposed memorial.

The Telephone.

Mr. B. E. Sunny, president of the Chicago Telephone Company, Chicago, Ill., will address the Commonwealth Edison Company Section of the National Electric Light Association, Chicago, on March 19.

Mr. H. B. Thayer, president of the Western Electric Company and vice-president of the American Telephone & Telegraph Company, New York, returned from Europe on the steamer *Lusitania*, arriving on March 14.

Mr. Alfred E. Holcomb, tax attorney, American Telephone & Telegraph Company, New York, delivered an address entitled "One Assessment—One Levy," at the second State Tax Conference held at Buffalo, N. Y., January 9, 10 and 11. The address has been reprinted in pamphlet form.

New Channel Telephone Cable.—The French government recently laid a new submarine telephone cable across the English channel, between Abbot's Cliff, Dover, England, and Cape Grisnez, France. It has two metallic circuits and is of the continuously-loaded type.

Long Private Telephone Line.—One of the longest private telephone lines is being built by the Southern Sierras Power Company, from San Bernardino, Cal., to its power plants near Bishop, Cal., a distance of 240 miles. The line will be used for public as well as for private service.

Telephone Herald Suspended.—The New Jersey Telephone Herald which was organized at Newark, N. J., to furnish various forms of entertainment by telephone during specified hours of the day and night has suspended after an existence of four months. Lack of capital is the cause given.

Telephone Party.—Society has taken up the telephone as a means of entertainment. A "telephone party" was given by a society young lady in New York, March 9, a feature of which was conversation by telephone between the guests. Miniature telephones of silver were given as favors.

Telephone Protection of Hen Houses.—A Connecticut poultry raiser ran a telephone circuit between his hen house and his bed room. At daybreak one morning, he was awakened by the loud cackling of his hens, and, seizing his shot gun, he started for the scene of the commotion. He shot and killed the thief, which was a mink.

Telephone Rate Making. — Mr. Alonzo Burt, first vice-president and treasurer of the Wisconsin Telephone Company, Chicago, Ill., delivered an address on "Some of the Problems of Telephone Rate Making," before the Wisconsin State Telephone Association, at Madison, Wis., on February 15. It has been published in pamphlet form, and gives much valuable and timely information on this important subject.

Consolidation in Sioux City.—The consolidation of the Sioux City, Iowa, Telephone Company with the Bell interests, was consummated in that city recently, the consideration being $2,-500,000. The local company operates an automatic system and the new management will let the public decide whether it desires the automatic or the manually-operated system. The local company has 15,000 subscribers.

Telephone Election. — Mr. H. J. Pettengill, president Southwestern Telegraph & Telephone Company, Dallas, Tex., has been elected president of the Missouri and Kansas Telephone Company, vice Mr. C. S. Gleed, who has been elected chairman of the Board of Directors of the Southwestern Telegraph & Telephone Company. Mr. E. D. Nims was elected vice-president and treasurer; Mr. E. S. Bloom, second vice-president, and J. K. Wass, auditor. Mr. Benjamin S. Reed was appointed general manager of the St. Louis Division to succeed Mr. F. R. Mott.

Telephone and Telegraph in the Kongo.—All telephone and telegraph lines of the Kongo are owned and operated by the Belgian Government. The wires as a rule extend along railroad lines or the Kongo River and are used for both telephone and telegraph service. The approximate total mileage of wire is 1,685, of which 685 is not yet equipped with telegraph instruments. The charges for telephone messages range from about forty to ninety cents, according to distance, for five minutes' conversation, and from forty cents to $1.10 for fifteen words sent by telegraph.

A Petition Over Two Hundred Feet Long.—The Public Service Commission, Second District, New York, received a petition 226 feet in length, signed by 4,160 persons, asking the Commission to use its influence to induce the New York Telephone Company to make reasonable terms for the retention of public telephones in drug stores. The New York Telephone Company recently put into effect a regulation allowing druggists only ten per cent. of the receipts from coin slot instruments instead of twenty per cent. and upward as formerly. The company has, however, modified its regulation in such a manner that the druggists will be able to get practically their former commission.

The Washington-Boston Underground Line.

The American Telephone & Telegraph Company has completed the duct work for its Washington-Boston underground line, and expects to have the cables all drawn in by next fall.

This line will be the longest of its kind in the world, and was undertaken to insure service between the two points and intermediate cities at all times.

The distance between the two cities is about 475 miles, and an interesting feature of the cable is that it is to be phantomed and so designed that the phantom circuits, as well as the side circuits, of which they are made up, can be loaded.

A full description of this line was published in our issue for June 16, 1911.

Rules for Use of Telephone on Northern Pacific Railway.

Following are the rules of the Northern Pacific Railway Company for the guidance of its employes in the use of the telephone in the transportation department:

Speak directly into the transmitter in a moderate tone.

Where jack boxes are used plug must be left disconnected from the jack except when in actual use.

To answer a call: Insert plug in proper jack, take down receiver and *speak name of the station.*

To call dispatcher: Insert plug in proper jack, take down receiver and listen; if line not in use, say "Dispatcher" and name of your station.

Except train orders, which will be made complete in the usual manner, all communications will be acknowledged by "All Right" or "O. K.," followed by name of person receiving them.

In transmitting and repeating train orders, the following method will be observed:

Numbers one to nine inclusive will be pronounced, and then spelled thus: 1, O-N-E; 5, F-I-V-E, etc.

In numbers above nine, except time in the body of train orders, the figures will be pronounced separately, and then the whole number pronounced, thus: 1-0, ten; 3-2-5, three twenty-five; 2-3-7-8, twenty three seventy eight: (the figure 0 will be pronounced as though spelled Oh).

Time in the body of train orders, except in schedule orders will be pronounced and then spelled thus: 1-0-3-5; T-E-N T-H-I-R-T-Y F-I-V-E: 6-1-5; S-I-X F-I-F-T-E-E-N.

In transmitting and repeating time in schedule orders the figures will be pronounced separately and then the whole number pronounced, thus: 1-0-3-5, ten thirty five, etc.

Names of stations in the body of orders, except when repeating schedule orders, will be pronounced and then spelled thus: Hawley, H-A-W-L-E-Y; Winlock, W-I-N-L-O-C-K; etc.

Example of order as transmitted and repeated:

Number 1 O-N-E engine 2-1-6-2 twenty-one sixty-two waits at Missoula M-I-S-S-O-U-L-A until 1-2 3-5 T-W-E-L-V-E T-H-I-R-T-Y-F-I-V-E P. M. for Number 6-0-2 six hundred and two engine 2-3-7-8 twenty-three seventy-eight.

Example of same as written:

No. 1 eng 2162 waits at Missoula until 12 35 twelve thirty five p m for No. 602 eng 2378.

Trains should be reported thus:

OS Bluffton Number 1 by 4-20; OS Heron extra east 2-7-2-8 by 6-1-0, etc.

Trains may be reported without first calling the dispatcher, but the dispatcher should acknowledge getting the report by saying "All Right" or "O. K."

When in doubt, spell names and numbers. Confusion of similar sounds can be overcome by spelling such letters as T, B and C, etc., thus: T-E-A; B-E-E; S-E-E; etc., when necessary. Repeat until certain of being understood correctly.

When circuit is interrupted or selector signal inoperative, operators will cut in frequently in an endeavor to keep in touch with the dispatcher.

Portable Train Set as a Time-Saver

The loss of time entailed by the inability of crews of stalled trains and of repair gangs to communicate with headquarters from places along the right-of-way led the Lehigh Valley Railroad to purchase, in all, over seven hundred Western Electric portable telephone sets during the past year. Each train unit is furnished with one of these sets, as is each bridge crew and each track repair gang, and the officials of the road state that the purchase of these sets is one of the most profitable investments the company has ever made. As an instance of the utility of this modern device, one of the track repair gangs was sent out on this road recently with its first portable set, to replace worn rails. The "Black Diamond" express was due, according to schedule, just about the time the track foreman was ready to replace several rails. Under the old order of things, the track foreman would have waited until the express had passed before beginning work. He communicated by means of his portable set with headquarters and learned that the "Black Diamond" was two hours late. Knowing this, he went ahead with his work, made the rail replacement and had ample time to move on to the next place of operation before the train passed.

Among other uses, it may be mentioned that the bridge inspector can report minor troubles to headquarters and have a repair gang start toward the scene of action in less time than he could formerly reach a signal tower. In an emergency, such as a wreck, the train crew can communicate immediately with the dispatcher and give detailed information concerning the extent of the accident. The railroad officials can then, with a minimum of delay, arrange for the re-routing of trains and the hurrying of the wrecking and relief trains to the scene.

Canadian Notes.

The Great Northwestern Telegraph Company will soon install motor-generators in its Ottawa, Ont., office, to replace the storage battery plant. Mr. Charles E. Davies is supervisor of equipment.

Wireless Cradle — Auto-phono-cinama-cradle is the name of a French invention. For the benefit of those who cannot translate the name it may be stated that it means a combination of an automatic cradle, a phonograph and a moving picture machine. Baby's cries are recorded on a disk which starts wireless waves and the waves set the rocking mechanism in motion. The same waves start the phonograph and the moving picture machine, and ring the wireless telephone in the mother's or nurse's room.

Telephone Pioneers of America.

BERNARD E. SUNNY.

Mr. Bernard E Sunny, president of the Central group of Bell Telephone Companies, with headquarters at Chicago, Ill., is one of the most prominent telephone executives in the United States and is yet a young man. He possesses executive and technical talent of high order, besides being a master in the art of organization and with an intelligent mind and a high personal character he has won his way through life.

Mr. Sunny was born in Brooklyn, N. Y., in 1856, and began his business career in 1872, as a messenger in the employ of the Atlantic & Pacific Telegraph Company, later becoming an operator. In 1875 he went to Chicago, there continuing in the employ of the telegraph company he had served in the East and soon became night manager of the office, a promotion that was shortly afterward followed by his being advanced to the position of manager.

B. E. SUNNY,
President Central Group of Bell Telephone Companies, Chicago.

The telephone then in its infancy attracted the attention of Mr. Sunny. In 1879 he was offered the superintendency of the Bell Telephone Company and resigned from the telegraph to enter this new field of electrical transmission. In the subsequent merger of the Bell and Edison companies, thus forming the Chicago Telephone Company, Mr. Sunny continued as superintendent. He remained identified with telephone interests until 1888, and was closely associated with the first successful efforts to operate telephone wires underground.

In 1888 Mr. Sunny became president of the Chicago Arc Light and Power Company, which position he retained for two years.

His next change was to accept the Western management, with headquarters at Chicago, of the Thomson-Houston Electric Company, and in this responsible post he remained for two years achieving much to advance the interests of that corporation in the Western field. When the organization of the General Electric Company was brought about through the merging of the Thomson-Houston, the Brush and the Edison General Electric Companies, Mr. Sunny was called to manage its Western interests. He was made a vice-president of the General Electric Company in 1906.

In 1908 Mr. Sunny resigned his position with the latter company, and went back to the telephone service, after an absence of twenty years, as vice-president of the American Telephone & Telegraph Company and president of the Chicago Telephone Company. In addition to the offices named he is also president of the Central Union, Michigan State, Cleveland and Wisconsin Telephone Companies. His return to the telephone field was largely in response to the demand for a man who could combine executive ability with technical knowledge and a practical appreciation of the complex problems of the telephone service.

Mr. Sunny has always taken an active interest in political affairs. He was president of the Civic Federation of Chicago for four years, and effected the successful campaign for an amendment to the Constitution of the State which gave Chicago its splendid municipal court in place of the disreputable justice court system which prevailed for many years, and it will also permit the City of Chicago to secure a much needed new charter whenever the latter can be agreed upon.

He was appointed president of the Police Pension Fund by a Democratic mayor, and served for four years, and later was appointed by a Republican governor, president of the Board of Trustees of the Eastern Illinois Hospital for the Insane, which position he filled for a similar period. Mr. Sunny is a member of the American Institute of Electrical Engineers, and a few years ago was given the honorary degree of Doctor of Engineering by the Armour Institute of Technology, Chicago.

He is a director in the First National Bank of Chicago, the Chicago City Railway Company, the General Electric Company, the Western Electric Company and the Public Securities Corporation.

English Telegraph Girls.—During a meeting of the parliamentary committee in London on the subject of the application of English telegraphers—male and female—for higher pay or shorter hours, the remark was made by an opponent of the petition that the duties of female telegraphers are "purely mechanical." This remark furnishes the text for an article published in the London *Daily Express* of February 8, in which the hardships in the life of a telegraph girl are portrayed, to disprove the assertion that the duties are mechanical. The article indirectly reflects one of the results of government ownership of the telegraphs, and it is safe to say that no private company would countenance such exacting and discouraging conditions as those prevailing in the government telegraph service in England.

The Function of Crystal Detectors.

BY CLAYTON I. HOPPOUGH, VALPARAISO, IND.

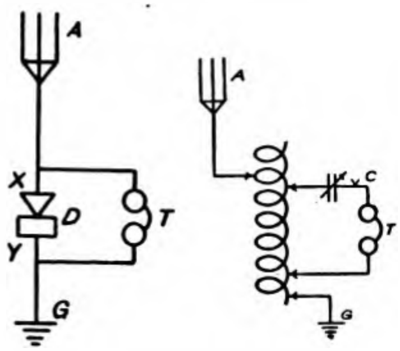
A misconception exists among many amateur and professional wireless operators regarding the use of detectors for receiving wireless signals says *Popular Electricity*. The misconception is that the detector itself is more sensitive than the ordinary current detecting devices such as delicate galvanometers, relays, telephone receivers and the like. This is an error in belief, and has probably been brought about by a lack of knowledge regarding the conditions under which the detector operates, and the exact manner in which it performs its duty.

It must first be remembered that in receiving signals we are handling currents of very high frequency. If a telephone receiver be connected to a tuning device as in Fig. 1 (the condensers and tuning coils being adjusted to a wave length of 300 meters) and we are to expect the reception of signals to result from the use of such a "hook-up," it would necessitate the diaphragm moving back and forth at the rate of 2,000,000 vibrations per second. For the diaphragm to accomplish this is mechanically impossible. Furthermore, as the telephone receiver is wound with many turns of fine wire, its self-induction is relatively great, and thus, the high frequency electromotive force generated by the action of the waves in cutting the conductors of the aerial would produce a very weak current flow through the telephone receiver. Even if the telephone diaphragm did vibrate at the rate of 2,000,000 per second, our sense of hearing would not detect the vibrations, as the greatest number of air vibrations which the ear is capable of detecting is somewhere between 30,000 and 40,000 per second. It is therefore necessary to use some appliance which will transform these rapidly reversing currents into an effect that will cause the telephone to set in motion air vibrations whose number per second are within the limits of audibility.

Probably one of the most common devices accomplishing this transformation is the carborundum detector, and as the principles governing the action of other common mineral detectors such as silicon, perikon, molybdenite, ferron and pyron coincide with those of carborundum, the statement of a few facts regarding the action of the latter may assist in understanding the action of most crystal detectors.

In 1906, General H. H. C. Dunwoody, of the United States Army, discovered that crystals of carborundum, whose chemical name is carbide of silicon, possessed the property of detecting electromagnetic waves. In the description contained in his patent application, there seems to be no explanation of why the crystals of carborundum act as a detector. Mr. G. W. Pickard in 1906 ascribed to carborundum crystals the property of unilateral conductivity; that is, that current could be made to flow freely through the crystal in one direction, but encountered great resistance when the crystal was reversed and current made to flow through it in the opposite direction. It was found also that a current passing through a carborundum crystal does not obey Ohm's law. This latter characteristic was found by F. Braun to be possessed by various minerals, such as copper pyrites, iron pyrites, galena, and copper sulphide showing traces of antimony in combination.

It is, however, to Professor Pierce of Harvard University that we are indebted for a consistent explanation of the reason for the wave detecting properties of most mineral detectors. After Professor Pierce had published the results of some of his experiments, the writer collected a quantity of carborundum crystals at random, and with the aid of delicate instruments obtained a current voltage curve which was approximately the same for seven crystals compared. In doing this each crystal was clamped between two spring electrodes and the surfaces offered for contact as well as the contact pressure was maintained as nearly constant in all cases as possible. The curve showed that the current obtained at two volts constant electromotive force through the crystal was about four micro-amperes. However,



FIGS. 1 AND 2.

the resistance of the crystals varied greatly, and three specimens, hereinafter designated as (A), (B) and (C) measured 101,790, 21,900 and 992 ohms one way respectively, and 31,960, 12,910 and 490 ohms when the current was reversed.

Attention is now invited to a brief consideration of the currents from the aerial upon a wireless receiver. They are alternating in character, flowing one way, then changing and flowing in the opposite direction. Also, as has been previously stated, they are of high frequency. Now considering Fig. 1, assume that an alternating current is attempting to flow through the carborundum crystal from X to Y. As already noted from the results obtained with the seven crystals, conditions remaining the same, more current will flow from X to Y than from Y to X. Accordingly the resultant current will partake more of the nature of a pulsating direct current than of an alternating current. These pulsating currents will cause the diaphragm of the telephone receiver shunted about the detector to be continuously pulled in the direction of the telephone magnets, because, although the pulsations may be at the rate of perhaps a million a second, the inductance of the telephone circuit changes the whole number into an effect similar to that produced by a continuous direct current. The energy of each wave train after it has been transformed by the detector will cause one pull only upon the diaphragm, thus causing a click for each wave train, a succession of clicks forming the characters of the telegraphic code. It must not be understood from the last statement that one wave train would necessarily correspond to a dot of the code, as the whole number of wave trains per signal depends upon the rate of sending, the length of spark, the capacity of the condensers and the frequency of the current upon the primary circuit of the wireless transformer.

We have, then, by the use of a carborundum crystal obtained the desired result; that is, transformed a train of oscillations into a pulsating direct current which produces audible air vibrations. The whole action is due to the fact that the crystal is a partial rectifier of alternating current. It is from the latter fact that mineral detectors are nearly all termed "crystal rectifiers."

In the foregoing experiments by the writer an interesting comparison between the sensitiveness and resistance of the crystals was developed. Crystal (A) whose resistance was 101,700 and 31,960 ohms developed a good buzzer test, and was not sensitive enough to detect signals from a two kw. commercial station situated about 40 miles from the receiving aerial. Crystal (B) whose resistance was 29,900 and 12,910 ohms did not prove as sensitive to a buzzer test as (A) yet detected signals from the same station weakly. Crystal (C) measuring 992 and 490 ohms resistance was weakly sensitive to a buzzer test, while the signals from the commercial station were very clear and loud.

It will be noted that although the measured two-way, ohmic resistance of crystal (A) was in a ratio of 3.14 to 1, the ratio of crystal (B), which fell to 1.69 to 1 was a more sensitive detector of electromagnetic waves. It would seem from this that a great difference of the two-way, ohmic resistance of a particular crystal is not always a safe prediction of the sensitiveness of the crystal, and that a good buzzer test does not always signify that the crystal is most sensitively adjusted for wave detection.

The above results would indicate that if we could obtain a crystal in which the resistance offered to a current flowing through it one way would be equal to the resistance offered to a current passing through it in the opposite direction, it would be a more sensitive detector of electromagnetic waves than either (A) or (B). However, this is only true within certain limits, as the author, by additional experiments with other crystals than those mentioned, found that when the two-way, ohmic resistances differed by less than 20 per cent., the crystals possessed indifferent detecting qualities, regardless of contact surface, contact pressure or size of crystals.

The most sensitive carborundum crystal examined had a two-way resistance of 1212 and 461 ohms, was about the size of a pea and was jet black.

Owing to the difficulty of keeping the silicon and perikon detectors in adjustment during the application of an electromotive force sufficient to measure their resistances, using the instruments at hand, no accurate curves or resistance measurements were obtained, but a specimen of silicon with a fine steel wire contact delicately adjusted measured about 54,000 and 710,000 ohms. In the same manner, a perikon detector consisting of a piece of zincite in contact with bornite measured approximately 61,290 and 11,212 ohms resistance. The silicon firmly clamped and held in heavy contact as was the carborundum showed only twenty-one ohms resistance both ways, and a non-sensitive, heavy contact perikon detector offered thirty-two ohms resistance to a current flowing through it either way, showing that at last with the silicon and perikon detectors it is the contact rectification phenomena with which we have to deal.

In conclusion the perikon was found to be the most sensitive of all mineral detectors named in this article. However, it is very susceptible to burnouts from heavy signals or static and will easily jar out of adjustment. For general all around wireless work, the carborundum detector when assisted by about 0.3 volts external electromotive force is probably the most reliable. Although less sensitive than either the silicon or perikon, its ease of adjustment and permanent qualities when adjusted compensate for its lack of sensitiveness.

For the amateur, whose chief concern is to hear far distant stations and whose aerial is comparatively low, the perikon or silicon detectors present possibilities of wave detection not found in the carborundum. Any crystal rectifying detector is more efficient if assisted by an external electromotive force of small value. The perikon or silicon is far more sensitive than the carborundum when no external electromotive force is applied.

Western Union "Canteen" Signs.

The Western Union Telegraph Company, through the office of the engineer of equipment, has adopted three new designs of canteen signs for use in offices situated in hotels, large railroad depots, etc., where an attractive illuminated sign is desirable.

Two of the fixtures are set on brass standards, and the third is for use on wall brackets, pendants, etc. The globes are lighted by an electric light placed inside, and on the two outer faces is the company's emblem lettered in relief.

The fixtures on standards are for use on counters, shelves or other convenient conspicuous location and need no fastening, although they may be fastened if desired.

CONSERVATION TALKS—II.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLA.

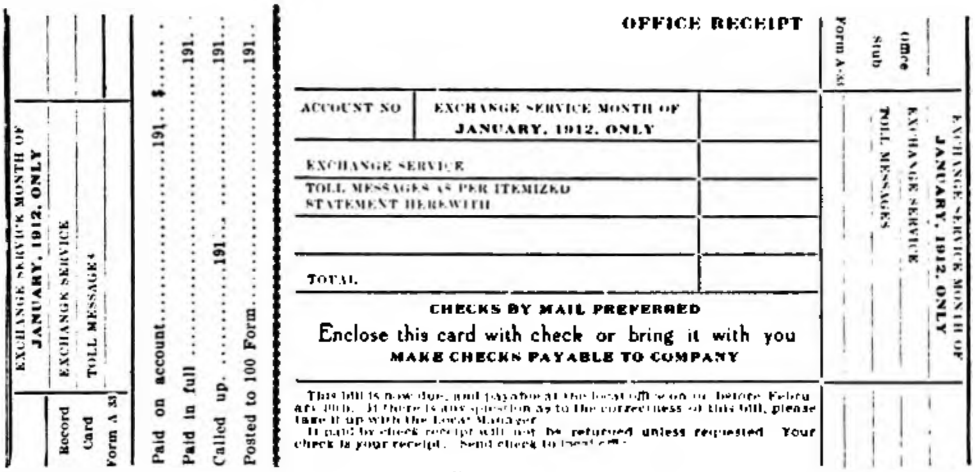
A Revenue Accounting and Collecting Method.

Revenue accounting for the purpose of this article is divided into Toll and Local. This method described is designed primarily for medium and small exchanges, and has for its object, economy and efficiency by simplifying the records at the local exchange.

The object sought, is to eliminate much wasted time and material; to make system, as far as possible, "Food proof," and to give a good check on the business, which most methods fail to do. Briefly, the routine is that the contract is signed by the applicant for telephone service and filed with the commercial department where the regular routine is gone through and the order for installation issued to the plant and other departments. The telephone being installed, a record is made by the traffic department, for its own use and for the directory, the plant department also posts its records, the auditor assigns an account number, and opens an account with the new patron.

It is customary to require three months' payment in advance, as a protection to the company against the expense of installing. This also insures advance payment, which should be carefully kept up thereafter to avoid loss. When the three months' initial payment has exhausted, which should be arranged so as to occur on the last day of the month, the form of postal card shown in Fig. 1 is made up, the several items, except toll charges, being filled in, together with the telephone rental and miscellaneous charges. Care must be taken not to put any back charges, toll or local, on the cards as this is against the Post Office rules. Such data are furnished on the auditor's bill.

In a large system, an addressograph is used, and each card is put through the machine three times, placing the same information on (1) the record card, (2) the office receipt, (3) office stub. The card is then addressed in the regular manner by the Addressograph.



EXCHANGE SERVICE MONTH OF JANUARY, 1912, ONLY
EXCHANGE SERVICE
TOLL MESSAGES
Record Card Form A 33
Paid on account..........191.. $......
Paid in full ....191..
Called up. ....191.. ....191..
Posted to 100 Form..........191..

OFFICE RECEIPT

ACCOUNT NO	EXCHANGE SERVICE MONTH OF JANUARY, 1912, ONLY	
EXCHANGE SERVICE		
TOLL MESSAGES AS PER ITEMIZED STATEMENT HEREWITH		
TOTAL		

CHECKS BY MAIL PREFERRED
Enclose this card with check or bring it with you
MAKE CHECKS PAYABLE TO COMPANY

This bill is now due, and payable at the local office on or before February 10th. If there is any question as to the correctness of this bill, please take it up with the Local Manager.
If paid by check receipt will not be returned unless requested. Your check is your receipt. Send check to local office.

Form A-33 Stub Office
EXCHANGE SERVICE MONTH OF JANUARY, 1912, ONLY
EXCHANGE SERVICE
TOLL MESSAGES

FIG. 1.

The post cards are now made up in packages and sent to the respective exchanges. With the package is sent an auditor's statement (Fig. 2), showing a detail list of bills for collection.

AUDITOR'S LIST OF BILLS FOR COLLECTION.

..................................EXCHANGE ....191.....

ACCOUNT NO.	AMOUNT	ACCOUNT NO.	AMOUNT	ACCOUNT NO.	AMOUNT	ACCOUNT NO.	AMOUNT

INSTRUCTIONS:—Check this sheet carefully with your Card Statements. Sign on the line provided, and return it to the Auditing Department. A duplicate will then be sent you for your file. RETURN THIS AT ONCE.

AUDITOR:—I acknowledge receipt of statements for all accounts as listed hereon.

....

Manager.

FIG. 2.

Upon receipt of the post cards, the manager checks the cards with the auditor's statement, and if O. K., signs and mails it to the auditor who charges the manager's account with the total of the auditor's statement.

The manager then proceeds to post on the bills the toll charges (miscellaneous and regular charges are handled between the auditor and manager in the usual manner), in the spaces provided. The manager then tears off the record stub at the perforation and files the stubs alphabetically in the uncollected drawer of a collection case of form divisions, (1) Uncollected, (2) Collected, (3) Suspense, (4) Rebates, etc. The post cards are now ready for mailing. If the account has no toll charges, a one-cent stamp is affixed and the card mailed; if, however, there are any toll charges, these, together with the post card, are put in an envelope, addressed and mailed. If a drop letter, one cent is affixed; if rural delivery or out of town, a two-cent stamp is affixed.

The cashier (or manager) is now ready for the receipt of payments. Subscribers are requested to bring the post card with them when paying their bills, or for adjustment, or to mail the post card with a check to cover the amount.

Each exchange is provided with a Matthews coupon machine having a cash drawer and two keys. The card drawer is kept closed, except for change, during the day, and coins, bills, and checks are dropped in the slot directly under the knife. It is found best to keep money in drawer intact and have extra change on hand. When payment is made, the post card is inserted in the machine, statement side up, the stamp is pushed back and then brought down on the card, this inks the stamp, cuts off the stub, automatically drops the stub into the cash drawer and stamps the receipt portion of the post card "Paid" which is given to the subscriber. This is the office receipt.

The stubs and cash in the drawer are balanced every evening. The stubs are then arranged according to account numbers, posted to cash report, cash deposited in bank, record cards are marked paid, dated and transferred to the collected drawer.

If, on account of error or other good reason a rebate is necessary, the cards are transferred to the rebate drawer and reported immediately to the auditor with recommendation and explanation in detail.

All collections should, as far as possible, be made in advance, but there are cases where this plan cannot, for good reasons, be used. It is well to state that in front of the "uncollected" drawer is an index arranged alphabetically, showing the telephone number, and, if necessary, the account number.

In most cases the telephone directory will, however, serve this purpose. Other than receiving payments as they come in no further action is necessary until the fifth of the month, when the cashier calls up each subscriber whose bill is unpaid and inquiries if they have received the bill, and if so when they can give it their attention, noting the replies on the back of the record card, care being taken to get the person responsible for the telephone rent. If a personal call is requested, a definite day and hour should be fixed, and such appointments kept.

Again, on the evening of the ninth or on the

REPORT OF UNCOLLECTED.

AUDITOR: ——————EXCHANGE, ———, 1912.

According to the rules of the Company I have taken the following action in regard to the subscribers whose bills were unpaid on this date....................

RULE.—The line of SUBSCRIBERS whose bills remain unpaid at———a. m., on the ——————, 191——, will have lines barred from long distance service.

No.	Sub. name	Res. Bus. Rural	Tel. No.	Acct. No.	Exc. rental due	Tolls etc. due		REMARKS: State whether disconnected or barred and time, also give subscriber's reason for refusing to pay.

NOTE.—When exceptions to the above rule are necessary, the Manager must investigate personally each case, and use his very best judgment, protecting the Company against any possible loss in every instance. Poor judgment will reflect upon his ability to look after the Company's interest.

I certify that this report is correct in all particulars and agree to be liable for any rentals accruing on any of the above telephones after the——————inst., if, contrary to this report, the same are still in service.

I understand that all the above telephones on which the bill has not been paid by the first of next month, are to be removed and reported regularly on form———.

To the best of my knowledge, the subscribers listed are ALL the subscribers at this exchange who were in arrears in any amount on the 20th inst.

................................Manager.

We certify that we have carefully read this report, and that a copy of the same is now posted on our switchboard and that we understand that none of the above subscribers are to have service unless reinstated according to the regular rules of the Company.

.....................................Chief Operator.

...............................Night Chief Operator.

...................................Plant Chief.

....

FIG. 3.

morning of the tenth of the month, those who have not settled their bills should be called up and reminded that the telephone will be disconnected on the eleventh day unless the bill is paid by that time.

There are exceptions to this date and this method will have to be adjusted to meet the terms of the contract, but it is only a question of education, having in view advance collections and a definite date for disconnection and removal for non-payment. On the eleventh day of the month a list of uncollected accounts (Fig. 3), is made up by the manager or cashier and turned over to the traffic and plant departments, and a certified copy, properly signed, is sent to the auditor.

When bills are due and unpaid, but good and sufficient reason exists for not disconnecting at the specified time, a statement is so made. The auditor upon receipt of the uncollected report, checks up the manager's account and draws off a balance sheet (Fig. 4), which is sent to the manager immediately. This shows in the body of the account. Where parties have left town the manager is urged to use great diligence in ascertaining the new address, this being given to the auditor. The account is transferred to suspense and followed up by the general office, if possible, to a successful termination. If a bill is not paid by the fifteenth of the month, the telephone is taken out and the company then takes such legal steps as may be necessary or advisable. The manager is required to personally visit each disconnect before the removal of telephone.

It will be seen that such a method as this, eventually dispenses with the necessity for collectors, and, in addition, reduces the amount of bookkeeping at the local exchanges, thereby making it possible to prorate the bookkeeper with another department. In addition to this, the manager is automatically checked up each month and the visits of the traveling auditor become less frequent or necessary.

The subscribers' ledger is kept at headquarters only. After the record and office stub have served their purpose they may be filed or destroyed, as may seem best. Once an account is closed, the manager has no further need of any record, as he can fall back on the general office for data. Until some definite disposition is made of the account, the record is kept intact, and, if transferred to suspense, he places the record stub, etc., in the suspense drawer for reference.

AUDITING DEPARTMENT

AUDITOR'S BILL NO............ ....191...

....

....

Our records show the following uncollected for month of ....191... at your Exchange

If not correct, take up with the Auditor's Office AT ONCE. If correct, list on next Cash Report (Form ——) entering each item separately and PLACE THE AMOUNT IN COLUMN ——, AND IN COLUMN FOR "REMARKS," Write "Auditor's Bill No. ...."

Chargeable to your account if not paid or adjusted before..................191...

FIG. 4.

form the detail of uncollected accounts, together with the following:

COLLECTIONS DEVELOPMENT

Total due for month of ....
Rentals $............
Tolls $............
Other charges $............
Total $............
Totals $............
Reported and deposited $............
Balance due $............
Uncollected per station ....%
Collected for month of ....%
Uncollected for month of ....%
No. of telephone ....date ....
No. of telephones ....date ....
Gain or loss ....

The manager is told that this balance is charged to him personally (he is, of course, under bond), and will not be taken off the books unless collected by him, or a definite report sent in giving good and sufficient reasons why any account or a portion of same should be rebated or transferred to suspense

The "uncollected" drawer can also be made to serve the purpose of a follow-up by using date tags to fasten on any index card where an account is to be attended to on a given date. This applies especially to overdue accounts.

Each month managers are furnished, by bulletin or otherwise, with a table showing the standing of his exchange compared with others and friendly rivalry is the result.

As a further inducement to activity in collections, etc., the regular vacation is extended in proportion to the general efficiency of the exchange. This will be explained later as the efficiency collecting is only a part of the scheme of granting vacations.

The secret of good collections is to start the account right and keep it right. This can be done by accepting only reliable patrons and collecting three months in advance; in this way subscribers cannot get very far behind on telephone rentals. On toll rentals it is a more difficult task, and, while we give credit to most of our patrons, there are some from whom we should require a deposit, enough to protect us on service rendered. This may be five dollars, and, when this amount is exhausted, a new deposit must be made. Where a patron fails or refuses to pay his toll bills and no adjustment is possible or seems necessary, an order is issued on the traffic department to bar that particular telephone from further long-distance service until the bill is paid or adjusted. Collections from public pay stations should be made daily, thus avoiding disputes between operators and collector.

TOLL ACCOUNTING.

The following is a new method for recording and charging toll messages. It is intended to use the standard toll ticket, except that, instead of the tickets being cut and used singly, they would be printed, made up in rolls and numbered consecutively, say, in 1,000 lots. Duplicate rolls would also be provided carrying the same serial numbers, but only having printed the data necessary for the subscriber such as Form .....at ....to .....at ..... Date .... Time filed .... Amount toll $ .... Messenger fees .... Other charges .... Total fees $.........

A roller machine, such as used in groceries, etc., would be provided permitting the original tickets to be exposed one at a time and passing over a flat, smooth surface for writing purposes, carrying at the same time, the duplicate ticket. This duplicate would pass to another roller and be retained in the machine while the original would pass out and be torn off, a special cutter edge being provided for this purpose. The duplicate would be made either by carbonizing that portion of the original to be duplicated or by having a carbon between the original and duplicate, working at right angle to the tickets on the rollers as in the typewriter or calculagraph.

The filing time could be worked in connection with the machine, but I prefer that it be written in by the operator. The machine may be made to set flush with the operator's keyboard. The machine is now loaded and ready for use, the operator enters the call in the regular manner, tears out the ticket, and proceeds to handle the call in the usual way, the method varying according to the size of the exchange, until the finished ticket arrives at the chief operator or ticket auditor, as the case may be, when the rate is checked. The chief operator, at the end of the day's business, opens the toll recording machine, tears out the used portion of the duplicate roll, and copies the charges and telephone number from the original ticket on to the duplicate and files the tickets by telephone number. The duplicate roll is then turned over intact to the commercial department, which checks the serial numbers and sees that none are missing. It then cuts them up and files the tickets carrying charges in the proper envelope (by telephone number), making the necessary entry on the face of the envelope, such as ticket number and amount.

At the end of the month, the charges on each envelope are totalled and entered on the rental post cards and mailed to subscribers, together with the duplicate slips. If, for any reason, these duplicate slips are lost, they can be made up again from the traffic record very easily, by knowing the telephone number.

The saving effected in stationery and time, to say nothing of the almost perfect record, is apparent to anyone who has gone through some of the tedious and inaccurate systems now in use.

This system also eliminates the possibility of mistakes in transferring the charges from the toll ticket to the toll bill. This system also contemplates the abandonment of the check error system and spending some of the expense connected therewith in closer traffic observation of toll calls, high efficiency which can only be had by observing, say at least 20 per cent. of all messages, an expense which is now prohibitive.

The reason for the abandonment of the check error is too well-known to require discussion, and, moreover, the speedy traffic methods now in use, make such practice impossible; however, a check should be made at irregular intervals. The only exception to this would be other company business and toll stations.

Printing Telegraphs.

BY E. R. WAKEFIELD, SEATTLE, WASH.

I would like to ask why so little information is contributed concerning the problems of the printing departments of the telegraph companies, both in the plant and traffic divisions.

There seems to be no question now but that the "Printer" has come to stay, at least as far as the Western Union Telegraph Company is concerned. Both the printer mileage and hours of operation have been greatly increased during the past year, and the installation of new circuits is still proceeding.

Since the printer was first adopted the work of those in charge of the apparatus has been largely what might be called "pioneering," for want of a better term. Each one has had to evolve a system to meet his own needs, as it was early discovered that the methods employed in handling the Wheatstone system would not answer for printer operation. All these systems have their good points and each is limited by its lack of the good points of the others. Hence there appears to be a need now for the establishment of a standard of practice for the guidance of the printer operatives. Much has been accomplished in this direction, but I believe a free discussion of printer problems would be of great benefit to all concerned.

The columns of TELEGRAPH AND TELEPHONE AGE are open to anyone who may wish to contribute information on this subject.

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March 16, 1912.

The Past and the Present.

We often hear the remark that conditions in the telegraph service today are not like what they used to be a few years ago and those who are wont to remind their hearers of this fact do not stop to realize that if the conditions had not changed the telegraph service would be a disgrace to this age of progress. Those who would have the old conditions still with us stand in their own light; what they need is some modern ideas.

Conditions have changed very much, it is true, but if they had not changed we would be still reading the Morse tape and cleaning battery jars, and the public would be required to pay much more than they do now for their telegrams. It is not very many years ago that the first telegraph superintendent in this country, the late James D. Reid, issued an order cautioning operators not to read by sound on pain of dismissal. Would the ultra-conservatives have those conditions today?

The telegraph is simply keeping pace with the progress of the world and it must necessarily do so or the world will not support it. The real progress is in ideas and aims and in carrying them into execution the means must conform to the end to be attained. The tape had to give way to reading by sound, and the human machine having reached the limit of its capacity has had to give way to a large extent to speedier mechanical devices. Machinery is doing the work of the world today and men merely build and control the machines. The machinery is constantly undergoing development and is becoming more and more highly specialized, and it requires highly specialized knowledge and training to operate it. That, in short, is largely the situation in the telegraph service today. Therefore, the man whose head is filled with the ideas of a quarter of a century ago is decidedly out of joint with the present. There is this to be said in favor of the telegrapher of the earlier period—he was a telegrapher in fact as well as in name, but the telegrapher of today is largely reduced to a machinery basis. The former was highly skilled since he had to do all the work himself in sending and receiving, and by his proficiency in doing his work he was graded. Nowadays, however, machinery largely performs both of these functions, and the operator has no opportunity to develop or exercise skill. Sending machines make a racket with dots and dashes and the typewriter obeys the touch of the receiving operator, and it makes no difference whether he is a good penman or not the results are the same—they are machine-made.

The machine era certainly has a tendency to make machines of men as far as their mental equipment is concerned, but at the same time it, is teaching them to be on the alert and produce the best results according to their lights. High-pressure work begets high-pressure life and telegraphers along with others are under the spell. Complaint is general as to the results of such conditions, but we suppose that there will always be complaints, no matter what the conditions may be. Conditions today are the result of progress in the world's activities and cannot be evaded, although they are nerve-racking. The only thing to do now is to improve on the nerves. They, too, must be modernized.

That the introduction of mechanical devices has worked hardships among many members of the telegraphic fraternity there is no doubt. It is for them to decide for themselves whether they shall join the procession under the new order of things. If they do not they are compelled to make way for more progressive spirits. We are living in the present, not in the past, and if we wish to make headway we must adjust ourselves to present conditions and not dwell upon the fact that things are not what they used to be—which is true—and are going to the dogs in consequence.

The Oldest Telegraph Employe.

We are constantly receiving clippings and marked copies of newspapers from all parts of the United States recording the retirement of some old-time telegrapher on pension, with the added information that the beneficiary is the oldest employe in the company's service. This information it is needless to say is in most cases added by the reporter to make the story more interesting and impressive. Of course the oldest telegraph employe exists somewhere, but it would require more time and investigation than any newspaper reporter can give to it to find the individual. If we were to refer to these separate cases in our columns it would provoke endless discussion.

Most of the clippings refer to services extending from thirty-five to forty-two years. Pensioners in this class are young men compared with many of the employes of the company, and assertions that Mr. So-and-So is the oldest employe in the telegraph service should be questioned until proof is produced.

Inquiries at the headquarters of the Western Union Telegraph Company in New York revealed the fact that the employe longest in the service, as far as the company's records show, is Mr. J. H. Seaborn, batteryman at Jackson, Tenn., who has just been retired. He entered the service in 1846 or 1847 when the first telegraph line was built through Tennessee. Mr. Seaborn is now 79 years of age.

Induction.

When a varying current of electricity flows in a wire parallel to an adjacent wire a sensitive indicating instrument—a galvanometer for example—connected to the second wire will indicate the presence of electric action, although the wire itself need not necessarily be connected directly with a source of current. This effect is called electromagnetic induction. The phenomenon was first observed and studied by Joseph Henry, the eminent American scientist.

The same effect occurs in the electromagnet of a telegraph or telephone instrument, one convolution of the wire acting inductively upon the adjacent convolutions, the practical effect of this being that the induced current tends to oppose any change in the original or inducing current—in other words, it prevents the original current from attaining its full value as rapidly as it would if the inductive effect were not present.

Induction is always present when a change takes place in the strength of the primary current; a steady and unvarying current has no inductive effect. The one essential condition to the production of induction is change in the strength of the current.

Induction cannot be prevented any more than we can prevent a pound of lead weighing a pound, but we can to a more or less extent counteract its effects, although we cannot deal with the cause. Induction takes place even on a straight wire with no other wire in its immediate proximity. Take for instance a line with a battery at one end and grounded at the other; closing the key at the battery end will start the current into the wire but the current itself will tend to induce an opposing current on the wire ahead of its own advance.

The sensitiveness of an electrical instrument—a relay for instance—is relative. The relay may not be sensibly affected by a low inductive effect, but with high-tension currents its usefulness may be entirely counteracted. A sensitive or "high-wound" relay, such as a multiplex relay, feels the effect of induction more than does an ordinary relay.

With the increasing extension and use of high tension transmission lines all over the country telegraph lines in their vicinity are suffering more or less disablement in consequence of the inductive effects caused by the rapid alternations on the power lines. In most cases the detrimental effects have been counteracted by special apparatus and in others the aid of the courts has been invoked by the injured interests to adjust the difficulties.

One of the telegraph companies is now installing special transformers on its lines between Chicago and South Bend, Ind., which run parallel to a single-phase trolley line between the two points named. The induction from the trolley line had a serious effect upon the telegraph lines, and experiments have led to the adoption of a method of overcoming the disturbing influence.

Another serious case of inductive disturbance is mentioned in another column in this issue. In this instance the induction from a high tension transmission line in Michigan has so seriously interfered with the operation of a railway's telegraph system that the railway company is seeking an injunction through the courts against the power transmission company to restrain the latter from interfering with its telegraph service on the ground that it endangers the lives of the passengers on account of the inability of the dispatchers to control the trains.

At best induction is the bane of the telegraph and there is here a wide field for the application of inventive ingenuity. As already stated the cause of induction cannot be avoided; we can only modify the effects and anyone who undertakes to deal with the problem must approach it from that direction.

What Becomes of Messengers.

"Where do telegraph messengers get to after leaving the service?" an old newspaper man recently inquired. "I have never yet heard of one turning out badly," he continued.

This gentleman has had occasion to make frequent use of the services of the young messengers, "and," he said, "I have always found them honest and good if fairly treated. One of them became a star reporter for a prominent Philadelphia paper; another has charge of an important office in New York, and a third is one of the most reliable engineers in the Pennsylvania Railroad service. The foreman of a large machine shop is a former messenger, and another commands a salary of $10,000 a year in a large automobile works.

"There have been times," he continued, "when I thought the entire lot—both of the Western Union and Postal Companies—ought to be locked up and kept on bread and water for a week, for a more mischievous set never lived. However, they get over that."

The inquirer probably knows that many railroads and industrial concerns are directed and managed by former telegraph messengers, and that they may be found in financial circles, successful and prosperous. It is because of the varied training they get while messengers that they are fitted to occupy positions of honor and trust. They all make good records after graduating from the primary class.

Course of Instruction in the Elements of Technical Telegraphy—XI.

(Copyrighted.)

(Continued from page 145, March 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Circuits.

A circuit is a path composed of a conductor, or several conductors joined together, through which the current flows, from a given point, around the path, back to the starting point.

A circuit may be composed wholly of wire, or partly of wire and the earth.

A circuit is opened, or broken, when the conducting path is interrupted, or incomplete.

A circuit is closed when the conducting path is uninterrupted, or complete.

A circuit in which the earth forms a part of the conducting path is a grounded circuit.

A circuit in which the earth does not form any part of the conducting path is a metallic circuit.

The external circuit is that part outside the battery.

The internal circuit is that part within the battery.

A circuit, divided into two or more branches, is a derived or divided circuit. The branches of a divided circuit are said to be connected in parallel.

QUESTION PAPER.

(1.) A battery develops a difference of potential of 25 volts; what is the electromotive force?

(2.) In a copper and zinc combination, is zinc the negative element?

(3.) How then can the copper be the positive pole?

(4.) In a gravity cell, which element does the current start from?

(5.) What keeps the solutions separate in a gravity cell?

(6.) (a) The end copper and zinc of a battery are connected with a short wire; what represents the external circuit?

(b) The internal resistance?

(7.) What is a resistance?

(8.) Is there such a thing as a perfect conductor?

(9.) (a) When both poles of a battery are to earth does the current flow from the negative pole of the battery to the ground, or in the opposite direction?

(b) Why?

(10.) Referring to Table 1, (page 111, February 16) if copper and lead are used to develop a difference of potential, which would be the positive pole?

(11.) Can a continuous current be generated without a continuous, or constant, difference of potential?

(12.) Is the potential developed between the plates of a cell affected by the internal resistance of the cell?

Ohm's Law.

Let us suppose that a cyclist plans in a fifty mile race to ride at such a uniform speed that all his strength will be expended between the starting and finishing marks; he will be completely exhausted at the tape and will collapse at that point.

If, without the rider's knowledge, we change the condition of part of the track, substituting several yards of soft earth and metal, he will expend a good deal more force in maintaining his uniform speed over the roughened section, than was called for before the track was altered, and will therefore be exhausted before reaching the tape.

It is evident that, to complete the distance, he will be compelled to readjust his gait to the new conditions of the track, and run the race at a lower uniform speed.

If, on the other hand, part of the track be improved, the cyclist will expend less strength over the smoother section than in his calculation he had allotted to it, and at the finish will still have some energy left, which, if expended in the race, would increase his speed.

Now consider the flow of current in a circuit. It is governed by the strength of the battery and the circuit resistance, as the cyclist's speed is governed by his strength and the road conditions.

If, with a given current flow, more resistance be added to the circuit, more force will be required to overcome it, and, unless the battery strength be correspondingly increased, the current strength will be reduced.

In like manner if the resistance of the circuit be reduced, there will be an overplus, as it were, of force which will expend itself in increasing the current flow.

By Ohm's law the strength of the current varies directly as the electromotive force (E. M. F.), and inversely as the resistance of the circuit; or, in other words, anything that makes the E. M. F. of the cell greater, will increase the strength of the current proportionately, while anything that increases the resistance—either the internal resistance of the cells themselves or the resistance of the external circuit—will proportionately diminish the strength of the current.

This law may be stated in the following definite manner: The number of amperes of current flowing through a circuit is equal to the number of volts of electromotive-force divided by the number of ohms of resistance in the entire circuit; or,

$$\text{Current} = \frac{\text{Electromotive-force}}{\text{Resistance}}$$

Representing, for convenience, each quantity by the letters I, E and R: I for current, E for electromotive-force, and R for resistance, we obtain the equation:

$$I = \frac{E}{R}$$

Multiply both members of the equation by R, which will not destroy the equality of the equation,

$$E = IR.$$

Divide both members by I,

$$R = \frac{E}{I}$$

We thus have three equations which will readily give the value of the current in amperes, of the E. M. F. in volts, and of the resistance in ohms, provided two of the quantities are known in each case.

Example 1. The E. M. F. of a battery is 10 volts, the current strength .05 ampere, what is the resistance of the circuit?

Solution. $R = \frac{E}{I} = \frac{10}{.05} = 200$ ohms. Ans.

Example 2. The current strength is .05 ampere, the resistance of the circuit 200 ohms, what is the battery E. M. F.?

Solution. $E = IR = .05 \times 200 = 10$ volts. Ans.

Example 3. The E. M. F. of a battery is 10 volts, the resistance of the circuit 200 ohms, what is the current?

Solution. $I = \frac{E}{R} = \frac{10}{200} = .05$ ampere. Ans.

It is of the utmost importance that the student be perfectly familiar with these three equations, since they form the basis of electrical measurements and are indispensable to a proper understanding of the ensuing lessons. They should be carefully committed to memory.

(1) $\frac{E}{R} = I$ in amperes.

(2) $\frac{E}{I} = R$ in ohms.

(3) $IR = E$ in volts.

A New Balance for Multiplex Systems.

BY S. D. FIELD, STOCKBRIDGE, MASS.

The accompanying illustrations show a new arrangement for obtaining a balance in multiple telegraphy.

The method diminishes the error due to the presence of the usual battery resistance, and at the same time removes from the circuit the signal halting defect caused by the static capacity usually added to the equating circuit.

Fig. 1 shows the arrangement as applied to a simple straight current duplex. By following out the connections it will be seen that the first and second condensers obtain a charge during the time when the transmitter is open and no current is flowing to line.

When the key is closed, the discharge of these condensers through the equating windings of the relay, neutralizes the static charge flowing to line

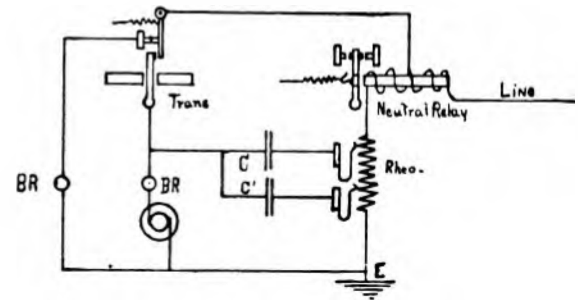


FIG. 1—APPLICATION TO SIMPLE STRAIGHT CURRENT DUPLEX.

through the line winding. On opening the key, a reverse action balances the line discharge.

Fig. 2 shows the arrangement as applied to double current work, such as the quadruplex or polar duplex.

Tests indicate that on an ordinary circuit of about 15,000 KR., a gain in signal strength of about 30 per cent. is obtained by this device, when using a signal speed of 120 words per minute.

Under this arrangement, the straight current, in its freedom from inductive disturbances on adjacent parallel circuits, together with a permissible

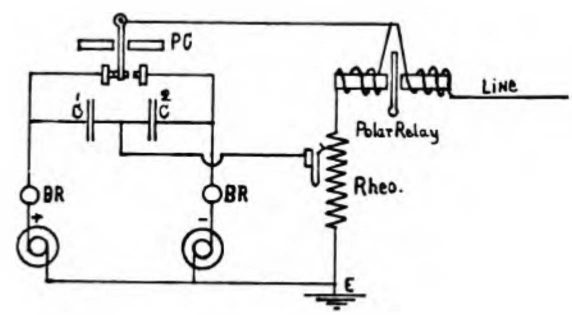


FIG. 2—APPLICATION TO DOUBLE CURRENT WORK.

use of continuity-preserving keys, becomes a strong rival of the ordinary polar duplex. Another point in its favor is the extreme simplicity of the mechanism and its consequent ease of management.

No appreciable sparking at the contacts is observable in either of the arrangements.

The arrangement is protected by a "Method" patent of the United States and other detail patents for various combinations are pending.

Mr. C. H. Walton, of Washington, D. C., in renewing his subscription for another year writes: "I think a subscription for TELEGRAPH AND TELEPHONE AGE is money well invested. A telegraph or a telephone man who does not keep up with what is doing in the two professions is dead to the world."

Telegraph Ownership.

Mr. Frederic J. Haskins, the well-known writer on economic subjects, is the author of a series of articles on telegraph ownership.

Mr. Haskins refers to the law passed by Congress in 1866, granting the right to telegraph companies in this country to build their lines over the public domain, etc., one of the provisions of which was, that the United States government might, at any time after five years after the passage of the act, purchase the lines and other property of the telegraph companies. Every telegraph company is required to subscribe to this act before it can engage in business. The whole question was brought up before Congress in 1872, when it was acknowledged that the government unquestionably has the right to acquire possession of the telegraph properties.

"The fight for the government ownership of the telegraph lines of the country and their operation in connection with the postal establishment," says Mr. Haskins, "reached its highest pitch in the early seventies. No sooner had the agreement of the telegraph companies to sell out to the government in five years from 1866 taken effect, than numerous plans were brought forward in this connection.

"The agitation, however, resulted in the passage of a law in 1874 reaffirming the right of the government to acquire ownership by purchase of the telegraph lines of the country. This act provided that the United States might, for postal, military, or other purposes, purchase all the telegraphic lines, property, and effects of any or all companies operating under the act of 1866. It was this act which was quoted by Postmaster-general Hitchcock in his recommendation of 1912 that the government acquire ownership of the telegraph lines of the country. Mr. Hitchcock is, by no means, the only postmaster-general who has recommended the acquisition of the telegraph lines by the government. The most pronounced advocate of the plan was John Wanamaker, postmaster-general under President Harrison, who made a strenuous fight to have Congress take the necessary steps to acquire the telegraph lines.

"Many objections have been urged to government ownership of the telegraph or even to government control of the message business of the country. One is the contention that the government cannot conduct a telegraph business as cheaply or as efficiently as can private enterprises. One of the reasons for opposing the government ownership of the telegraph in 1872, was the alleged fact that in point of efficiency, trustworthiness, and attention to the interests of the public, the post office system in the United States was far inferior to the postal systems of Great Britain, Belgium or Holland.

"Another argument against government ownership as advanced by David A. Wells on behalf of the Western Union, was that in every case, business conducted by the government was more dilatory, expensive and vexatious than that conducted by individuals. Mr. Wells asserted that if any corporation were to undertake to do business according to government methods, its existence, so far as public patronage was concerned, would be exceedingly limited. It was also urged that there might be a tremendous abuse of the free message business. Another objection urged was that federal ownership was inconsistent with the theory of Republican institutions. It was claimed that it would give to the government a system of espionage over the business of the country that would be subversive of the best interests of the republic.

"Likewise, it was urged that government ownership would add greatly to the patronage at the disposal of the public officers of the country, and, therefore, would hinder a clean administration of governmental affairs. It was also contended that under government ownership, the wires could be manipulated at the close of an exciting political campaign in such a way as to prevent the actual results from reaching the people.

"The most interesting investigation yet made into the telegraph business of the United States was by the Bureau of Labor in 1908. It was found that the principal telegraph companies handle four kinds of business: service and wire messages, 'C. N. D.' messages, government messages, and general business. To these might be added the press service and the transfer of money by telegraph. Service and wire messages go free and relate to the proper handling of the business of the company and the keeping in condition of the wires and apparatus. The 'C. N. D.' messages come from what is known as the Commercial News Department. They consist of stock quotations and similar business. Many business men have wondered whether the government would continue this service if the telegraph lines passed into its hands. A number of states have enacted legislation forbidding the transmission of such business, and several bills have been introduced in Congress looking to the same end.

"It is asserted by many that the United States would be making a bad bargain to acquire the telegraph companies of the country at their present-day capitalization. It is contended by those who take this view that the cost of reproducing all the lines now in existence would be much less than the cost of buying those now in operation.

"The telegraph companies," says Mr. Haskins in conclusion, "feel that their provision of night and day letter service has served to meet most of the arguments offered by the advocates of government ownership or operation."

Mr. J. P. Edwards of the office of the engineer of equipment of the Western Union Telegraph Company, Atlanta, Ga., writes:

"It not only gives me pleasure now, but it has always been my pleasure to recommend TELEGRAPH AND TELEPHONE AGE to all employes of either telegraph company with which I have been associated as *the* publication available to them, which, if they give attention to its technical articles and its editorial advice would be more productive of good to them than any other publication I know of. I shall continue advice of this kind in the future as in the past."

Word Puzzle in Telegrams.*

What is a telegraphic "word"?

This problem has worried senders of telegrams in England for many years, and *The Daily Mirror* of London, in an attempt to elucidate the mystery, learned that the problem is at present occupying the closest attention of post-office officials.

The Post Office hopes to do something to straighten out the word tangle that now exists and decide definitely what a telegraphic "word" really is. At present if you send, in a telegram the name "Newcastle-on-Tyne" it costs you but one halfpenny. If you send "Bromley-by-Bow" you must pay three halfpence. "Chapel-en-le-Frith" is one word, "Bethnal Green" counts as two words.

To the average lay mind these anomalies are beyond comprehension, and the official Post Office Guide throws but little light on the subject. According to that volume, the following are among those constituting one word in a telegram:

All words in any modern European tongue and in Latin, words ordinarily written as one or coupled by hyphens.

Names prefixed by St., O', Mac, De la. All names of towns and villages in the United Kingdom.

Initial Letters, such as H.M.S., A.M., P.M.

Yet, despite this, exception is taken to place names which are districts of a postal district, and, consequently, London suburbs boasting more than one name must pay on each.

The Daily Mirror sent the following telegram:

Father-in-law forty-five to-day; step-parents subcontracted at Newcastle-on-Tyne; wire Wood Green.

This message totals actually seventeen words and seven hyphens. The Post Office accepted it as ten words, charging two for Wood Green, because it was part of the London postal district. Another telegram was addressed to Green-street, Bethnal Green. The clerk demanded one halfpenny for each word in Bethnal Green, despite *The Daily Mirror's* protestations that this place was a separate parish and borough, and was certainly in the United Kingdom. The overseer at the Ludgate Circus Post Office was called into the discussion. He was official and adamant, so *The Daily Mirror* continued its inquiries at the General Post Office. There the secretary explained that as far as the Post Office is concerned a postal district is a town, and any part of that district merely part of a town. To the Post Office, the City of Westminster, has no more importance than Shepherd's Bush; both are mere parts of London.

It was admitted that Bethnal Green was an historic parish, once a village, now a borough, but it also happened to be in the London postal district, and consequently, must pay the penalty and be charged two words.

"The rule," the secretary said, "is a continual bone of contention, and we are, at the present time, considering in what way it can be modified. But it is full of difficult points. If Tulse Hill, the district, be admitted as one word, why not Tulse Hill, the thoroughfare, and if that, why not High Street, or any name of a road."

It was suggested that any two-word named place at present just outside the London district would, upon being absorbed, lose its right to be transmitted as one word. Ponders End was suggested as an example.

"No," said the secretary, "that is not the case; once a name has been admitted as one word it always retains that right."

And the rule remains for the time being, at any rate, that no matter how many words the name of the postal district may contain, it counts but one. Any part, however, of that postal district must pay for its name at the usual rate.

*From *The Daily Mirror*, London.

Rapid Restoration of Telephone Service in Birmingham, Ala.

On Sunday morning, January 14, fire completely wrecked the four upper floors of the building of the Southern Bell Telephone & Telegraph Company in Birmingham, Ala., and the entire toll switchboard, used for long distance connections and located on the fifth floor, became a complete loss. The local switchboard and the associated frames and racks on the second and first floors, respectively, were not injured by the fire, but some damage was done by the water coming through from the other floors. Telephone communication was established with the Hawthorne, Ill., factory of the Western Electric Company the same afternoon, with the result that within forty-eight hours a complete new toll switchboard equipment, consisting of eight two-position sections with miscellaneous cable, was shipped by express to the scene of the fire.

Meanwhile, an installing force was put to work on Monday morning, January 15, to assemble the temporary toll equipment forwarded from Atlanta, and by 1:30 p. m., toll communication was restored in temporary quarters obtained for that purpose. Owing to the damage done to the local switchboard equipment, a considerable amount of work was necessary; but by January 23, 70 per cent. of the local service was restored and the remainder on the following day. The new toll switchboard arrived in Birmingham promptly, and was put into service at 2 o'clock Monday morning, January 29, giving the telephone company a new, up-to-date toll equipment in fifteen days.

Got Down to Facts.—One of the telegraph officials who had been annoyed by newspaper men in their endeavors to obtain an official statement from him as to the condition of the wires after a recent severe storm, in desperation replied that there seemed to be no trouble between New Rochelle, N. Y., and Stamford, Conn., and that business between those points was moving with accustomed regularity. The statement verbatim appeared in one of the newspapers. Now the question is how much business does New Rochelle have for Stamford in the course of a day.

The Ground Connection in Lightning Protective Systems.*

BY E. E. F. CREIGHTON.

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

This matter can be clarified only by an analysis of the requirements in each case. Before that is done, however, it is useful to note that the three main elements of interest in an earth connection are the resistance, inductance, and a condition which, for want of a better name, may be designated as the electro-static capacity factor or equalizing connection.

In regard to the resistance, its constancy may be affected, either gradually, by droughts, freshets, freezing and such other changes as naturally attend the seasons; or suddenly, by the heat given out by an electric current passing to ground. Furthermore, in regard to the resistance of an earth connection, its laws differ from the ones we are accustomed to use. For example, we are accustomed to think that if the area of cross-section of the conductor is increased, the resistance will be correspondingly decreased. However, doubling the area of a pipe-earth by increasing the diameter does not reduce the resistance to earth by one-half; in fact, by such a change, the resistance to earth may be decreased by only a small percentage. If not in a reduction of resistance, what, then, is gained by an increase in area? This is a question that must be answered. Also how can the earth resistance be reduced? And why not by doubling the area of a single earth-plate?

In regard to the earth connection, there is still another factor of an unusual nature that must be taken into account, viz., its permanency or life. When a conductor is installed overhead, its oxidation is of negligible value even after many years of use and the electro-chemical action is sensibly nil. In an earth-connection, however, conduction is naturally by electrolysis, which produces a dissociation of the materials; and, furthermore, the metal parts are subject to the chemical action of the soluble ingredients of the moist earth. Still further there is a great difference in wear on the earth-plate, depending on whether the current is alternating or direct.

In regard to the second main division, viz., the inductance of earth-connections, the three main factors are, length of the conductor, loops in the conductor, and multiple conductors.

There is still the third division which has been designated as the electrostatic capacity factor.

It is convenient not to follow the exact order given in the foregoing outline. It seems desirable to state, as briefly and definitely as may be done, the general laws concerning earthing, give instructions for making a pipe-earth, and then later give detailed data on which the laws are based.

After a depth of several feet in the conducting stratum has been reached, each additional foot decreases the total resistance by one divided by depth in feet. This is explained later.

*Abstracts from "General Electric Review."

Practically all the resistance is in the earth in the immediate vicinity of the pipe. This resistance depends on the specific resistance of the material. The specific resistance depends on the amount of moisture and electrolyte in the moisture. To get the lowest possible resistance, pour strong salt water around the pipe.

When it is desired to lower the resistance to earth below that of a single pipe-earth, drive others at distances of not less than six feet. Then the total conductance is only slightly less than the sum of the individual conductances, and the total resistance is the reciprocal of the total conductance. For uniform condition of soil, the approximate rule may be stated: That two pipe-earths connected together give one-half the resistance of one, ten pipe-earths give one-tenth the resistance of one, and so on.

For distances between pipe-earths up to one foot, the resistance increases rapidly. For every additional foot, the added resistance becomes less and less. At a distance apart of six feet, the resistance has reached nearly a constant value. Stated otherwise, the resistance between two pipe-earths at any distance apart greater than six feet is nearly equal to the sum of the isolated resistances of each.

Since the resistance of a pipe-earth lies mostly in the immediate vicinity of the pipe, the greatest potential drop when the current flows, will also be concentrated there. Heating and drying out will tend to magnify this.

The quantity of electricity that can be passed through a pipe-earth, without materially changing its resistance, increases directly with the wetness of the earth in contact with the iron, and the area of the iron surface exposed to the passage of the current; and decreases as the resistance of the earth in contact with the pipe increases. Certain critical values of current may be carried continuously by a pipe-earth without varying the resistance. The higher the current above this critical value, the more rapid the drying out. To increase the ampere-hour capacity, keep the pipe-earth wet with salt water.

The resistance of a pipe-earth does not decrease in direct proportion to the increase in diameter of the pipe. Two pipes driven side by side and connected together will have only slightly less resistance to earth than one pipe; it is, therefore, not surprising that a pipe two inches in diameter has a resistance only about six per cent. to twelve per cent. less than a pipe one inch in diameter.

Make the connecting wire as short as possible by taking as direct and straight a path as possible. The objection to sharp corners lies entirely in the fact that it is longer around two sides of a triangle than it is along the hypothenuse. A curved turn is shorter than a right-angled turn, but it is not as short as the hypothenuse.

Loops in the lead introduce unnecessary impedance to high frequency impulses.

The inductance of a conductor to high frequency may be said to decrease with the increase of surface. A hollow metal tube conducts as well as a solid wire of the same circumference. A flat strip is an economical way of getting large surface with a small weight of metal. The minimum degree of inductance with the minimum weight of metal is obtained by using separated parallel wires. Copper is best on account of its conductivity and durability, but since only the surface layer of metal carries the current, galvanized iron is permissible in some cases.

An earth connection is necessarily made by electrolytic conduction. To obtain a low resistance, it is therefore necessary to have electrolytic moisture in contact with the earth-plate, or, lacking thus a fair degree of conductivity, it is necessary to have a very large area of cross-section for the current. One finds no dry earths that are conductors. If the earth contains no soluble substances which conduct electricity it is necessary to add an electrolyte. The one precaution in choosing an electrolyte is to avoid one which attacks chemically the metal conductor.

It is impossible, as many know, to make a rule or practice to cover all cases; but, the general practice of using pipe-earths can be justified in nearly every case of earth-connection. Coke, so often recommended for earth-connections, is not a good conductor in itself. It attracts and holds moisture, to be sure; but since that moisture usually does not contain an electrolyte in solution, it leaves the earth-connection with high resistance. From every point of view the iron pipe-earth is to be recommended,—on the basis of first cost, ease of inspection, resistance, care, measurements, etc. Iron is the cheapest available metal; its use in water-mains has thoroughly proved its serviceability even when embedded in salty marshes. Salt or washing soda is to be recommended as electrolyte. While washing soda has less chemical effect on iron than salt, the resistance is higher. In the majority of conditions, salt is preferable.

All the fanciful ideas in "grounds" may be classed with the platinum points for lightning rods. They are both miserly ways of burying money.

Just plain pieces of standard one- to two-inch pipe, driven as much over six feet as is convenient, are best. Solid metal spear-heads on a pipe, and sleeve joints which make holes larger than the diameter of the pipe, increase the contact resistance enormously. If for any reason they are used, special precaution should be taken to fill up the space between the pipe and the earth by an abundance of salt water. If the pipe drives with too much difficulty a solid crow-bar will usually open up a hole. If there is no stand available for starting a pipe eight feet or more long, a shorter pipe, slightly larger in diameter, may be driven several feet and then withdrawn to make a start for the longer pipe.

A basin should be scooped out of the earth at the surface around the pipe, and salt brine poured in. The amount of salt water needed depends on the local conditions of the soil. Where the resistance of a pipe-earth is less than 100 ohms without salt, a bucket full of brine may suffice; where the pipe-earth does not reach moisture below, several bucketfuls may be necessary. Finally, a few handfuls of crystal salt should be placed around the top of the pipe in the basin. Whether the basin is to be filled with dirt, or made permanent by the use of a tile with a cover, depends upon the importance of the earth-connection.

It has been the practice to use a buried coil of copper wire for a local ground near the relays on signal circuits. A number of signal engineers have recognized the value of using a rail for an earth connection and have used an extra gap between a rail and the local ground or earth. Measurements of the relative resistance of the local earth and a rail show that a rail, in spite of its position on wooden ties and rock ballast, has only a small fraction of the resistance of a local earth-plate. Furthermore, the rails, on account of their length, gather in the radiating earth-currents of a lightning stroke. It seems reasonable to presume that an induced potential from electrostatic charges will exist principally between the overhead wires and the rails. Protection should therefore be provided between these two circuits. So far as the writer knows, no reason is evident why the ground terminal of a lightning arrester should not be connected directly to one rail without the use of a local earth-plate. So long as the lightning arrester is shunted across the coils and contacts to be protected, the inductance of the length of rail is a factor that does not enter the problem of protection. At any rate, even when a local ground is used, there should be a lightning arrester connection to a rail.

A pipe-earth or rod-earth is usually sufficient. The earth-connection should be capable of carrying the current of a series arc circuit without drying out. In case of such an accidental cross, the fuses protecting the instrument will not, and should not, melt and open the circuit. It is necessary for the earth connection to maintain a fair degree of conductivity in order that the potential at the telephone receiver may be kept down to a safe value.

Rapid Work in Handling Telegram by Telephone.

"As an illustration of the speed of the Western Union Telegraph service in connection with the present practice of receiving and delivering messages by telephone," says the *Telephone Review*, "a lady in White Plains, N. Y., recently telephoned a telegram to the local joint telephone and telegraph office, for a point in southern Virginia. An answer was received over the telephone in exactly thirty-six minutes from the time the original message was filed. This so astonished the sender that she at first refused to accept the answer as genuine, saying that it was impossible to get an answer from so distant a point in that time, and the local office must have received the message given to her as a reply, before her message reached its destination.

"She finally became satisfied, however, that the answer was really sent in reply to her message.

"It can readily be seen that had the delivery of the message depended on messenger boys, the thirty-six minutes or more, would have been thus consumed with no time left for transmission between White Plains and Virginia."

Telephone Lines.*

A telephone line consists of two conductors, one of which may be the earth; the other always is some conducting material other than the earth —almost universally a metallic wire. Both conductors of a line may be wires, the earth serving as no part of the circuit, and this is the best practice. A line composed of one wire and the earth is called a grounded line; a line composed of two wires not needing the earth as a conductor is called a metallic circuit.

In the earliest telephone practice, all lines were grounded. The wires were of iron, supported by glass, earthenware, or rubber insulators. For certain uses, such lines still represent good practice. For telegraph service, they represent the present standard practice.

Copper is a better conductor than iron, does not rust, and when drawn into wire in such a way as to have a sufficient tensile strength to support itself is the best available conductor for telephone lines.

In the open country telephone lines consist of bare wires of copper, of iron, of steel, or of copper-covered steel supported on insulators borne by poles. If the wires on the poles be many, cross-arms carry four to ten wires each and the insulators are mounted on pins in the cross-arms. If the wires on the poles be few, the insulators are mounted on brackets nailed to the poles. Wires so carried are called open wires.

In towns and cities where many wires are to be carried along the same route, the wires are reduced in size, insulated by a covering over each, and assembled into a group. Such a bundle of insulated wires is called a cable. It may be drawn into a duct in the earth and is then called an underground cable; it may be laid on the bottom of the sea or other water and be called a submarine cable; or it may be suspended on poles and be called an aerial cable. In the most general practice each wire is insulated from all others by a wrapping of paper ribbon which covering is only adequate when very dry. Cables formed of paper-insulated wires, therefore, are covered by a seamless continuous lead sheath, no part of the paper insulation of the wires being exposed to the atmosphere during the cable's entire life in service. Telephone cables for certain uses are formed of wires insulated with such material as soft rubber, gutta-percha and cotton or jute saturated with mineral compounds. When insulated with rubber or gutta-percha, no continuous lead sheath is essential for insulation, as those materials, if continuous upon the wire, insulate even when the cable is immersed in water. Sheaths and other armors assist in protecting these insulating materials from mechanical injury.

A wire supported on poles requires that it be large enough to support its own weight. The smaller the wire, the weaker it is, and with poles a given distance apart, the strength of the wire must be above a certain minimum. In regions where freezing occurs, wires in the open air can collect ice in winter and everywhere open wires are subject to wind pressure; for these reasons additional strength is required. Speaking generally, the practical and economical spacing of poles requires that wires, to be strong enough to meet the above conditions, shall have a diameter not less than .08-inch, if of hard-drawn copper and .064-inch, if of iron or steel.

Lines whose lengths are limited to a few miles do not require a conductivity as great as that of copper wire of .08-inch diameter. A wire of that size weighs approximately 100 pounds per mile. Less than 100 pounds of copper per mile of wire will not give strength enough for use on poles, but as little as ten pounds per mile of wire gives the necessary conductivity for the lines of the thousands of telephone stations in towns and cities.

Grouping small wires of telephone lines into cables has the advantage over open lines of allowing less copper to be used, of reducing the space required, of improving appearance, and of increasing safety. On the other hand, the same grouping introduces negative advantages. It is not possible to talk as far or as well over a line in an ordinary cable as over a line of two open wires. Long-distance telephone circuits, therefore, have not yet been placed in cables for lengths greater than 200 or 300 miles, and special treatment of cable circuits is required to talk through them for even 100 miles. One may talk 2,000 miles over open wires. The reasons for the superiority of the open wires have to do with position rather than material. Obviously it is possible to insulate and bury any wire which can be carried in the air.

A telephone line composed of two conductors always possesses four principal properties in some amount: (1) conductivity of the conductors; (2) electrostatic capacity between the conductors; (3) inductance of the circuit; (4) insulation of each conductor from other things.

*From *Telephony*, by McMeen & Miller.

Bound Volumes of Telegraph and Telephone Age.

Mr. S. Gray of the Western Union Telegraph Company at Wilmington, Del., in renewing his subscription writes: "I do indeed want the TELEGRAPH AND TELEPHONE AGE as I read every part of it and find it of the greatest interest to me."

Poles Purchased in 1910.

In our issue for October 16, 1911, note was made of the preliminary statement issued by Census Director E. Dana Durand, Washington, D. C., as to poles purchased in the United States in 1910. The full report on the subject has just been issued by the Bureau of the Census, and, from this report, we abstract some additional facts of general interest.

The demand for wooden poles, now amounting to nearly 4,000,000 annually, is supplied principally from three different sections of the United States, the northern white cedar region of the lake states, the chestnut region of the eastern portion of the United States, and the western red cedar region of the Northwest, including Idaho, Washington and Oregon. Southern white cedar, or juniper, is found mainly in North Carolina, Virginia and New Jersey. At present the largest part of the cedar used is cut in the lake states, but the indications are that the Northwest will be called upon to supply a constantly increasing proportion.

The qualities most desired in a pole timber are durability, strength, lightness, straightness, and a surface which will take climbing irons easily. The various species of cedar combine these qualities in a high degree. Next to cedar, chestnut, oak and pine were the leading woods drawn upon. The demand for these four species grows greater each year. Over 80 per cent. of all poles reported were of cedar or chestnut, cedar alone supplying nearly 62 per cent. of the total. The number of cedar poles increased slowly during the last few years up to 1909, but shows a slight decrease in 1910. The use of chestnut poles fell off considerably from 1907 to 1908, but, since the latter date, has again increased.

The number of oak poles purchased shows a heavy increase, the number purchased, in 1910, being more than three times that reported in 1907. Various species of oak are utilized in different parts of the country, the more durable varieties of the white oak group being preferred. The number of pine poles has shown a slight increase for each year, except 1908. Several species of Southern yellow pine are used to considerable extent, principally in the Southern States. In the West, another species, the Western yellow pine, is reported. The latter is seldom used for poles without preservative treatment.

The number of cypress poles purchased seems to be falling off, the number reported for 1910 being only about three-fourths as great as in 1907. Cypress poles are cut only in the Southern States, mainly in Arkansas and Missouri. The use of Douglas fir in the Northwest is growing rapidly. Over 56,000 Douglas fir poles were reported in 1910, as compared with about half this number in 1909, and less than 16,000 in 1907. Poles of several other kinds of woods were purchased in quantities of less than 50,000, of which tamarack, redwood, osage, orange, spruce and juniper were the most important. More than a dozen other woods were utilized to a relatively small extent.

The telephone and telegraph companies, which are the principal consumers of poles, reporting 73.2 per cent. of the total number used, purchased 84,195 fewer poles in 1910 than in 1909. The electric railway and electric light and power companies, on the other hand, purchased 105,678 more poles than in 1909, while the steam-railroad companies purchased 110,471 more poles than in the preceding year.

More than one-half of the poles purchased are from 20 ft. to 30 ft. long, this being the length most commonly used by the telegraph and telephone companies. About one-fifth are from 30 ft. to 40 ft. in length, and one-twentieth from 40 ft. to 50 ft. Only about 1 per cent. of the poles purchased exceed 50 ft. in length. Poles of less than 20 ft. in length are used largely by the rural telephone companies, which report a considerable variety of woods, prominent among which is oak.

The increase from 1909 to 1910 in the total number of poles purchased was 3.5 per cent. The largest increase for any of the several classes, was that for poles over 50 ft. in length, 23.5 per cent., and the next largest, that for poles from 40 ft. to 50 ft. in length, 16.9 per cent. A slight decrease is reported for poles from 20 ft. to 30 ft. long.

For a number of years past, experiments have been carried on by private parties, and by the United States Forest Service, with a view to finding and perfecting methods of preventing such decay, and, it may be stated, that it is possible, through the proper application of certain preservatives, to increase the life of a pole from 50 to 100 per cent. The practice has proved a success economically. Not only does it lengthen the life of the pole, but it makes possible the utilization of many cheap local woods which, without preservative treatment, would be valueless for the purpose, thus reducing the cost of poles and transportation charges. In the principal European countries, the practice of pole preservation is much more common than in this country, nearly every pole receiving a penetrating treatment with some preservative before being set. The economy of the process has been so well established that as it becomes generally understood, the percentage of treated poles reported in the United States, will no doubt rapidly increase, and the methods used become more effective each year. The preservatives most commonly used are creosote oil, a solution of zinc chloride and various proprietary preparations, usually antiseptic oils of low volatility.

The increase in the practice of really effective pole preservation in the United States has been retarded by the lack of pole-treating apparatus applicable to the needs of the small consumer. As a result, poles have been treated mainly by methods which do not require the use of a special treating plant, and which add but few years to their service. The usual method is that of painting the lower end of the pole with the preservative.

A somewhat more effective method is that of dipping the pole in an open tank containing the preservative. By this operation all seasoning checks are thoroughly penetrated. A variation of this method is to stand the poles upright in a bath of the preservative, making the wood of the butt end of the pole decay-proof by the absorption of large quantities of the oil or solution, through the action of a partial vacuum in the wood cells created by the alternate raising and lowering of the temperature of the bath. Satisfactory plants have been devised for this purpose which are economical for firms using considerable numbers of poles annually.

In parts of the South, conditions are so favorable to decay, that it is desirable to treat the entire pole, and both commercial and private plants have been established for this purpose. The poles are placed in a closed cylinder, and absorption of the preservative is secured by the use of pressure. Large numbers of pine poles have been treated by this method, which is found to be the most effective.

By far the larger part of the treated poles were treated after purchase, the increase in the number treated after purchase during the past few years being much more rapid than that in the number treated before purchase. The electric railway and electric light and power companies have been especially active in pole preservation. These companies treated nearly 30 per cent. of their poles, while the telephone and telegraph companies and the steam-railroad companies each treated less than 20 per cent. of their poles. These percentages indicate a large gain for each class of purchasers, except the steam railroads, which treated 31.1 per cent. of the poles purchased by them in 1909.

Although the number of treated poles reported, is growing rapidly each year, most of these poles receive a merely superficial treatment which adds only a very few years' service. The figures for 1910 indicate that a larger proportion of the poles were treated during that year by the brush and open-tank methods, than in the preceding year. Future progress in pole preservation should show not only increases in the number of poles treated, but an increasing use of the more effective methods of preservation.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. The review of Maver and Davis' book. "The Quadruplex," was completed in our issue for February 16, and the next book to be taken up and treated in like manner is "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

GALVANOMETERS.

What do the primary laws of electricity teach?

What is the effect upon the current of increasing and decreasing the E. M. F. and resistance?

If the deflection of the galvanometer needle is too great, how can it be decreased, and what instrument is used for the purpose?

How are the coils of a rheostat connected?

Why is the deflection of the galvanometer needle reduced by the addition of resistance to the circuit?

Upon what does the sensibility of a galvanometer depend?

If we desire to measure low resistances, should the resistance of the galvanometer be high or low?

What is the meaning of the term "ampere-turn"?

If a galvanometer has one coil of one turn of wire and another coil of 100 turns, would a current of one ampere in the first coil cause a lesser or greater deflection of the needle than a current of one-hundredth of an ampere in the second coil. State the reason for the result.

Why are galvanometer coils usually wound with a large number of turns of fine wire?

What is the effect upon the needle of multiplying the number of turns?

What is the object of the windings of a galvanometer—to get resistance or ampere-turns?

If the needle gives a deflection of ten degrees with a current of ten milliamperes through its coil, would a current of twenty milliamperes give a deflection of twenty degrees? If not, state the reason.

If the galvanometer coil is made large and the needle very small, what is the effect?

[The various kinds of galvanometers will be taken up for consideration in the next installment of these questions.]

Induction from Michigan Transmission Lines. The Eastern Michigan Power Company which is utilizing the Ausable River in Michigan for electric power purposes, and built a transmission line to Bay City, Saginaw and Flint, supported by steel towers, on February 1 turned on current at approximately 140,000 volts pressure. The line parallels the Detroit & Mackinaw Railroad between Emery Junction and Pinconning, a distance of twenty-nine miles, and the induction from this high voltage line completely paralyzed the wires of the Western Union Telegraph Company, and the Detroit & Mackinaw dispatcher wires between these two points. An injunction applied for by the railroad company restraining the power company from interrupting the telegraphic service, thereby endangering the lives of passengers on account of the dispatchers having no control of their trains, is now pending in Judge Connine's court in Tawas City, Mich.

Censorship in Santo Domingo. — The Santo Domingo government has established a censorship on private telegrams to and from that republic.

Mr. W. C. Black, superintendent of the Postal Telegraph-Cable Company of Denver, Col., in renewing his subscription, writes: "TELEGRAPH AND TELEPHONE AGE is the one journal that we cannot do without."

The Military Telegraph Pension Bills.

Mr. A. A. Zion, of Indianapolis, Ind., chairman of the legislative committee of the Society of the United States Military Telegraph Corps, advises us that "as chairman of the legislative committee, appointed by President Col. W. B. Wilson, at the last meeting of the association for the purpose of securing action on the part of Congress to pension the military operators who served in the Civil War, proper bills to secure this result have been introduced in both the Senate and the House and are now in the hands of the committees on pensions.

"We have made personal appeal to each and every member of the House of Representatives and the Senate," says Mr. Zion, "asking them to favor our bill and they have been made thoroughly familiar with our cause. The congressional committee has also received the hearty support and co-operation of every member of our association by appealing to their respective representatives and senators to use their best efforts to secure favorable report from the pension committees and support of the bill. We have also appealed to President Taft and other prominent and influential men throughout the country, including several governors of states, asking them to assist us in our efforts for the passage of the bill by their taking the matter up direct with members of the pension committees and members of congress. We have received an unqualified endorsement of our cause by members of congress and those who have been appealed to to assist us, and we have every reason now to believe that Congress, at this session, will pass the bill.

"The members of our committee, consisting of Mr. E. Von Eye, Crawley, La.; Mr. Frank B. Knight, Dallas, Tex.; Mr. Ten Eyck Fonda, Omaha, Neb.; Mr. M. F. Robinson, Sanford, Fla.; Mr. R. H. Bohle, St. Louis, Mo., and Mr. J. J. Fowler, New Orleans, La., have spent a great deal of time in assisting in this work and have accomplished a great deal of good. President Wilson has spent considerable time at Washington conferring with congressmen and the pension committees, and is keeping in close touch with this matter, and secretary David Homer Bates has rendered some very valuable assistance by writing personal letters to several of his prominent friends in Washington, which will no doubt prove very beneficial.

"I want to inform the members of our association," Mr. Zion says in conclusion, "that they can rest assured that every possible effort is being made to secure favorable action on the part of Congress and that no stone will be left unturned to secure them the benefits that they have so long been deprived of. It is surprising how many members of congress have advised us that they are in hearty sympathy with our cause and that when given an opportunity, they will use their best efforts to secure the passage of the bill."

Proposed National Commercial Organization.

In his message to Congress on December 7, 1911, President Taft expressed his belief that it would be of great value to have "some central organization in touch with the associations and chambers of commerce throughout the country, and able to keep purely American interests closely in touch with commercial affairs."

In a statement issued March 1, Mr. Taft announced that he had instructed the Secretary of Commerce and Labor to take the necessary steps to initiate as soon as practicable at Washington a conference of delegates from organizations which are engaged in the promotion and development of commerce and industry in their respective districts, such conference to consider the establishment of a representative national organization for commercial development, and to outline the principles by which it should be governed. "It is obvious," he says, "that by some means immediate relation between the government activities and the commercial and industrial forces of our country must be established if we propose to enjoy the full advantage of our opportunity in domestic and foreign trade."

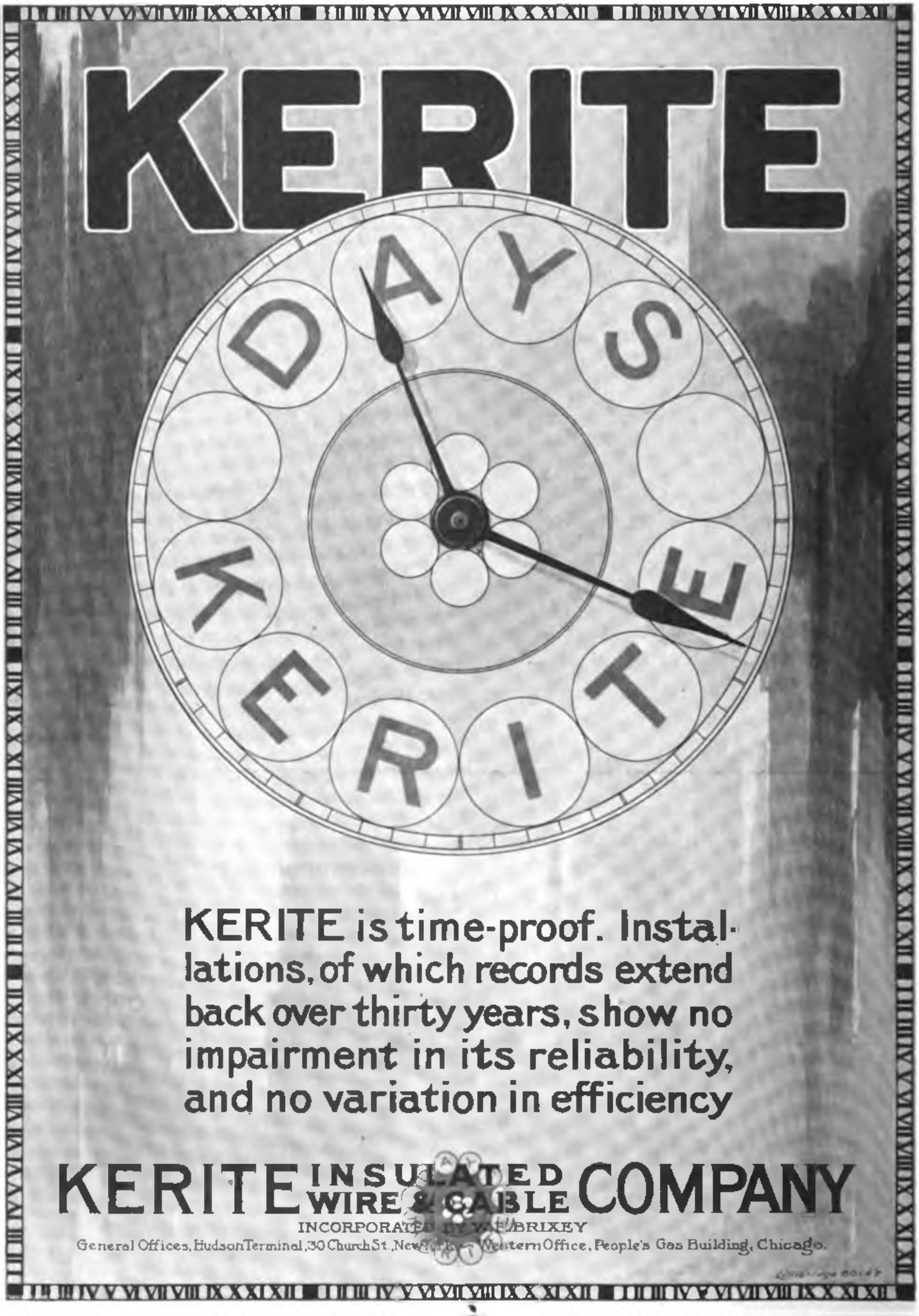
In compliance with these instructions Mr. Charles Nagel, Secretary of the Department of Commerce and Labor, has called a conference of such delegates to be held at Washington on April 15.

Government Ownership of Telegraph in Canada.

During a recent discussion in the Canadian parliament at Ottawa, Ont., on the subject of government ownership of Canadian telegraph lines, Mr. J. E. Armstrong argued that the telephone and telegraph services could be handled with greater economy through the post office department. The proposition, he said, was along the lines of the Hydro-Electric Commission. The commission brings the wires to the municipalities and in like manner the trunk lines for Telephones could be built from city to city and municipality to municipality. The commission favored government ownership of telephone and telegraph lines as it could more readily distribute power to the farmers by using the same poles. [Nothing is said about the troubles from induction by running telegraph and telephone lines on the same poles with the power wires.]

Hon. Rodolphe Lemieux favored the proposition. He said that much of the news received in Canada from the mother country was more or less tainted because of coming through American services.

A. I. E. E. Convention.—The annual convention of the American Institute of Electrical Engineers will be held at the new Copley-Plaza Hotel, Boston, Mass., on June 25-28.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The Railroad.

Telephone Dispatching on Central Vermont.—A telephone train dispatching system has been installed on the New London division of the Central Vermont Railroad. Two dispatching districts on this road—Northern and Southern—are now equipped with telephone dispatching equipment. Mr. M. Magiff, St. Albans, Vt., is superintendent of telegraph.

Pennsylvania Telegraphers Visit Lehigh University.—Two hundred employes of the telegraph and telephone department of the Pennsylvania Railroad met at Lehigh University, South Bethlehem, Pa., recently, and listened to addresses by Professor W. S. Franklin on the "Gyroscope," and Mr. A. L. Erwin, on "Morse and Multiplex Telegraph Apparatus."

Chicago Meeting of Railway Telegraph Superintendents.

At the joint meeting of the Eastern and Western Divisions of the Association of Railway Telegraph Superintendents, at Chicago on March 20, many matters of special interest will be presented for consideration, including the arrangements and programme for the annual meeting of the Association, which is to be held at the Waldorf-Astoria in New York, in June. The Entertainment Committee, of which L. S. Wells, superintendent of telegraph of the Long Island Railroad, New York, is chairman, is actively engaged in arranging matters in connection with the convention and entertainment and there is every indication that the meeting will be a successful one and largely attended. The committee will leave nothing undone that will in any way aid in the realization of their efforts to make the convention a complete success. Much credit is due Mr. L. B. Foley, superintendent of telegraph, Lackawanna Railroad, New York, acting chairman of the Entertainment Committee, in the absence of Mr. Wells on account of illness, for the progress that has been made in this regard.

Another matter that will probably be brought to the attention of the joint meeting at Chicago will be that of cost of maintenance, rates of pay, statistics, etc., in train movement service since the adoption of telephone train dispatching. There is urgent need for data of this character and while the subject has been discussed at former meetings nothing definite has been formulated. The whole matter of compilation is in the hands of a special committee, consisting of Mr. U. J. Fry, of the Chicago, Milwaukee & St. Paul, Milwaukee, Wis.; Mr. W. W. Ryder, of the New York Central Lines, Chicago, and Mr. W. F. Williams, of the Seaboard Air Line, Portsmouth, Va., and it is expected that the committee will be ready to report action at the general meeting in June.

In our issues for February 1, February 16, and March 1, we printed reports from many railway telegraph superintendents on the extension of telephone train dispatching on their respective lines, and the records show that it is a live subject with the railroads, and all authorities agree that it is only a question of time when the telegraph will be entirely superseded by the telephone as a means of dispatching trains and transacting other classes of railroad business. An article on this subject in this issue will be found of special interest at this time, as it points out the tendency of events in railway operation, and shows the great strides that have been made in late years in his direction.

Much enthusiasm is being manifested in these meetings on account of the matters of importance that are now before the superintendents for attention and solution.

Mr. P. W. Drew, superintendent of telegraph of the Milwaukee, St. Paul & Sault Ste. Marie Railway, Chicago, Ill., is the secretary of the association and will be glad to give any further information regarding the association and the meetings.

Entertainment for Railway Telegraph Superintendents.

A meeting of the entertainment committee of the Association of Railway Telegraph Superintendents was held on March 12 in the office of Mr. L. S. Wells, superintendent of telegraph, Long Island Railroad, Pennsylvania Station, New York, to consider matters in connection with the annual meeting in New York in June. Mr. L. B. Foley, superintendent of telegraph, Lackawanna Railroad, New York, presided.

It was decided that the convention be held at some other place than at the hotel which the members will make their headquarters. The selection of the hotel and the date of the meeting are to be determined at the joint meeting of the Eastern and Western Divisions of the association to be held in Chicago March 20. It is thought, however, that June 4 will be the date selected for the convention, and it was definitely settled that a banquet should be held at the Waldorf-Astoria on Friday evening of the same week, June 7.

A tentative programme of entertainment was presented by the Railway Telegraph and Telephone Appliance Association. It provides for shopping parties for the visiting ladies; trip through Central Park; visits to museums and other places of general interest; automobile sight-seeing rides, also for the ladies; a visit to the Edison works at Orange, N. J.; theatre or roof garden party; inspection of large ocean steamers in port, for the general party and a visit to the Cortland Street telephone exchange, and the Western Union headquarters. The excursion to the Edison works will take place on Friday, and in the evening, the banquet.

Several prominent old-time telegraphers will be present at the banquet, including Mr. Thomas A. Edison, Mr. W. C. Brown, president of the New York Central Lines, New York, and others. It is expected that between 250 and 300 persons—active and associate members with their families—will be in attendance at the general meeting.

Those present at the meeting, besides Mr. Foley, were the following superintendents and others: G. A. Cellar, Pennsylvania Lines, west of Pittsburg;

J. C. Johnson, Pennsylvania Lines, Philadelphia, Pa.; L. S. Wells, Long Island Railroad, New York; E. P. Griffith, Erie Railroad, New York; E. E. Hudson, T. A. Edison, Inc., Orange, N. J.; A. P. Eckert, National India Rubber Company, New York; R. A. Patterson, Duplex Metals Company, New York; W. F. Crowell and A. D. Walters, New York Telephone Company, New York, and T. R. Taltavall, TELEGRAPH AND TELEPHONE AGE, New York.

Telephone Train Dispatching.

The United States Electric Company, New York and Chicago, has delivered since the first of the present month seventy-eight Gill selector local battery bell telephone train dispatching outfits to the Norfolk & Western Railway, together with the necessary sending keys. The Norfolk & Western had, heretofore, 175 of the Gill bridging selector outfits in use and the satisfactory service rendered has led to the extension of the system.

The Baltimore & Ohio Railroad, which has had in service about 150 of the Gill outfits, has received from the United States Electric Company forty-one additional Gill selector local battery bell train dispatching outfits and thirty-five local battery bell intercommunicating telephone selector outfits. An interesting feature of this message circuit is that the United States Electric Company's universal calling key will be used in the intercalling service.

The Turner Monument Fund.

A meeting of the Turner Monument Fund Committee will be held in a few days to fix a date for the dedication of the monument to be erected at Harriman (Turner), N. Y., to commemorate the sending of the first train order by telegraph.

The fund now amounts to $2,325.09, and contributions continue to come in. Anyone who is not financially represented in this worthy movement has yet an opportunity to become identified with it. Remittances should be sent to Mr. J. B. Taltavall, 253 Broadway, New York, who is the treasurer of the fund.

The granite monument is now in place at Harriman ready to receive the bronze tablet, and the work is so far advanced that everything will be in readiness for the dedicatory exercises at the time appointed.

The tablet for the monument is now on exhibition in the window of the Gorham Manufacturing Company's store in Maiden Lane, near Broadway, New York.

The fund now stands as follows: Previously acknowledged, $2,320.09; Charles A. Tinker, Brooklyn, N. Y., $5.00. Total, $2,325.09.

Independent Telephone Convention.

The National Independent Telephone Association held its fifteenth annual convention at the Hotel Sherman, Chicago, on February 7, 8 and 9. President Manford Savage's address was on "The Outlook." "The men who are providing telephone competition," he said, "should not fear government control, investigation or wise legislation. They should favor the enactment of sound public utility laws in each State." He said that the important feature of the year was the fact that the American Telephone & Telegraph Company had abandoned its policy of cutting off independent toll-line connections by the purchase of plants.

Mr. J. C. Crowley of Superior, Wis., spoke on "Experiences under Commission Control," and Mr. S. E. Ward of Mansfield, Ohio, reviewed the telephone situation in Ohio.

Other subjects considered were the life of dry batteries on local-battery telephone lines, pole preservation, distinguishing party-line calls, one-way or kitchen telephone service, use of automobiles in telephone service, and phantom circuits.

A banquet was held on the evening of February 8. The officers will be elected by the board of directors.

Obituary.

John Eagan of the Canadian Pacific Railway Telegraph, Winnipeg, Man., died on February 17, at the age of 66 years.

James Bartlett, aged sixty-five years, a well-known real estate dealer in Amsterdam, N. Y., and formerly manager of the Western Union Telegraph office at that place, died there on February 23.

Mr. H. Campbell, aged 41 years, broker-operator employed by Harriman & Co., New York, died of heart disease on February 29. He was a West Virginian by birth. He worked in Pittsburgh before coming to New York eight years ago.

H. H. Matlock, aged 71 years, a prominent old-time telegrapher in the West, and a member of the United States Military Corps during the Civil War, died at Springfield, Ill., April 6. He entered the telephone service in the early days and installed exchanges in various Iowa cities. Later, he became identified with the Central Union Telephone Company as superintendent for the states of Iowa and Illinois, with headquarters at Springfield. In 1886, Mr. Matlock was sent to Australia by the Western Electric Company to dispose of the telephone property in Victoria to the government, and returned to the United States in the following year.

George F. Macdonald, aged 66 years, an old-time telegrapher and superintendent of fire alarm telegraph, Ottawa, Ont., was found dead in bed, on March 2. He was one of the best-known officials of that city, and was well-known to the members of the Old-Time Telegraphers Association and the International Association of Municipal Electricians, being a regular attendant at their annual reunions. Mr. Macdonald was a man of extreme good nature, and was a popular figure at these gatherings. He had an inexhaustible fund of humorous anecdotes, and kept everyone around him in constant good humor. The members of these two associations, as well as his many friends individually will regret to learn of his sudden death.

Decision on Patent Restrictions.—The United States Supreme Court in a decision on March 11, upheld the right of holders of patents to make license restrictions as to the way the articles they they sell may be used.

Railroad Telephone Equipment.

Within a period of less than five years a gradual, but none the less decided and revolutionary change has been made in the making in the method of transmitting intelligence over railroad systems. The

FIG. 1—DISPATCHER'S OFFICE.

railroads which interlace the United States are one by one abandoning the use of the time-honored telegraph for this purpose, and are replacing it with telephone equipment, so that at present eighty-seven steam roads are employing the telephone method of handling their train movements over an aggregate of some 60,000 miles of line.

FIG. 2—WAY STATION.

The many advantages accruing from the use of the telephone instead of the telegraph for the dispatching of trains, alone were responsible for its adoption. The telephone, in the first place, is quicker. It has been observed that the ring of the bell will insure a prompt answer, and for this purpose, large extension bells are used, which can be heard several hundred feet away. In the four years that the telephone has been used for dispatching, not a railroad accident has, it is stated, been charged against it, so that it may be said to be as safe as, if not safer, than the telegraph. Furthermore, it has been made possible to increase the length of a division handled by one dispatcher by as much as fifty per cent.

The personal relationship factor, which is always a thing to be desired, is strengthened by the direct personal communication by word of mouth between the dispatcher and the men under him. Discipline is improved and efficiency increased through the agency of the telephone.

It is not intended in this article, to dwell, to any extent, on the operation of the circuits, but, a general statement regarding the working of the new system will not be amiss. The dispatching circuit consists of two wires, and to these are connected the various telephone sets and selectors located at the way stations. When it is desired to call a sta-

FIG. 3— SELECTOR SET FOR WAY STATIONS.

tion, the dispatcher turns a selector key, which, as the name implies, selects only that particular station desired, and through the medium of the receiving selector apparatus, rings a bell. When two or more stations are wanted on the line at the same time, the proper number of keys are turned by the dispatcher. Train orders are then communicated verbally by the dispatcher, who writes down the order as he delivers it, in order that it may not be delivered faster than the operators can transcribe it. The message is then repeated back to the dispatcher. All proper names and figures are spelled out, as prescribed by the rules of the railroad telegraph associations.

A further feature is, that the telephone circuits are so arranged that the superintendent chief dispatcher, or other road official, can listen in on the line at any time he may desire and inspect the service being given. Such listening-in or observing-service sets can be connected to the circuit at any point.

Perhaps the greatest advantage in the employment of the railroad telephone is in its use in siding and portable telephone sets. The former may be placed at any interval along the right-of-way, or at stated points, such as long sidings, water tanks and drawbridges. In case of emergency they are of infinite value, as they permit the train crew to get into touch immediately with headquarters and get new orders. Another type of apparatus which is also valuable in emergencies is the portable telephone set, which is carried on trains and can be connected or hooked on to the overhead circuit by means of jointed line poles, at any point on the line.

The communications described, are carried over what is known as "train wires," that is to say, wires

FIG. 4—TRANSMITTER ARM.

which are used only for handling train orders. There are, however, two other classes of wires which will show that the telephone serves other purposes, and facilitates the general transaction of railroad matters.

The "block wire" is a circuit extending from block tower to block tower, and is of use in permitting the tower men to get into easy and quick communication with each other.

The "message wire" is a circuit over which the railroad transacts its commercial and executive af-

FIG. 5—TELEPHONE SET FOR SIDINGS.

fairs. In fact, when used in connection with a private branch switchboard, the railroad has its own telephone system.

It may not be amiss to mention the "phantom" circuit, which is, in its simplest form, the use of two physical metallic circuits (that is, actual wires), connectd in such a way with suitable apparatus, that, for purposes of transmission, there are three distinct circuits, two physical and one "phantom." It will be seen, readily, that an arrangement of this character effects a saving in wire.

Another circuit, in use where stations are far apart, and where it would be an undertaking involving considerable expense to construct new telephone lines, is the "composite" circuit. This simply means, that telegraph and telephone messages may be sent over the same wire, and, at the same time, by adding certain apparatus and changing the line connections somewhat. A comparatively recent achievement, which is of great value in railroad work, has been the compositing of phantom circuits.

The telephone lines which have been, and are being installed, are built very substantially, and consist, in the main, of two copper wires weighing 210 pounds to the mile. The lines range in length from thirty to 400 miles, and practically any desired number of stations can be installed.

It has been mentioned that eighty-seven railroads have adopted the telephone for train dispatching, and, that these make use of the selective method, employing, in all, approximately 11,500 selectors at the various way-stations. There are, however, a large number of roads not having a length of over thirty miles, which use the magneto telephone, with code ringing, for handling trains. When these are added to the others, the aggregate is, indeed, very large.

A number of roads have their total mileage completely covered by telephone circuits for dispatching trains, and others are attaining this desirable end as quickly as the necessary appropriations are made. It may also be stated here, that the nine-hour law, which was established for telegraph operators, was a factor in getting the railroads to consider the telephone for dispatching work, inasmuch, as the number of extra telegraphers made necessary by the adoption of the new legislation, was not available. The consensus of opinion among railroad men is, that within ten years, the telegraph will have been superseded by the telephone for the more efficient dispatching of all railroad business—train dispatching and commercial.

The telephone sets used in the dispatching equipments are of various types. In many cases, the standard Western Electric desk stands and transmitter arms, equipped with highly efficient transmission instruments, are used. A recent development, by the Western Electric Company, is a loud-speaking receiver. Tests made under the most severe conditions, it is stated, show the articulation to be distinct and the tone of sufficient volume, to make it easy for the operator to hear clearly, no matter how much noise there may be.

Frequently, special transmitter arms have been designed to meet the special requirements of railroad service. One of the most striking of these is arranged so that when the arm is swung into position before the operator, he needs merely to place his head in position to talk. The transmitter and receiver are on a short, adjustable arm affixed to the transmitter arm proper. This does away with the use of a head receiver, and is designed especially for tower service, or that the operator may reach his switches without delay. These arms, which are also of Western Electric manufacture, have been used very successfully wherever installed.

Efficient Primary Battery Cells.

Until within comparatively recent years, many people disliked to use the telephone, the indistinctness of the transmission rendering conversation difficult in a great many cases. Fortunately, these conditions no longer exist for most of us, the rapid strides made by the telephone engineers and manufacturers having brought the modern city system to a point where it is a pleasure to use the telephone instead of a severe strain on the vocal cords as formerly. Metallic circuits, improved instruments and the adoption of the common battery system are mainly responsible for the improvement, a large measure of the credit belonging to the latter, for the reason that it furnishes one of the prime requisites for perfect transmission, viz: steady current.

The importance of an absolutely uniform current for the talking circuit is universally recognized by telephone men, owing to the fact that no change should take place in the secondary circuit other than that brought about by the disturbance in the magnetic field, caused by the vibration of the diaphragm. It is clear, therefore, that good transmission cannot be had when the transmitter circuit is supplied from a battery that rapidly polarizes under discharge, thereby changing the strength of the magnetic field, and seriously affecting the transmission.

The efficient and clear transmission possible with an up-to-date telephone plant can be duplicated in the railroad telephone dispatching systems, by use on the talking circuit, of a battery capable of furnishing uniform voltage with no appreciable increase in internal resistance, as the process of discharge advances, thus establishing the valuable feature of constant resistance in the talking circuit, and eliminating the disturbances incidental to a cell that quickly polarizes and weakens the magnetic field.

It is claimed that the Edison cell fills these requirements so closely that one would think it had been designed for the service. The change in voltage of the 400 ampere-hour cells, when discharged constantly at the rate of .25 amperes, about the average current taken by a transmitter, is a drop of only .07 volts, from the beginning of discharge until the cell is exhausted, indicating that the increase in internal resistance is negligible.

The fact that these cells are so well adapted for transmitter service, however, is not the only feature worthy of attention. It is suggested that the economy which can be effected by their use on account of the long life, ease of renewal and small amount of attention required are characteristics that should receive favorable consideration, even if the battery were no better fitted for the work than the open circuit types. An idea of the saving that can be made in both labor and material can be gathered from the fact that when a set of open circuit cells will operate a circuit one month, a set of Edison 400 ampere-hour cells will, according to the manufacturer, Thomas A. Edison, Inc., Orange, N. J., usually last twenty months. The average annual consumption of a way station transmitter is frequently estimated to be about fifty ampere-hours, and under these conditions the Edison 400 ampere-hour cells will last approximately eight years. Here again is another advantage of the Edison cell, i. e.: the ampere-hour capacity is consumed only in supplying current to the circuit and no energy is wasted due to local action, cells drying out or defects of this nature common to many types of primary cells.

Improved Telephone Train Dispatching Apparatus.

The United Telephone Company, Boston, Mass., calls attention to its high-power train-dispatching telephone sets. The operative parts are supported on an adjustable arm, thus replacing the ordinary head receiver. Induction noises and dangers from injury from lightning discharges are eliminated by this arrangement.

The sets are provided with a non-metallic megaphone, which gives a large increase in volume of tone, and a distinct enunciation is thus secured. One of the advantages in the use of this device, is the doing away with constant listening.

The main line and local circuits are controlled by a semi-automatic switch operated by the foot, thus freeing the hands of the operator for other work; also preventing waste of battery, as it is drawn on only when needed. The apparatus is provided with a transmitter of the power required for the service.

The high-power transmitters, it is claimed, have double the transmitting power of ordinary instruments under the same conditions, or, in other words, they halve the cost of wire now required with present transmitters. They are, moreover, advantageously applicable to the common battery system and where copper circuits are not available provide perfect transmission over iron telegraph wires.

The United Telephone Company also manufactures telephone repeaters that are especially adapted to long distance telephony. They automatically re-transmit speech from one circuit into another without loss of volume or distortion of the articulation. Like the telegraph repeater in telegraphy, they make possible transmission to any distance.

Telephone Train Dispatching in 1911.

(Continued from page 156, March 1.)

Mr. C. A. Parker, superintendent of telegraph of the Denver, Northwestern & Pacific Railway, Denver, Col., writes: "We have not made any progress in developing our telephone or telegraph systems during 1911, as we have done no new building. We have moved our general offices to the new Tramway Building at Fourteenth and Arapahoe Streets, where we have a new private branch exchange board of the latest style, with twenty-four branches and eight trunk lines in use. We hope to extend our line, and string a new telephone circuit this year."

Report of Bell Telephone Company of Pennsylvania.

The annual report of Mr. F. H. Bethell, president of The Bell Telephone Company of Pennsylvania, and its Associated Companies, for the year ended December 31, 1911, shows the following earnings and expenses:

EARNINGS.		
Exchange Revenue	$16,123,586.74	
Toll Revenue	3,705,858.04	
Dividends and Interest	32,549.63	
Miscellaneous	388.02	
		$19,862,382.43
EXPENSES		
General Expenses and Taxes	$1,305,957.21	
Procuring and Handling Traffic	5,629,428.32	
Maintenance and Replacements	7,134,621.48	
Instrument Rental ..	863,514.30	
		14,933,521.31
Earnings over Operating Expenses ..		$4,928,861.12
Interest		235,973.46
Revenue Balance		$4,692,887.66
Dividends Declared		3,600,046.00
Balance to Surplus		$1,092,841.66
Surplus, January 1, 1911		4,579,425.86
Surplus, December 31, 1911		$5,672,267.52

The system consists of The Bell Telephone Company of Pennsylvania, The Central District & Printing Telegraph Company, The Chesapeake & Potomac Telephone Company, and the Diamond State Telephone Company and their subsidiary companies.

Radio-Telegraphy.

Signor Guglielmo Marconi and Mr. Godfrey C. Isaacs, managing director of the Marconi Wireless Telegraph Company, London, arrived in New York on the steamer *Lusitania* on March 14.

Senator Marconi.—Signor Guglielmo Marconi it is stated, will be created an Italian senator this month.

Jack Binns Club.—Young wireless amateurs in Cincinnati, Ohio, have organized the "Jack Binns Club," which is to be a clearing house of wireless ideas.

United Wireless System on Steamers.—United Wireless telegraph equipment is to be installed on four steamers of the Insular Line running out of New York.

Change Names of Wireless Stations.—The Navy Department has changed the names of four of its large wireless stations as follows: Cape Elizabeth to Portland, Me.; Point Loma to San Diego, Cal.; Table Bluff to Eureka, Cal., and Unalaska to Dutch Harbor.

Wireless from Chicago to San Francisco.—Wireless messages were exchanged between Chicago and San Francisco, Cal., on March 1, according to a report from the first named city.

Long Distance Wireless.—It is stated that a test wireless message was received recently at Hillcrest station in San Francisco, Cal., from the Arlington station at Washington, D. C.

Wireless Station at Rome.—The Marconi Wireless Telegraph Company has arranged with the Italian government to erect a high-power wireless station at Rome. Two towers will be 240 feet high, and four, 150 feet each.

Wireless on New Torpedo Boats.—The two new submarine torpedo boats, E1 and E2, of the United States Navy, now being equipped at the Newport, R. I., naval station, are the first boats of this type in the United States Navy to be fitted out with wireless apparatus.

Wireless Station at Wellington.—A high power wireless telegraph station is being erected on a mountain peak near Wellington, New Zealand, 1,000 feet above sea level. Two wooden masts, 150 feet high, of the ladder type, will be erected. This station will be able to communicate with Sydney, Australia, and Fiji.

"Radiograms" Official Designation.—The Navy Department, Washington, D. C., on March 1 adopted the word "Radiogram" to designate a wireless message. Attention has been called to the fact that the words "Radiogram" and "Radiograph" have long been used in connection with X-Ray work.

Government Rate for Wireless Messages.—Postmaster-general Hitchcock has fixed fifteen cents as the maximum rate per word that the United States government may pay for wireless messages within the limits of the United States. No charge shall be made for the date and name of place from which the message is sent.

English Imperial Wireless System.—The Postmaster-general of Great Britain has accepted the terms of the Marconi Wireless Telegraph Company for the construction of all the high-power wireless stations required for the imperial wireless system. The Marconi Company will operate the stations for the government for the first six months and then turn them over to the government.

Wireless Suits.—The National Electric Signaling Company has entered suit in the United States District Court, New York, against the Marconi Wireless Telegraph Company of America for an alleged infringement on its patent for the substitution of horizontal transmitting and receiving wires for the vertical wires. The Marconi Company has a counter-suit for the use by the National Electric Signaling Company of a certain tuning patent, for which the latter claims prior rights.

To Regulate Wireless.—A bill was introduced in the United States Senate by Senator Smith, of

Michigan, on March 4, to regulate radio-telegraphic communication. It provides for a license to be issued by the Interstate Commerce Commission to all operators of wireless instruments and gives the commission power to regulate the wave length of stations. It is provided that signals from vessels in distress shall be free from interference.

Regulating Clocks by Wireless.—It is proposed to regulate all public clocks in Germany by the aid of wireless telegraphy. An electrician by the name of Ferdinand Schneider has invented a method of accomplishing this result and has received the recognition and support of the German military and naval authorities. A central station is to be erected at Fulda from which wireless waves will be transmitted from a 325-foot tower at one-minute intervals.

Private Wireless Plant in Canada.—In our issue for February 16, reference was made to the wireless telegraph system of the Goodyear Tire & Rubber Company of Canada, between its offices in Toronto and factory at Bowmanville. The distance between the two stations is forty-three miles, and, Mr. F. Barton, the company's wireless operator at Toronto, informs us that the system works very satisfactorily. The equipment used is that of the Clark Wireless Telegraph & Telephone Company of Detroit, Mich.

Wireless Charges in Uruguay.—The central office and branches of the national telegraph throughout the Republic of Uruguay are now transacting business through the radio-telegraph stations charging for the land service (including address and signature) twenty-five centesimos (twenty-six cents) for the first ten words, and two centesimos for each additional word; the radio-telegraph charge is ten centesimos for each word, with a minimum of ten words. The call signal is U M V. All private stations have been closed.

Naval Wireless Regulations.—The Navy Department at Washington has issued orders that alertness on the part of operators at United States naval wireless stations must be maintained during all hours of the day and night. When within range of a naval wireless shore station, vessels of the navy are required to report their position, course and speed. In case it is desired to find a vessel, reference is made to her last position report and her course traced until she is reached through the nearest shore station. The order designates "XXX" as an interference signal, and also "min" for "wait a minute"—denoting interference with business on hand. A ship shall not call longer than fifteen minutes at a time.

Proposals Invited. — Bids are invited by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until April 2, for a quantity of magnet wire (schedule 4400), to be furnished at the Boston Navy Yard. Blanks will be furnished by the navy pay office, Boston, Mass., or by the Bureau at Washington.

Franchises in Alabama.—The Supreme Court of Alabama has decided that when a franchise is granted by a city and acted upon by the grantee, that such grant is perpetual unless there are expressed limitations in the franchise. The American Telephone & Telegraph Company was granted a franchise some years ago by the City of New Decatur, Ala., and established a plant and service in accordance therewith. The franchise was later revoked, the city contending that all public service franchises were revokable. The case was carried through the state and federal courts with the result mentioned.

Bunnell Election.—At the annual meeting of the J. H. Bunnell & Co., New York, on March 11, M. J. J. Ghegan was re-elected president and secretary and Mr. C. E. Graham vice-president and treasurer.

Gold and Stock Life Insurance Association.—The printed proceedings of the thirty-fourth annual meeting of the Gold and Stock Life Insurance Association, New York, have been distributed to the members. The pamphlet includes a copy of the constitution and by-laws and list of members. It is neatly gotten up and should be carefully read by the members. Mr. W. J. Dealy, 195 Broadway, New York, is the secretary.

T. M. B. A. Assessment.—Assessment 535 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Michael S. Malony, at New Orleans, La., Edward H. Wade, at Lackawanna, N. Y., Ralph E. Lawrence, at Crafton, Pa., George M. Huntington, at New York, and Jeremiah M. Delaney, at Fort Edward, N. Y.

Investing in California Property.—An interesting proposition is presented to telegraphers by Mr. R. K. Holahan, a well-known telegrapher of Los Angeles, Cal. Mr. Holahan is president of the Telegraphers' California Land Purchasing Agency in that city, and he offers to purchase for telegraphers lemon or orange groves, acreage or lots in and near Los Angeles, and take care of them until such time as the purchaser is ready to occupy the property and take possession personally. This is an excellent opportunity to invest in property that is rapidly growing in value. Further details of this proposition will be found in Mr. Holahan's advertisement on another page in this issue.

Chicago Telegraphers' Aid Society.

At the annual meeting of the Chicago Telegraphers' Aid Society held on February 4, Richard S. Gill was elected president; John J. Harrington, vice-president; Chas. H. Shell, Sr., treasurer, and Alfred J. Fuller, secretary. The reports of the secretary and treasurer show the society to be in a prosperous condition, and, the past year was one of the most successful in the history of the organization.

The society is the result of co-operation between 1,000 morally responsible members, to secure insurance during sickness and at death, at the lowest practicable cost, and it is governed by its own members. It was organized in 1889, and has paid $60,000 to members for sick benefits, and $8,400 to members' families as death benefits.

Consolidation of Typewriter Interests. — On March 1, the sales organizations of the Remington, Smith-Premier and Monarch typewriter companies were consolidated. The executive staff of the greater organization will consist of the active leaders of the three original companies. The consolidation is stated to be the first step of expansion for a more aggressive campaign, and many new branch offices will be opened in the United States. Last year's business of the three companies named, it is stated, surpassed every previous record.

LETTERS FROM OUR AGENTS.

CHICAGO WESTERN UNION.

Messrs. H. M. Buckley, assistant chief, and J. D. King, traffic chief, of the Sioux City, Iowa, office, were recent Chicago visitors.

PHILADELPHIA WESTERN UNION.

Mr. I. D. Maize, the well-known veteran telegrapher of this office, celebrated his seventieth birthday on February 28. He received the congratulations of a host of friends at his home, surrounded by his wife, four daughters, two sons and five grandchildren. Mr. Maize is still hale and hearty.

The "Dot and Dash Club" was organized in this city on March 11, in the office of Mr. C. E. Bagley, superintendent of the Postal Telegraph-Cable Company. The following persons were present: C. E. Bagley, A. S. Weir, J. A. Chapman, R. C. Murray, R. C. Mecready, Harvey S. Williams, J. H. Wilson, A. G. Strickland, C. B. Wood, I. D. Maize, L. W. Miller, W. V. Madden and M. N. Redding. The club was organized by the election of Mr. S. S. Garwood, president, A. S. Weir, vice-president, C. B. Wood, secretary, and J. H. Wilson, treasurer. A constitution was adopted and by-laws will be submitted later. Over fifty members were elected. Another meeting will be held on March 25. The object of the club is to promote a more fraternal feeling among the telegraphers, and to hold several dinners during the year at which prominent speakers will be invited to be present. All persons who are or have been at any time Morse operators are eligible, and the membership will probably be limited to 150 to 200.

PHILADELPHIA POSTAL.

The sympathy of the entire office was extended to manager J. A. McNichol on the death, on March 9, of his mother. The funeral on Wednesday, March 13, was attended by many of Mr. McNichol's friends from the office.

Vice-president and general manager E. J. Nally, vice-president C. C. Adams, general superintendent, E. B. Pillsbury and superintendent of messengers, Mr. E. P. Tully of New York, recently paid this office a visit.

Chief operator E. W. Miller went to New York recently on company business.

Wire chief E. P. McElroy has recovered most all of his silver and jewelry which was stolen shortly after Christmas.

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 $328,000, which, apart from current assets, amounts to nearly 6½% 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 employe 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 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.

TELEGRAPHERS OF TO-DAY.

"Telegraphers of To-Day," illustrating the personnel of the telegraphic profession as it existed in 1894, with more than 900 biographical and historical sketches of leading members of the craft, is a unique and valuable publication; it has become standard, being the only work of the kind extant. It contains 354 double-column pages, 7 x 11 inches in size, has gilt edges and is bound in imitation morocco—altogether a handsome volume.

Of this fine publication, becoming more and more valuable as time passes, we have but a few copies left. The original price was $5. In order to readily dispose of these remaining volumes, and place them where they rightfully belong, in the hands of every telegrapher who failed to secure a copy at the higher original price, we have cut the figure to $1 a volume. On receipt of this amount the book will be sent to any address, express charges to be paid by the purchaser. At this low rate, a sum below the cost of binding the book even, no telegrapher who desires to own a copy should fail to obtain one at this time, for this "bargain" price can never be repeated, as the book will soon be out of print. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Any electrical or telegraph book published, for sale by Telegraph and Telephone Age, 253 Broadway, N. Y.

Telegraph and Telephone Age

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Gas Engines vs. Electric Motors.

One of the things most noticeable when weighing the merits of plans and projects of a novice in electrical or mechanical engineering is his apparent oversight or ignorance of certain conditions which he may and probably will have to meet after the scheme has been put into practical operation.

The knowledge of possible conditions and governing factors can, of course, only be acquired by experience, or by a thorough reading of the subject from the pen of some authority who points them out and suggests the proper remedies.

For illustration let us take the problem of installing motive power, electric or gas, in a small but growing factory and the question resolves into that of: Which will be the most economical, an electric motor or a gas engine?

In order to show the snags a novice is liable to encounter we will give the actual experience of one who decided in favor of the gas engine.

Being somewhat of a mathematician he figured out closely about what horsepower was required and purchased an engine which apparently would meet the requirements.

For about a year everything went smoothly, but afterward business picked up so rapidly that additional lathes and other machinery were required and then he discovered that he had figured too closely and had not made ample provision for future growth. This was his first oversight. A new and larger engine must be bought, while the old one would bring very little sold as second hand.

Another thing he learned, too late, was that a gas engine consumes about the same amount of fuel when running light as it does with a full load. In his case he did not lose much on the plant in that respect because there was usually a full load.

The point to remember in connection with gas engines, however, is that they are economical and most efficient only when worked at or close to their rated capacity. Hence for plants requiring a practically constant power year in and out gas engines are both economical and, in many cases, best suited.

An electric motor, on the contrary, consumes energy only in proportion to the load carried, hence the cost of energy is less when the load is light. Nor is this the only argument in favor of the electric motor for variable loads. Larger machines may be installed thus providing ample provision for future growth at comparatively little additional expense, while the efficiency of the motor is practically the same under all loads. The result of our friend's experience was that he was finally compelled to substitute an electric motor of proper power for the gas engine at considerable expense, but states that since then he has not only been able to meet unusually large temporary demand for power, but he believes he has saved enough in the long run by the change to pay for his first experiment. This illustration must not be taken as belittling the merits of the gas engine, however. The gas engine is all right in its proper place. The failure in this case was due merely to insufficient knowledge of its limitations.

Another fact worth bearing in mind is that nearly all small apparatus for generating electric energy are practically nothing more than expensive toys.

Amateurs of an inventive turn of mind are constantly trying to utilize batteries of small output in connection with low candle-power lamps for electric light in their homes.

They usually imagine that because a miniature one-candle power lamp may be operated by, say a couple of two-volt batteries in series, that sixteen similar lamps arranged in multiples and bunched together should be the equivalent of one commercial sixteen candle-power lamp, and probably be just as cheap to maintain.

Their mistake lies in the failure on their part to understand that, while a standard sixteen candle-power lamp will operate on about three watts per candle, on account of the great care that is taken in their construction for continuous practical illumination, a miniature lamp, as usually made, will consume a great deal more energy per candle and otherwise show less efficiency in nearly every respect. In addition to this waste of energy there is always considerable loss due to consumption of the current in overcoming the comparatively high resistance in the battery and external circuit.

In a regular electric light circuit the ratio of external resistance to that of the lamp is so small that practically all the electric energy supplied is utilized at the lamp.

Furthermore, even were it possible to operate sixteen one-candle-power lamps in multiple with a comparatively few number of cells, as proposed, how long do you suppose the cells would last? Let us figure this out.

The energy in watts consumed in any circuit is equal to the product of the current and the voltage of the battery. A standard sixteen candle-power lamp requires a little over one-half an ampere of current, and in order to bring the volume down to that figure a high voltage (usually 110 volts) and a high resistance lamp are required. It is evident, therefore, that if the voltage is reduced the current must be correspondingly increased to get the same product.

Now if a miniature lamp is so constructed that it requires, say two amperes of current per candle, as they often do, with a battery the electromotive of which is but a few volts, it follows that sixteen lamps in multiple would require thirty-two amperes of current, so that even were it otherwise practicable a standard storage battery of 100 ampere hours' capacity would only last a little over three hours, while the toy sizes of primary batteries, which usually go with one candle-power lamps would be exhausted in a very short time.

The same rule applies to a small electric generator. If it possesses a high electromotive force it cannot furnish a great current. It is, therefore, useless for multiple circuit operation. If another machine of the same size possesses a low voltage, it will furnish a correspondingly greater current, but will be useless for long circuits. The total output, however, will be about the same with either machine, but in a different form.

The reason why two machines of like dimensions may give out different forms of electrical energy is that their armatures, etc., are wound with different gauges of wire.

If wound with fine wire there will be a great many more convolutions in the coils than there would be if larger gauges were used. As each convolution increases the electromotive force the fine wire winding of course creates high voltage. But as fine wire possesses high resistance it is not capable of carrying a great volume of current without overheating, and consequent waste of current.

With coarser wire the same space will be filled with fewer convolutions, hence less voltage, but there will be less internal waste and it will carry a greater volume of current.

Owing to the fact that small machines consume so much of the energy uselessly in the way of overcoming high internal resistance, friction of moving parts, their efficiency is as low as 40 or 50 per cent., against 95 or 98 per cent. in the largest sizes. It may be said, in conclusion, that the efficiency of generators increases as their lineal dimensions are enlarged, other conditions being equal, for the reason that a greater percentage of their total output may be utilized in the external circuit.

Telegraph and Telephone Patents.

ISSUED MARCH 5.

1,019,236. Signaling. To R. A. Fessenden, Pittsburgh, Pa.

1,019,260. Coherer. To C. D. Lanning, Boston, Mass.

1,019,403 and 1,019,404. Illustrative Telegraphy. To N. S. Amstutz, Cleveland, Ohio.

1,019,574. Telephone-Pay-Station Cabinet. To H. I. Wiechers, Leon, Mexico.

1,019,628. Railroad Telephone. To W. E. Frost, Lewiston, Me.

ISSUED MARCH 12.

1,019,781. Signaling System. To E. R. Gill, New York, and O. J. Hamlin, Smethport, Pa.

1,019,879. Telephone Metering System. To G. Babcock, Rochester, N. Y.

1,019,883. Telegraph Transmitter. To J. A. Cox and J. H. Kidwell, Parkersburg, W. Va.

1,019,992. Telephone System. To J. L. Rue and C. F. Brown, Coshocton, Ohio.

1,020,032. Signaling by Electromagnetic Waves. To R. A. Fessenden, Pittsburgh, Pa.

1,020,211. Automatic Telephone Exchange. To G. W. Lorimer, New York.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange March 25.

Amer. Telep. and Teleg. Co.	148⅞
Mackay Companies	79½
" " pfd.	70
Western Union Tel. Co.	84¼

New Vocation for Telegraphers.—An operator in a Western city spends his spare moments in hypnotizing people. A surgical operation was performed on a man while under the hypnotic influence of this operator, none of the usual anaesthetics being administered. In fact he sang songs while the surgeon's knife was doing its work.

Mr. J. H. Nichols now a prominent business man of Denver, Col., a former old-time telegrapher, and an active member of the United States Military Telegraph Corps during the Civil War, in renewing his subscription states, "I am in no hurry for 'Old Age,' but for the TELEGRAPH AND TELEPHONE AGE, that's different."

Personal.

Mr. H. B. Perham, president of The Order of Railroad Telegraphers, St. Louis, Mo., was a recent New York visitor.

Mr. J. Frank Howell, a former telegrapher, now a New York Broker, accompanied by his wife, is spending his winter vacation in Florida.

Mr. W. E. Harkness of the United States Electric Company, New York, has been in Chicago for the past two weeks on business connected with the company.

Mr. Donald Murray, the inventor of the Murray system of telegraphy, sailed from New York on the steamer *Lapland*, March 23, his destination being London.

Mr. William H. Kernan, formerly superintendent of police and fire alarm telegraphs at Bayonne, N. J., was recently granted patents on improvements in fire and police signal systems.

Mr. J. J. Ghegan, president, and Chas. E. Graham, vice-president of the J. H. Bunnell & Co., New York, have returned from a trip to Jacksonville, and other points in Florida, where they spent a few days.

Mr. James F. Gormley of Canton, Mass., a well-known old-time telegrapher, celebrated his seventy-sixth birthday on March 3. Many of Mr. Gormley's old Boston comrades extended their congratulations in person.

Mr. Frank D. Chase, architect of the Western Electric Company, has opened offices in the Peoples Gas Building, Chicago, for the practice of architecture and industrial engineering, making a specialty of manufacturing plants and mercantile buildings.

Mr. Bertram M. Downs, who recently severed his connection with the Brookfield Glass Company, New York, is now associated with the Hemingray Glass Company, Covington, Ky. Mr. Downs has many friends in the electrical field who will wish him success in his new business relations.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. C. Adams, second vice-president, is in Philadelphia on company business.

Mr. C. P. Bruch, third vice-president, returned on March 25 from Pinehurst (Southern Pines), N. C., where he spent several days.

A conference of the general superintendent and superintendents of the Southern Division was held at 253 Broadway, New York, on March 26, 27 and 28. Papers were read on "Efficiency of the Service," by Jesse Hargrave, division superintendent; "Receipts," by W. C. Daviet, district superintendent, and "Expenses," by G. W. Ribble, district superintendent, all of Atlanta, Ga. Those present were: Messrs. George H. Usher, general superintendent; Jesse Hargrave, division superintendent; Geo. W. Ribble, W. C. Daviet, W. C. Lloyd and C. H. Ashburn, superintendents, Atlanta, Ga.; F. W. Conger, division superintendent, Dallas, Tex.; Mr. H. A. Tuttle, president and general manager of the North American Telegraph Company, Minneapolis, Minn., was also present. President C. H. Mackay, vice-president and general manager E. J. Nally and other officials were present, as were also the Eastern Division officials, including E. B. Pillsbury, general superintendent; L. Lemon, division superintendent; E. Kimney and C. F. Leonard, superintendents, New York; superintendents C. A. Richardson, Boston, Mass., C. E. Bagley, Philadelphia, Pa., and H. Scrivens, Pittsburgh, Pa. At the conclusion of the three days' conference the entire party was entertained at supper and the theatre on Thursday evening, March 28.

New equipment for the offices at the national conventions to be held in Baltimore and Chicago during June has been ordered.

Postal Telegraph Club of Atlanta.—The annual banquet of the Postal Telegraph Club of Atlanta, Ga., which was to have been held on March 23, has been postponed until some day in April on account of the absence of the superintendents of the Southern Division who attended the conference in New York on March 26. Mr. L. A. Minor is secretary of the club.

Magnetic Club Spring Dinner.—The spring dinner of the Magnetic Club will be held at Moquin's, on Fulton Street, New York, on April 24. Hon. William A. Prendergast, Comptroller of the City of New York, will be present as the guest of honor, and will address the Club. The proceedings of the twenty-third annual meeting of the Magnetic Club of New York, which was held January 11, have been printed in pamphlet form. The Constitution and by-laws of the club and a list of the officers and members are included.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of this company and of the American Telephone & Telegraph Company, sailed for Europe on March 30, to be absent about two months.

Mr. G. D. Perry, general manager of the Great North Western Telegraph Company, Toronto, Ont., was a recent executive office visitor.

General superintendent J. C. Nelson and division plant superintendent W. C. Titley, Denver, Col., recently made a trip of inspection through Kansas and Nebraska.

Mr. G. M. Yorke, engineer of this company, New York, who accompanied Mr. Belvidere Brooks, general manager, on his recent trip of inspection through the South, has returned.

Mr. W. N. Fashbaugh, traffic engineer, is in Denver, Col., on company business. He attended the joint meeting of the Eastern and Western

Divisions of the Association of Railway Telegraph Superintendents in Chicago on March 20.

Mr. C. H. Murphy, general superintendent of Time Service, New York City, was the host at a dinner given at the Brown Palace Hotel, Denver, on Saturday evening, March 16. The dinner was attended by Mr. J. C. Nelson, general superintendent, Mr. W. McD. Milne, division auditor, Mr. S. E. Leonard, division commercial superintendent, Mr. B. L. Brooks, division traffic superintendent, Mr. C. R. Fisher, district plant superintendent, Mr. E. E. McClintock, district commercial superintendent, and Mr. J. F. Reade, manager, Denver. Mr. Murphy left Sunday evening for the Pacific Coast.

Mr. Norman Ringer has been appointed manager of the Dallas, Tex., office to succeed Mr. W. B. Kendall; Mr. O. L. Turner chief clerk to general superintendent; L. McKisick, Dallas, Tex., has been advanced to the position of district superintendent.

Mr. P. W. Johnson, district commercial manager, Boston, Mass., lectured before the Bangor, Me., Chamber of Commerce, on March 21, on "The Use of the Telephone and Telegraph by Business Men."

The following appointments of managers in the Southern Division are announced by Mr. J. S. Calvert, district superintendent, Richmond, Va.: J. B. Irby at Bennettsville, S. C., vice T. B. Smith; Mr. W. R. Staples, Washington, N. C., vice Mr. G. C. Cauthen, transferred to Norfolk, Va., as assistant to the manager; Mr. O. H. Holly, Aiken, S. C., vice Mr. W. J. Terry, who leaves the service; Mr. J. I. Benson, High Point, N. C., vice Miss Genevieve Moore; Miss C. B. Beall, Ft. Monroe, Va., vice Miss Eva P. Wood.

The regular semi-monthly conference of district commercial managers was held in the office of Mr. J. F. Nathan, district commercial superintendent, New York, on March 22.

Mr. W. B. Kendall, manager of the Dallas, Tex., office of this company, has been appointed special agent for the Gulf Division with headquarters at the same place.

Mr. J. C. McGrew, manager of the Erie, Pa., office has exchanged positions with manager R. O. Walters of the Jamestown, N. Y., office.

Mr. Frank E. Coyle, chief clerk to the general superintendent, New York, is spending a few weeks at Lakewood, N. J., recuperating.

Mr. J. D. Felsenheld, general clerk in the office of Mr. J. F. Nathan, commercial superintendent, New York, has been transferred to the office of general superintendent A. G. Saylor.

The Western Union Telegraph Company has completed the installation of automatic printing equipment on three circuits, at Dallas, Tex.

Heavy Work on a Printer Circuit.

On January 9, 1,035 messages were handled, on the Portland-Seattle printer during eight hours' operation, an average rate of 129 an hour. This was the regular run of business, including day letters, railroad deadheads, etc. Mr. C. A. Cook is printer chief; W. E. Brooks, chief operator; J. A. Paquette, night chief operator; T. A. Long, late night chief at Portland.

Injunction Granted Western Union.—The Western Union Telegraph Company has been granted a temporary injunction restraining the Wisconsin secretary of state from canceling its charter in that state. The litigation grew out of the removal by the Western Union Company of a damage suit from the state to the federal court in violation of a state law.

Western Union Quarterly Report.

The report of the Western Union Telegraph Company for the quarter ending March 31, shows the estimated condition of the company at the close of that period as follows:

Surplus December 31, 1911		$12,291,634.66
The net revenues of the quarter ending March 31, based upon completed returns for January, partial returns for February and estimating the business for March; less quarterly assessment for Repairs and Depreciation pursuant to Executive Committee's resolution of January 31, 1912, conforming to president's annual report of 1911, will be about..........	$1,220,000.00	
Less interest on bonded debt	434,250.00	
Leaves estimated net earnings for the quarter, less interest on bonded debt.		785,750.00
		$13,077,384.66
It requires for a dividend of three-fourths of one per cent. on capital stock issued about..................		747,970.00
Deducting which, leaves a surplus, after paying dividend, of.................		$12,329,414.66

A dividend of three-fourths of one per cent. was declared payable April 15.

Mr. Lewis Cass Ledyard, of New York, was elected a director of the company.

J. C. Willever, United States Manager Western Union Cable System.

Mr. John C. Willever recently appointed United States manager of the Western Union Cable System with headquarters at New York, is a widely known and experienced man in the telegraph service and is eminently fitted to fill the exacting and delicate duties of his new position.

Mr. Willever is a native of New Jersey, having been born at Montana, Warren County, that state, on March 9, 1865. After a short service with the Delaware, Lackawanna & Western Railroad Company and the Central Railroad of New Jersey, he entered the employ of the Western Union Telegraph Company at Asbury Park, N. J., in 1881, afterwards coming to New York, where he has been continuously identified with the service in various capacities except for a short period of employment as private line operator for the banking firm of John H. Davis & Co. He became private secretary to the late president of the Western Union Telegraph Company, General Thomas T. Eckert, and with the advent of the administration of Col. R. C. Clowry, was ap-

J. C. WILLEVER, NEW YORK,
United States Manager Western Union Cable System.

pointed chief clerk in the executive offices. On January 1, 1909, he was elected secretary of the company which office he held until recently when it was relinquished in order that he might apply himself to the more active and important work in which he is now engaged.

Mr. Willever's appointment as United States manager of the company's cable system is a well-merited reward for long and faithful service and a recognition of his particular qualifications for the post.

The Cable.

West India & Panama Telegraph Company.—Shares in the West India & Panama Telegraph Company have advanced considerably lately in the London stock market. The activity of the stock is supposed to be due to the fact that the opening of the Panama Canal will result in increased business.

Divers Cutting Cable.—In a recent number of *The Illustrated Tribune* of Rome, Italy, is given a full page colored print showing divers at work cutting a submarine cable, in connection with the war between Italy and Turkey, under the Red Sea. As the water was shallow the work of the divers was comparatively easy. Cable cutting is one of the necessities of modern warfare between nations.

French Submarine Cable.—A bill has been submitted to the French Chamber for establishing an additional cable between Marseilles and Algiers, and the construction of a new aerial line between Paris and Marseilles for the service of the cable. There are now three cables between France and Algeria (Marseilles-Algiers), laid respectively in 1871, 1879 and 1880, and another between Marseilles and Oran, laid in 1892. In addition there is a cable between Marseilles and Tunis, laid in 1893, and another between Oran and Tangiers, laid in 1901. The proposed new Marseilles-Algiers cable is to be constructed during the winter of 1912-1913 and laid in the spring of next year.

The "All-British" Cable.

At a meeting in London, on March 13, of the Associated Chambers of Commerce of the United Kingdom, the desirability of an "All-British" transatlantic cable was urged. Sir John Barron, M. P., parliamentary secretary to the postmaster general, said that the Post Office had already obtained considerable reductions in rates from the cable companies, and although Great Britain did not own the cables, they all began and ended on British territory, and therefore England virtually had control of them.

If the British Government laid a cable across the Atlantic, he continued, it could only be maintained at a continuous loss. Moreover, great developments were now taking place in wireless telegraphy, and very shortly there would be introduced a machine which would transmit telegrams between England and other parts of the British Empire at a rate of fifty words per minute. At a dinner in the evening Hon. Herbert L. Samuel, postmaster general, stated that the government before long would obtain control over all cable business. This, the despatch states, is understood to have reference to the lapsing of the landing licenses at an early date, which can only be renewed on condition that the government have control of the rates charged.

Municipal Electricians.

Police Telegraph in Beverly.—A police telegraph system is being installed in Beverly, Mass.

Convention of Municipal Electricians.—The executive committee of the International Association of Municipal Electricians will hold a meeting in Peoria, Ill., some time in April to fix a date and make other necessary arrangements for the annual convention of the Association which will be held in Peoria. Mr. Clarence R. George, city electrician, Houston, Tex., is secretary of the association.

Continental Telegraph Company.—The Continental Telegraph Company, which operates on the Chicago, Milwaukee & Puget Sound; the Tacoma Eastern; the Gallatin Valley and White Sulphur Springs and the Yellowstone Park Railways has 172 offices in North and South Dakota, Washington, Montana and Idaho, and many important cities in these states are reached by the lines. There are offices at Seattle and Spokane, Wash. Some unusual names appear in the list. In Montana there are offices at Straw, Two Dot, Sixteen and Three Forks.

The Telephone.

Mr. H. J. Pettengill, president Southwestern Telegraph and Telephone Company, Dallas, Tex., was a recent New York visitor.

Telephone Election.—The annual meeting of the stockholders of the Western Telephone & Telegraph Company, was held in Pittsburgh, Pa., March 19, and all the retiring directors were re-elected.

Cumberland Company Mortgage.—The Cumberland Telephone & Telegraph Company has filed a mortgage for $15,000,000 covering its property in Kentucky, Tennessee, Louisiana, Mississippi, Indiana and Illinois. Mr. W. T. Gentry, Atlanta, Ga., was recently elected president of the company.

Telephone Numbers as Telegram Addresses.—The British Postmaster-General recently announced that hereafter telephone numbers may be used as telegraph addresses. This will save the public the expense which it had formerly to incur in registering their telegraphic addresses.

Telephone Rates in British Columbia.—The British Columbia Telephone Company on April 1 inaugurated new rates in Victoria and Vancouver. The rate for unlimited service for a business house is $5 per month, an increase of $1 per month. The long-distance rate from Vancouver to Victoria is 60 cents per minute.

Examination for Superintendent of Telephone Construction.—The United States Civil Service Commission, Washington, will hold an examination on May 29 of applicants for the position of superintendent of telephone construction in the Forest Service, Department of Agriculture. The salary is $1,500 per year and the age limit 28 to 45 years.

Texas Telephone Lines Purchased.—The The Southwestern Telegraph & Telephone Company has purchased two independent telephone lines in east Texas and the long distance lines of two other companies. The independent lines affected are the Cleveland Telephone Company, the Sabine Valley Telephone Company, the Yellow Pine Telephone Company and the Long View Telephone Company. The lines will be greatly improved and extended.

Government Ownership of Telephones.—A bill has been introduced in the House of Representatives at Washington, to provide for the condemnation, acquisition, and construction by the United States of the telephone lines, properties and holdings in the United States, and to provide for the operation of the same by the United States. The power to determine the market value of the properties thus to be acquired is to be vested in the Interstate Commerce Commission, and that body, the postmaster-general and the commissioner of telephones, an official to be appointed, are to decide which company should be proceeded against first.

Annual Meeting of A. T. & T. Co.—At the annual meeting of the stockholders of the American Telephone & Telegraph Company, held in New York, March 26, Messrs. Charles Francis Adams, 2nd, George P. Gardner and Richard Olney, all of Boston, were elected directors, filling the vacancies caused by the death of Thomas Sanders and the resignations of Thomas B. Bailey and Frank E. Warner. The other directors were re-elected. At the subsequent meeting of the directors the officers were re-elected with one change, Mr. A. A. Marsters being elected secretary in place of Charles Eustis Hubbard, who declined re-election, having held the position of secretary since the organization of the first Bell Company.

Officers of National Independent Telephone Association.—The following officers were elected in Chicago, March 11, by the Board of Directors of the National Independent Telephone Association: President, Mr. Manford Savage, Champaign, Ill.; first vice-president, Mr. E. B. Fisher, Grand Rapids, Mich.; second vice-president, Mr. W. J. Thomas, of Kentucky; secretary, Mr. Richard Valentine, Janesville, Wis.; executive committee, Mr. Savage, Mr. Fisher, Mr. Valentine, Mr. L. D. Kellogg of Chicago, Mr. H. D. Critchfield of Chicago, Mr. Theodore Gary of Macon, Mo., and Mr. N. G. Hunter of Wabash, Ind. President Savage and most of the other officers were re-elected.

Bell Telephone Company of Canada.—At the annual meeting of the Bell Telephone Company of Canada, held in Montreal, recently, Mr. C. F. Sise, President, gave out the figures representing the company's business during the year. Net revenue for 1911 amounted to $1,425,835, out of which was paid $1,000,000 in dividends. About 20,000 new subscribers were added, giving a total number of instruments now earning rental of 153,959. The system now comprises 58,300 miles of wire, of which 4,167 miles were added during the year past.

After deducting from the balance of revenue account the various charges for depreciation, etc., there is left a balance of $120,415 to be carried to 1912.

The retiring board of directors was re-elected as follows: Mr. C. F. Sise, president, the Hon. Robert Mackay, vice-president; Theo. N. Vail, Robert Archer, Wm. R. Driver, Hugh Paton, Charles Cassils, H. B. Thayer, L. B. McFarlane, Z. A. Lash, K.C.

Canadian Notes.

Mr. J. Frank Richardson, superintendent of telegraph, Canadian Pacific Railway, Montreal, Que., was recently presented with a purse of gold by the employes of the Eastern Division of the road, the occasion being Mr. Richardson's transfer to a similar position at Vancouver, B. C.

A Knotty Problem.—An exchange wants to know if when a Postal manager marries a woman railroad telegraph operator in California, it is a Western union tie-up.

Radio-Telegraphy.

Signor Guglielmo Marconi was made a life-member of the Italian Senate on March 4.

Mr. Marconi will be a guest of honor at the dinner of the Associated Press and the American Newspaper Publishers' Association in New York, on April 25.

A dinner was given in honor of Mr. Marconi and his associates by the *New York Times* in New York on the night of March 16 on which occasion congratulatory wireless messages were exchanged between the *Times* office and London, two messages coming from London in ten minutes. This is stated to be record time for wireless communication between the two points.

Mr. Marconi has left New York for Glace Bay, N. S., to inspect the Marconi Wireless station at that point.

Report of American Marconi Company.—The annual report of the Marconi Wireless Telegraph Company of America shows a profit for the year of $16,992.

Improving Wireless Station at San Pedro.—The station of the United Wireless Telegraph Company at East San Pedro, Cal., has been enlarged and otherwise improved to meet with the increasing business.

Wireless Tuition in Paris.—The committee of the International Society of Electricians, Paris, France, has decided to institute at its school a special section for practical and theoretical instruction in wireless telegraphy.

Lecture by Marconi.—Signor G. Marconi will deliver a lecture before the New York Electrical Society, at the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on April 17, on the subject of "Wireless Telegraphy."

Extending Marconi Service.—The Marconi Wireless Telegraph Company of America will increase its capital stock to $10,000,000 and will establish wireless stations at New York and London at once. It will also erect stations at Panama and Cuba and down the east and west coasts of South America.

Wireless Telegraphy Over Desert.—Dr. H. L. Coffman of Palm Springs, Cal., is securing estimates on the cost of installing a series of wireless telegraph stations to cover the upper reaches of the Conchilla desert. The plan is to establish at least five stations.

Wireless News Service to Honolulu.—The first press despatches received by wireless direct from San Francisco were published in the *Hawaiian Gazette*, Honolulu, on February 27. They were received at the Kahuku wireless station and telephoned thence to the newspaper office.

Wireless Telegraph Engineers.—The annual meeting of the Society of Wireless Telegraph Engineers was held at the Hotel Manhattan, New York, on March 4. Officers were elected as follows: President, Mr. F. Lowenstein; vice-president, Dr. Louis Cohen; secretary, Mr. J. L. Hogan, Jr.; treasurer, Mr. E. D. Forbes; managers, Messrs. G. W. Pickard, E. R. Cram and J. S. Stone. The society's headquarters have been moved from Boston to New York. The address of the secretary is National Electric Signaling Company, Bush Terminal, Brooklyn, N. Y.

Marconi Company Absorbs United Wireless.

When the suit of the Marconi Wireless Telegraph Company against the United Wireless Telegraph Company for alleged infringement of patent rights was brought to trial in the United States district court, New York, on March 25, it was announced that in consequence of a settlement being reached between the two corporations the United Company would make no defense, and would consent to the granting of the decree in favor of the Marconi Company. It was later learned that a merger agreement had been consummated between the Marconi and United wireless companies as the result of which the stations and contracts of the United Wireless will pass into the control of the Marconi Company.

The Arlington High-Power Wireless Station.

In response to a request for details of the new high-power wireless station now being erected by the Navy Department at Arlington, Va., near Washington, D. C., Mr. R. S. Griffin, acting chief of the Bureau of Steam Engineering, sends us the following:

This station is to consist of three steel towers. One tower is to be 600 feet high and 150 feet square at the base, and the two smaller towers 450 feet high and 120 feet square at the base. All three are to be of ornamental steel construction. There will be three buildings connected with the station, to be of tapestry brick and in keeping with the ornamental construction of the towers. The first of these buildings will be the house of the officer in charge of the station. The second will be the receiving building, which will contain a sound-proof room for the apparatus, the dormitory for twenty operators, a library, a living room, kitchen, laundry, operator's office, the office of the officer in charge of the station, and a large laboratory for the test of apparatus. The third building will be the transmitter building, which will contain the engine room, a machine shop, a laboratory, and several rooms for a radio museum.

In the engine room will be installed a 200-h.p. motor belted to a 100-kw. generator; a 15-kw. oil engine-driven generating set for charging storage batteries, and various other generators for test purposes. A low-powered set of about 5 kilowatts will probably also be installed, as will a 200-h.p. oil engine set, and storage batteries for the large set in case the other sources of power should fail.

With the high-powered set it is believed there will be communication at all times with ships in the North Atlantic ocean, with a similar station to be erected at Colon, and one to be erected at some place on the Pacific coast.

Joint Telegraph and Telephone Office.

The accompanying illustration shows the joint office of the Western Union Telegraph Company and the New York Telephone Company at Hudson, N. Y., as described by Mr. J. J. Malone, manager, in the *Telephone Review*. The office is located in the business centre of the city on the ground floor of a modern three-story brick building and is furnished with up-to-date furniture and equipment.

Since the joint occupancy of the office, business has had a healthy increase as a result of a systematic campaign in educating the patrons of the companies in the advantages of co-operation of the two services.

INTERIOR OF JOINT TELEPHONE AND TELEGRAPH OFFICE, HUDSON, N. Y., SHOWING ARRANGEMENT OF RESPECTIVE COUNTERS.

The desks of the telegraph and the telephone interests are shown in the illustration, and one may gain a general idea how the public room of a modern telegraph-telephone office looks.

Tests for English Telegraph Messengers.

The telegraph boy who sits on a convenient doorstep engrossed in Scott's "Ivanhoe" these days has a reason, or an excuse, for refusing to recognize the urgency of the "wire" packed in his leather pouch, says the *London Standard*. This reason or excuse is that the Civil Service Commissioners have made an essay on the famous novel one of the tests for this year's examination which must be passed by all messengers who wish to get permanent employment in the service. The examination takes place in April. The syllabus has just been issued, and eligible youths now wander through the corridors of the building in King William-street with a far-away look in their eyes conning the story of Rowena the fair.

Handwriting, spelling, and geography are among the other items in which the would-be civil servant must be proficient—but in order to curb the enthusiasm of the candidates it is pointed out coldly that in the handwriting section "all flourishes and superfluous strokes should be avoided." Further, it is stated that "the slope from the vertical should be even and not exceed thirty degrees."

The successful messenger boy must know how to treat vulgar fractions "simply," and understand the principal railway routes and many other matters of geography. He stands in danger of being "plucked" unless he can give a summary of political, industrial, and social England from 1760 to the present day, and he must be able to give the position of the principal countries in the world and their important physical features and towns; the influence of surroundings upon occupations and methods of life and the chief means of international communication by land and water. Yet, in spite of all that and after correct answers have been made, the candidate will be disqualified if he is flatfooted.

It is evident from this that the applications for position as messengers in England must be so numerous that they have to be weeded out by the civil service process. In this country the telegraph companies are not afflicted that way; they have to go gunning for good messenger material.

Annual Report of American Telephone and Telegraph Company.

The annual report of the directors of American Telephone & Telegraph Company to the stockholders for the year ending December 31, 1911, was presented by President Theo. N. Vail, at the annual meeting of the Company on March 26.

At the end of the year the number of stations which constituted the system in the United States was 6,632,625, an increase of 749,906, including 306,403 connecting stations. Of these, 2,158,454 were operated by local, co-operative and rural independent companies or associations having sub-license or connection contracts, so-called connecting companies.

The Bell telephone toll lines of the United States now reach 70,000 places, from many of which a telegraph message can be sent. The extent of the system is best realized by comparison with less than 65,000 post offices, 60,000 railroad stations and regular telegraph offices at about 25,000 places.

The total mileage of wire in use for exchange and toll service was 12,932,615 miles, of which 1,290,403 were added during that year. Of the total mileage nearly 11,000,000 miles were exchange wires, and 2,000,000 toll wires. These figures do not include the mileage of wire operated by connecting companies. Of this total wire mileage 6,831,667 is underground, including 411,406 miles of toll wires in underground cables. The most important development is in the Boston-Washington Subway, now completed with the exception of drawing the cable into the Providence-New Haven section. This subway will be about 450 miles in length, and contain about 2,100 miles of single duct and 79,000 miles of wire in the first cable.

Including the traffic over the long-distance lines, but not including connecting companies, the daily average of toll connections was about 645,000, and of exchange connections about 23,484,000, as against corresponding figures in 1910 of 602,500 and 21,681,500; the total daily average for 1911 reaching 24,129,000, or at the rate of about 7,770,000,000 per year.

The amount added to plant and real estate by all the companies, excluding connecting companies, constituting the company's system in the United States during 1911 was $55,660,738. It is estimated that about $56,000,000 will be required for current additions to plant in 1912, of which amount some $30,000,000 will be provided by the existing and current resources of the company.

During the year $58,840,000 was applied out of revenue to maintenance and reconstruction purposes; of this, over $12,000,000 was unexpended for those purposes.

The total provision for maintenance and reconstruction charged against revenue for the last nine years was over $342,300,000.

Tables show the business for the year of the Bell Telephone system including the American Telephone & Telegraph Company and its associated holding and operating companies in the United States, but not including connecting independent or sub-licensee companies, nor the Western Electric Company and Western Union Telegraph Company except as investments in and dividends from those companies are included respectively in assets and revenue.

The gross revenue collected from the public in 1911 for telephone service by the Bell System—not including the connected independent companies—was $179,500,000; an increase of nearly $14,000,000 over last year. Of this, operation consumed $60,000,000; taxes, $9,000,000 or one and one-half per cent. on the outstanding capital; current maintenance, $30,200,000; and provision for depreciation, $28,700,000.

The surplus available for charges, etc., was $51,600,000, of which $13,600,000 was paid in interest and nearly $26,000,000 was paid in dividends.

The total capitalization, including inter-company items and duplications, of the companies of the Bell System is $1,180,639,036. Of this, $524,679,951 is owned and in the treasury of the companies of the Bell System. The capital stock, bonds and notes payable outstanding in the hands of the public at the close of the year were $662,000,000. If to this be added the current accounts payable $23,400,000, the total outstanding obligations of every kind were $685,400,000, as against which there were liquid assets, cash and current accounts receivable, of $74,800,000, leaving $610,600,000 as the net permanent capital obligations of the whole system outstanding in the hands of the public.

Against these obligations, the companies had actual, tangible property, not including franchises, patents or good will, which cost $754,200,000, an excess of 23 per cent. over the obligations.

For the year there was an increase in assets of $78,600,000, of which $55,600,000 represented current additions to plant, including the necessary real estate. This increase of $78,600,000 is represented by $51,600,000 increase in outstanding obligations for the whole system, and an increase in surplus of $27,000,000. Of this $27,000,000 surplus, about $4,500,000 represents premiums on capital stock received through conversion of bonds.

This surplus, which does not include any of the intangible, though necessary and valuable assets, is invested in productive property not represented by any capital charges, the revenue from which enables the company to maintain its efficiency and at the same time make concessions to the public in the way of gross charges.

A table shows average operating revenue and expenses per station, operating ratios, unit plant costs, etc., of the associated operating companies (not including the American Telephone & Telegraph Company's long-distance lines), for the years 1895, 1900, 1905, 1910 and 1911.

There has been a steady decrease in revenue per subscriber's station, so that now the average subscriber pays for a higher grade, more comprehensive service, less than half what he paid sixteen years ago for much less useful service that was then possible.

Although there has been a decrease in cost of operation every year till 1910, there was an increase in 1911 over 1910. This is mostly accounted for by increased operators' wages.

The greatly decreased plant investment per station has been still further reduced during the year to $141, notwithstanding the extensive additions to toll lines and the continued increase in the proportion of wires underground.

The net earnings of the American Telephone & Telegraph Company for the year were $33,301,245.77, an increase of $1,368,031.28 over 1910. The interest charges were $5,567,980.30, and the dividends at the regular rate of 8 per cent. were $22,169,449.79. Of the balance, $5,563,815.68, there was carried to Reserves $2,800,000.00 and to Surplus $2,763,815.68.

No dividend on the stocks of the associated companies was increased during the year excepting the increase from 6 per cent. to 7 per cent. in the rate on the stock of the New England Telephone & Telegraph Company, made in the second quarter of the year.

During 1910 and 1911 over $23,000,000 of capital advances to associated companies were exchanged for stock of those companies. * * * The resulting decrease from this cause in the American Telephone & Telegraph Company's revenue is at the rate of over $825,000 per year, that amount additional remaining in the surplus of companies in which this company has about 95 per cent. interest.

The total outstanding capital stock and bonds of the American Telephone & Telegraph Company at December 31, 1911, were as follows:

Capital Stock	$318,427,500
4 Per Cent. Collateral Trust Bonds..	78,000,000
4 Per Cent. Convertible Bonds......	20,459,000
Total	$416,886,500

For the $318,427,500 capital stock, $339,633,235 has been paid into the treasury of the company; the $21,205,735 in excess of par value represents premiums. All discounts on the bond issues have been charged off. The outstanding capital obligations therefore represent over $21,200,000 more than their par value.

The Legal Department reports that the relations of the company and its associated companies with the Public Service Commissions of the several states have continued to be of a very satisfactory character. The telephone companies have co-operated with the Commissions in the endeavor to provide the best possible service. There are now Commissions with jurisdiction over telephone companies in twenty-eight states. Some of the decisions of these Commissions are illuminating, and support what we consider to be the soundest policy.

The year 1911 has, as usual, been an active one for the general engineering staff maintained at headquarters for the benefit of the associated companies throughout the United States.

In improving the transmission of speech a most important work has been the development of methods whereby the loading coil invention can be applied to the heaviest gauge wires and whereby such wires, when equipped with loading coils, can be operated on the phantom principle. By this means telephone service is now successfully accomplished between New York and Denver and the transmission of speech between cities less far apart has been greatly improved. By the application of the phantom principle to such circuits the available facilities have been largely increased so that between the important telephone centers notable improvements in service have been accomplished.

In long underground cables improvements have also been made so that the phantom principle may be employed in them, and the range over which speech may be transmitted has been so far increased that when this type of cable is installed between Boston and Washington it will be possible to talk underground between those cities and all of the intermediate points, which would have been impossible under the previous state of the art.

Fundamental plans have been made for the associated companies in twenty cities. These provide for the proper location of subways and central offices so as to insure the most efficient growth of the plant. The construction contemplated in these plans amounts to more than $100,000,000.

In different parts of the country a large number of important central office installations have been planned. When completed, the expenditure based upon these plans will amount to $10,000,000.

Under the rearrangement of territory the American Telephone & Telegraph Company, controlling the entire Bell System, will, as it has in the past, exercise the functions of a "centralized general administration." All questions of policy common to all, all common matters which may have an effect upon the system as a whole, will be settled by the Central Administration. As one administration will do for all what each would have to do for itself, it has the advantage of economy and will maintain uniformity.

For operating purposes there will be eight or ten divisions with boundaries determined by present commercial conditions, instead of a much larger number of divisions with boundaries fixed more or less accidentally or by other considerations prevailing twenty-five or thirty years ago.

All lines of responsibility and suggestion will go up, from the local representatives to the Central Administration. All lines of authority down, from the Central Administration to the local chief.

Under the Bell organization each associated company or group of companies is now, and each division hereafter will become an autonomous whole, with its own local control and identity, and within the limits of the general policy and authority, absolute on matters pertaining to or which affect only that territory.

INDEPENDENT AND OPPOSITION COMPANIES.

We have, says the report, wherever we could do so legally and upon satisfactory terms, and acting with the acquiescence and consent of the local public and local authorities, purchased, merged or made connecting contracts with a large number of independent or opposition companies. Wherever these arrangements have been completed and put into operation there seems to be general satisfaction with the result.

GOVERNMENT OWNERSHIP.

The discussion of the government ownership of the wire companies is not likely to become anything more than academic, at least for the present, continues the report. Even if the final conclusion should favor government purchase of all wire plants, there would be no unfavorable consequences to the shareholders of the wire companies other than the obligatory liquidation. Any possible award for the property which the security holders would be obliged to accept would give them better than current prices for their securities.

It is, however, highly desirable that if there is to be discussion, it should be on the right lines and that whatever be the conclusion it should be reached after a full consideration of conditions as they exist, and of the practical experience of other countries, and not be based upon theories, expectations, prophecies, promises with no power to fulfill, or wrong ideas of existing conditions.

Government operation of the telegraph would necessarily require the ownership, maintenance and operation of the transmission facilities and equipment, as well as the solution of many complex problems incident thereto, including that of profit and loss, all new to our form of government. Hundreds of millions must be invested in purchase or reproduction of facilities, all the charges on which, together with other costs, must be met out of the revenue from the service or become a charge on the general public revenue—all for the benefit of the comparatively few who would directly or indirectly profit by the use of the service.

In the arguments and prophecies that are being used in support of government ownership, history is but repeating itself. The same undervaluation of existing plants, the same exaggeration of the profits, the same optimistic and exaggerated statements of what would be the results of government operation that were made in favor of government ownership in other countries are now being made.

The facts are, that there is hardly a telegraph or telephone system in the world now operated by any government which shows a profit, even under accounting methods employed, and not one that would not show a deficit under accounting methods obligatory upon private enterprise. For authority, see any department report of any government telegraph system.

Another consideration, much misunderstood and often misstated, is the supposed superiority and cheapness of service in other countries.

There is not a single instance of telegraph or telephone companies operated by private corporations in competition with government operation, where the private service is not better than the government and profitable, against unprofitable government operation, if untrammelled by government interference.

TELEPHONE AND TELEGRAPH.

The inter-operations of the telegraph and telephone systems are improving rapidly. The collection and delivery of telegraph messages by telephone is becoming popular. Telegraph facilities have been largely extended, and will soon be much further extended, by agency telegraph offices established at telephone toll stations, and by the connection of the telephone system with telegraph "all-night" offices. All these innovations have been of convenience and advantage, and in case of emergency a great benefit, to the public, but they have not as yet been productive of economy in operation or of profit.

The Western Union system is to the telegraph situation what the Bell System is to the telephone situation, in that each tries to give a comprehensive universal service, but the comparison ends there.

The Western Union has over 25,000 offices in over 21,000 places, and in addition many thousand agency offices at the toll stations of the Bell System. From less than 2,000 of the 21,000 places, with an aggregate population of about 40,000,000, over 90 per cent. of its entire revenue is obtained. Nearly 17,000 of the 21,000 places have an average revenue of but slightly above $10 a month with a maximum of $50 a month. Some joint operating arrangement, generally with the railroad telegraph service, has been made for these and many other places where the revenue is insufficient to maintain an exclusive Western Union office. The increasing demand of the railroad telegraph service upon its operators, and because their first duty is to the railroad service, places the commercial telegraph service in a secondary place, which, with the best of intentions, is not conducive either to promptness or efficiency.

The Bell Telephone System has scattered over the whole territory exchanges or toll line centers from which radiate subscribers' circuits and branch toll line circuits. These centers are connected with each other by toll or long-distance circuits and constitute the telephone system. The toll circuits of the telephone system reach 70,000 places. At most of these places and upon substantially all of these branch toll circuits, and on many circuits connecting into the intermediate stations on trunk lines, there is not enough business to occupy fully either operators or wire facilities; were it not for the indirect advantage to the whole system few, if any, of them would have been established. While the telephone cannot be used interchangeably with the telegraph instruments in the transmission of messages over busy circuits by busy operatives, the "not-busy" operatives and circuits could be used for telephone and telegraph service "alternately" instead of "simultaneously," as there is not enough business to justify such circuits being "composited," *i.e.*, arranged for simultaneous use of telegraph and telephone. The joint use of such lines and operatives would be a source of economy. At busy offices, and on busy circuits, the circuits could be "composited" for the simultaneous use for telegraph and telephone purposes. Each service would require its distinct operating force and its distinct offices, as the services rendered by the telegraph and the telephone are functionally and fundamentally different although both use wire circuits. The telephone makes up a circuit and places it at the use of the customers, who do the communicating; *i.e.*, it leases its circuits to others for personal communication. The telegraph by its own operators performs all the services of collecting, transmitting and delivering messages; *i.e.*, it transmits over its circuits, for others, personal communications.

The great economy and advantage would come from the "compositing" or simultaneous use of one system of circuits for the two services, eliminating entirely one of the wire systems. The advance in the state of the art of "compositing" lines for joint use of the telephone and telegraph has been very marked in the very recent past.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. The review of Maver and Davis' book, "The Quadruplex," was completed in our issue for February 16, and the next book to be taken up and treated in like manner is "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

GALVANOMETERS (Continued)

What is the diameter of the coil of a tangent galvanometer?

How long is the needle?

What is a tangent?

How are the deflections of the needle compared?

If the needle is deflected five degrees, with a given current, and with another current the deflection is ten degrees, does it mean that the second current is twice as strong as the first?

Why is it necessary to move the galvanometer around so as to bring the needle point to zero?

What causes the needle to assume a North and South position?

How can the turning around of the galvanometer be avoided?

What is an Astatic galvanometer?

How many needles are employed on an Astatic galvanometer?

How are they placed with reference to each other?

Does such a combination of needles point North and South? If not, give reason.

How is the coil of an Astatic galvanometer wound, and why is it so wound?

What is a compensating magnet used on galvanometers for?

What is the usual form of such a magnet, and how is it attached to the galvanometer?

Can an ordinary bar magnet be used as a compensating magnet?

What is the "constant" of a galvanometer?

Describe the Thomson galvanometer.

How is the mirror-magnet combination suspended?

What is the purpose of the mirror in the Thomson galvanometer?

What is meant by saying that the mirror, or needle, is "dead-beat"?

What are the resistances of the interchangeable coils?

Describe the features of the four-coil Thomson galvanometer.

What is the principal objection to the Thomson pattern of galvanometer?

Who was the inventor of the moving-coil galvanometer?

What is the action of a moving-coil galvanometer when current is passing through the instrument?

What is the character of the magnetic field of a moving-coil galvanometer?

A B C of the Telephone.

There are several excellent books on the telephone and its practice, but all men do not know the rudiments of the telephone. It is well, therefore, in order to gain an understanding of this instrument, as in everything else, to begin the study at the beginning. The telephone is no harder to know than any other electrical device and it becomes extremely fascinating on better acquaintance.

A B C of the Telephone is a good book for the student to start with. It explains the subject in non-technical language and the main facts connected with the telephone industry are stated in a clear and simple style. Although it is elementary in character it covers the whole subject of telephony so comprehensively and completely that after a careful study of the book the student will have a good working knowledge of the instrument and its many uses. The book is rendered particularly valuable by reason of the great many illustrations, each one of which tells a story. It has 350 pages and nearly 300 illustrations. The author of the work is Mr. James E. Homans and he is a master of the subject.

The price of this book is $1.00 per copy and copies can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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April 1, 1912.

Delayed Newspaper Mail.

Much annoyance is caused to subscribers to this journal, as well as all other journals, living at distant points by the delay in the receipt and delivery of their copies by the post office authorities. In his zeal to put the postal service on a profitable basis Postmaster-General Hitchcock has incommoded the reading public by requiring that newspaper mail shall be forwarded to destination by fast freight. What "fast freight" means is a question. Practically, it means that our paper is delayed in its delivery in the middle western states from nine to sixteen days. All trade papers are subject to the same delay, and much dissatisfaction is expressed over the results of the postmaster-general's ruling.

The Telephone Report.

The annual report of the American Telephone & Telegraph Company, which is printed in part elsewhere in this issue, is an instructive and interesting document, and is comprehensive in scope. Apart from the facts in connection with the management and operation of the vast industry, these annual reports always contain matter of general public interest, and almost any one can read them with profit.

It is interesting to contemplate the magnitude of the operations of this corporation, and its cohesiveness is a great triumph of scientific business organization. One hundred and seventy-nine millions, five hundred thousand dollars is a sum so vast that the average mind can not grasp its material significance, and yet that is the amount the company collected from the public in return for service rendered during the past year. When one thinks of the great extent of the service and its almost universal use in this country, we begin to understand the source of this vast income. To carry on the business it required an expenditure of one hundred and twenty-eight millions, leaving fifty-one and a half millions for interest, dividends and surplus. A business of such magnitude can only be compared with that of the government itself.

The portion of the report relating to the engineering features of the industry is interesting, and shows how much the success of the business is dependent upon this department. The general public, of course, knows little or nothing about this work; all it is interested in are the results, and yet it is really the foundation of the business. Much credit is due, therefore, to the engineering skill under the initiative of progressive management, as exemplified in the present state of development in the art. The improvement of the little things is what has led to present perfection. There is no real reason why a subscriber in New York should not be able to talk with a subscriber in San Francisco; it is simply a matter of overcoming difficulties, which are constantly yielding to the power of scientific progress. Indeed, talking over such a distance is not mere fancy, it has been promised by the president of the company, and is likely to become an accomplished fact at any time.

Considerable space is given to the subject of government ownership of wire companies, which has recently been brought to public attention. The directors do not think that it is likely to become anything more than academic at least for the present, but they evidently believe that it is a future possibility, in which event, the report states, there would be no unfavorable consequences to the shareholders, other than obligatory liquidation. The directors do not believe, however, that wire communication service can be conducted as efficiently and economically by the government as by private companies.

The inter-operations of the telegraph and telephone systems are improving rapidly, the report states, and the collection and delivery of telegraph messages by telephone is becoming popular. The innovation, however, while not yet productive of economy in operation or of profit, has been of convenience and advantage to the public and there seems to be no good reason why the operating companies will not be financially benefited in time, when the facilities offered to the public for the inter-operation of the two services are utilized to a larger extent. This problem is, of course, one of public education, and both the companies concerned appear to be successful in getting the public interested in their work.

Conservation in the Telegraph Service.

The excellent articles on "Conservation in the Telephone Industry," written by Mr. P. Kerr Higgins, and now being published in these columns carry many valuable suggestions for the men engaged in the telegraph service. There are undoubtedly many small leaks in the conduct of telegraph offices which a careful analysis would disclose and for which a remedy could be devised.

Some years ago the telegraph companies left the backs of their message forms blank, and until some exponent of conservation conceived the idea of filling up this space with rules and regulations, many unscrupulous persons ordered large quantities of telegraph blanks, which were utilized for scrap paper and not for telegraphic purposes. This is one example of a large leak which was effectually stopped and there are probably many such opportunities at the present time for the application of the principles of conservation.

In the keeping track of supplies, in the supervision of office accounts and deposits, and in every department of such a large organization as the telegraph, we need the assistance of the efficiency engineer, one of whose chief fields of endeavor is the art of conservation.

Telephone Pioneers of America.

UNION N. BETHELL.

Mr. Union N. Bethell, president of the New York Telephone Company, and vice-president of the American Telephone & Telegraph Company, New York, rose from the ranks by virtue of his own energy and effort.

He entered the telephone business twenty-four years ago and worked his way rapidly and steadily to the front. For nearly eighteen years he was the operating head of the New York system, which is

U. N. BETHELL.
President New York Telephone Company and Vice-President American Telephone and Telegraph Company, New York (1888).

noted all over the world for its perfection of service. Mr. Bethell has had charge not only of the great problems of policy and finance, but also of the details of management, and to broaden his knowledge has visited Europe several times, making exhaustive studies of telephone conditions there.

Mr. Bethell was born at Newburg, Ind., about fifty years ago. He was educated at Hanover College, graduating in 1879, and later receiving the degree of A.M. from that institution. Upon leaving college he was appointed Deputy Auditor of Warrick County, Ind., and remained in that office until 1881, when he entered the government service as a clerk in Washington. There he attended the Columbia Law School, graduating in 1885. In the same year he was admitted to practice in the District of Columbia, and later in Indiana, and still later in the Supreme Court of the United States.

As a special agent of the government he spent two or three years in the West, principally Michigan, Wisconsin, Minnesota and the Dakotas.

His telephone work began in Brooklyn, N. Y., in 1888, when he entered the service of the New York & New Jersey Telephone Company. In a short time he was elected secretary and treasurer of that company, and in 1893, he was made general manager of the New York Telephone Company. His principal work was in New York, but in 1901, he was made president of the company operating in Washington, Baltimore and surrounding territory, and later of the company operating in Philadelphia and Eastern Pennsylvania. By successive steps he assumed the management of the several Bell Companies operating throughout the States of New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia, finally becoming president of the New York Telephone Company, and vice-president of the American Telephone and Telegraph Company.

For his assistance in applying the telephone to conditions in Japan, Mr. Bethell was honored in 1909 by His Imperial Majesty, the Emperor of Japan, who bestowed upon him the Order of the Rising Sun.

Electrical Instruments and Testing.

Every one connected with the telegraph and telephone service should know how to test lines and also be familiar with the instruments used in such work. It does not require much study to learn the mechanical operations of this important branch of the service, but of course a knowledge of electrical and mechanical principles involved in the design and construction of the instruments, and of the principles involved in measurements is the source of deep and never-ending pleasure to the ambitious student.

An excellent book on this subject, intended for the practical man, is "Electrical Instruments and Testing," by Norman H. Schneider, with new chapters on testing wires and cables and locating faults, written by Jesse Hargrave, division superintendent of the Postal Telegraph-Cable Company, Atlanta, Ga.

The price of this book is $1.00 and copies can be had of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York. Any other book on telegraph, telephone or general electrical subjects can be obtained at the same place.

Course of Instruction in the Elements of Technical Telegraphy—XII.

(Copyrighted.)

(Continued from page 176, March 16.)

[We began in our issue for October 16 the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Wire Resistance.

The ohm, as we have already stated, is the unit of resistance.

The resistance of a wire may vary a little with change of temperature, but it is not affected by the strength of the current flowing through it.

If a wire one mile long has a resistance of creased, his speed will be increased, but variations in his speed cannot affect the road surface, since the obstacles, or resistance, the road offers to the rider depends solely on its construction.

In a circuit, by increasing the E. M. F., the current may be increased, but the resistance of the external circuit remains the same as before; for the resistance of a wire depends solely upon its length, its thickness, and the metal of which it is made.

The resistance of a wire is proportional to its length.

If a wire one mile long has a resistance of twenty-five ohms, then two miles of the same wire will have fifty ohms resistance. It is thus a simple matter of proportion to find the resistance of any length of wire, if the resistance of a part be known.

For instance, if one foot has .002 ohm resistance, then to find the resistance of 5,280 feet, or one mile;

$$1 : 5280 :: .002 : R$$
$$R = 10.56 \text{ ohms.}$$

The resistance of a wire is also affected by its thickness.

Cut through a piece of covered copper wire and look at one of the ends. All that is visible of the conductor is a small circle of copper.

The area of this circle is the sectional area of the wire.

The area of any circle may be found by taking the square of the diameter and multiplying it by .7854.

The square of the diameter means the diameter multiplied by itself. For instance, if the diameter were three inches, the square of three would be written 3^2, and would equal $3 \times 3 = 9$.

Example. The diameter of a round copper wire is .1 in., find the sectional area.

Solution:

$.1^2 = .01 \quad .01 \times .7854 = .007854$ sq. in.

As the sectional area of a wire increases, the resistance decreases; or the resistance varies inversely as the sectional area.

Example. If a certain length of round wire, .1 inch in diameter, have a resistance of .5 ohm, how much will the resistance be diminished with the diameter changed to .18 inch?

Solution:

The sectional area with .1 in. diameter is

$$.1^2 \times .7854.$$

Similarly the sectional area with .18 in. diameter is

$$.18^2 \times .7854.$$

It now becomes a problem in simple proportion with the given resistance for the third term; and, as the resistance decreases with an increase of sectional area, the greater area will form the first term. We thus have the following:

$$.18^2 \times .7854 : .1^2 \times .7854 :: .5 : R$$

Cancelling the common factor .7854 and solving

$$R = 1.54 + \text{ohm.}$$

Note:

The + denotes a remainder after carrying out the division to three decimal places.

Since the common factor .7854 can always be cancelled, it may be omitted altogether, and the resistance of a round conductor is therefore inversely proportional to the square of the diameter; in other words, the resistance may be found by simple proportion if you square the diameters and remember that the larger the diameter the less the resistance.

Example. A wire .12 in. in diameter has a resistance of .6 ohm; what would be the difference in resistance with the diameter changed to .14 in.?

Solution:

Since the diameter is increased, the resistance is decreased, or

$$.14^2 : .12^2 :: .6 : R$$
$$R = .44 + \text{ohm}$$

The resistance of a piece of round copper wire .001 in. in diameter and one foot long is 10.8 ohms; find the resistance of 1,200 feet of copper wire .102 in. in diameter.

Solution:

There are two proportions here, length of wire, and thickness. Taking the length first, 1,200 feet will have more resistance than one foot, therefore the smaller length forms the first term;

$$1 : 1200 :: 10.8 : R$$

Now take the thickness.

The diameter has been increased, therefore the resistance has been decreased, or

$$.102^2 : .001^2 :: 10.8 : R$$

Combine these two into one proportion, thus,

$$\begin{array}{l} 1 : 1200 :: 10.8 : R \\ .102^2 : .001^2 \end{array}$$

Multiply the first terms together,

$$1 \times .102^2 = .010404$$

Multiply the second terms together,

$$1200 \times .001^2 = .01296$$

The proportion is now

$$.010404 : .01296 :: 10.8 : R$$

$$\frac{.01296 \times 10.8}{.010404} = 1{,}245 + \text{ohms.}$$

QUESTION PAPER.

(1.) A wire 10 miles long has a resistance of 275 ohms. What resistance will a foot of the same wire have?

(2.) A circuit has 500 ohms resistance, and a battery of 75 volts, what is the strength of current?

(3.) A circuit has a current strength of .02 ampere. The difference of potential developed by the battery is 50 volts, what is the circuit resistance?

(4.) (*a*) With the same external circuit if the E. M. F. be doubled will the current strength be doubled?

(*b*) Why?

(5.) A circuit has a resistance of 5,000 ohms and a battery of 100 volts. If a test relay of 150 ohms resistance be inserted at the switchboard, how much will the current be decreased?

(6.) In a circuit of 500 ohms which has a battery of 25 volts there are three 150 ohm relays. What will be the change in current strength when

(*a*) Two relays are only in circuit.
(*b*) One relay only is in circuit.
(*c*) No relays in circuit.

(7.) (*a*) Find the value of E when R = 500 ohms and I = .03 ampere.

(*b*) Find the value of R when E = 100 volts and I = .1 ampere.

(*c*) Find the value of I when E = 15 volts and R = 500 ohms.

(8.) The diameter of a round copper wire is .1 in. and the resistance of the wire .5 ohm.

If the diameter be increased to .2 in., the other conditions remaining unchanged, what will be the resistance?

(9.) What is meant by the sectional area of a round conductor?

(10.) (*a*) A battery of 25 volts generates in a circuit a current of .05 ampere. If the battery be increased to 56 volts, and the current strength consequently doubled, how will this increase affect the external resistance?

(*b*) The internal resistance?
(*c*) The circuit resistance?

(11.) The resistance of a piece of round copper wire, .001 in. in diameter and 1 foot long, is 10.8 ohms; find the resistance of one mile of similar copper wire ⅛ in. in diameter.

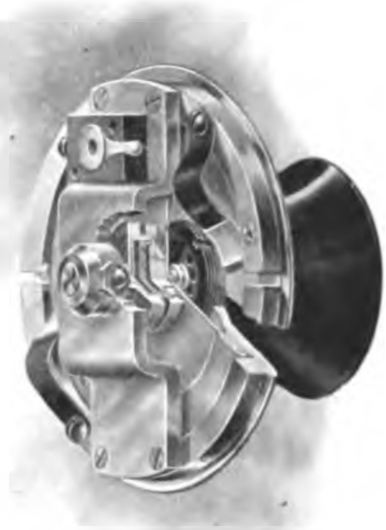
3.649 + ohms. Ans.

Alloys.—An alloy of 60 parts copper, 10 manganese, and 30 nickel has a specific resistance of 65; one of 40 copper, 40 manganese, and 20 nickel has a resistance of 150, as compared with copper = 1.

The Telephone Transmitter.

During the past decade the public has come to accept the telephone as an every day sort of thing, good for talking to some one else miles away, but owing to the familiarity which such continued speaking acquaintance has bred, has probably never given a thought to the delicate workmanship necessary to turn out a transmitter which will really talk well.

The transmitter, which is found on the great majority of telephones, is made up of fifty-nine details or parts, not including over fifty thousand granules of carbon, which are encased in a closed cup and form what might be termed the "dynamo"



THE TELEPHONE TRANSMITTER.

of the instrument. Each detail of the transmitter is made as carefully as the most delicate part of an expensive watch. The average person, rarely dealing with dimensions less than one-eighth of an inch, will scarcely realize what it means to manufacture very small parts whose dimensions must not vary more than one one-thousandth of an inch either way. The outside of the transmitter is compact appearing and strongly built.

Through the medium of these delicately manufactured Western Electric instruments, it is now possible to transmit speech from New York to Denver, Col., a distance 2,050 miles. In a short time the line will be extended to San Francisco, Cal., when, if the hopes of the telephone engineers, who are engaged in the work, are realized, the dream of trans-continental telephone communication will have come true.

The "KR" Law.

Some inquiries have been made recently as to the meaning and application of the so-called "KR" law, and as a consideration of this law is of the highest importance in the calculations of telegraph and telephone circuits we print in part an article prepared by Mr. William Finn, an electrical engineer of the Western Union Telegraph Company, New York, and published in this journal some time ago. The facts, of course, are as true now as they were when the article was first prepared, and their republication at this time will no doubt be of special interest to students of the technical course of telegraphy now running in these columns.

The distance to which it is possible to operate successfully a quadruplex circuit with a given potential is limited by the electrostatic capacity (K) and the resistance (R) of the line; the former factor tending to absorb a portion of every current wave or impulse sent into it, while the latter affects the final strength of the current flowing through it.

The number of signals that can be transmitted per second over any telegraph circuit depends upon the numerical value of its capacity in microfarads multiplied into its resistance in ohms, or upon what is known as the "KR law," which has long been understood to determine the carrying capacities of all long submarine cables, fast speed automatic circuits, etc., but the applicability of which to quadruplex working has not been so generally known or appreciated.

In telephony this particular law has played a very important part, inasmuch as it has rendered possible the calculation of the size of wire required for the successful transmission of speech. It has determined, for instance, that:

When KR = 15,000, speech becomes impossible.
When KR = 12,500, speech becomes possible.
When KR = 10,000, speech becomes good.
When KR = 7,500, speech becomes very good.
When KR = 5,000, speech becomes excellent.
When KR = 2,500, or under, speech becomes perfect, so that if a suitable value be adopted as the KR constant for any projected telephone line, it will only be necessary to select the proper kind and diameter of wire, the product of whose capacity in microfarads into its ohmic resistance will give the required standard.

Now since the KR conditions of a line have such an important bearing upon the working of telephone circuits, and, as the law pertaining thereto is equally applicable to telegraph circuits, it would seem desirable in the latter connection that, for each of the important systems in use, a KR value should also be found that would serve as a standard for determining their working capacities and the distances through which these systems could be worked direct.

In the absence of any data bearing upon the subject, the following may be interesting as affording at least an approximate idea of the efficiency limitations imposed by the KR law as applied to quadruplex working in one particular instance.

The writer was once called upon to make a test, over the Western Union lines, of a 300-pound copper wire (868 miles in length) between New York and Chicago, for the purpose of ascertaining whether, in view of its low mileage resistance, it could not be operated as a quadruplex circuit direct, that is, without the aid of a repeater in circuit.

The test was made under highly favorable conditions, the weather being fine at all points along the line, while the inductive interference from neighboring wires was comparatively slight, owing to the particular day and hour of making the experiment. The type of instrument used on the "No. 2 side" was that known as the Freir self-polarizing relay; the potentials employed being 360 volts at Chicago and 320 volts at New York. The value of Chicago's current was nineteen milli-amperes from the "short" end, and fifty-seven milli-amperes from the "long" end; the latter developing in the New York instrument an amount of magnetism considerably in excess of that ordinarily obtained in practice, inasmuch as the average full-working current on a quadruplex circuit does not exceed forty-five milli-amperes.

Despite these favorable conditions and notwithstanding the fact that the apparatus was adjusted to the highest degree of delicacy at both ends of the line, it was found impossible to secure satisfactory working signals on the No. 2 side when the distant polechanger was in operation. The effect of the "reversals" upon the second side relay cut down its working margin to an extent never before observed in the writer's experience; a result which apparently demonstrated that the advantage gained by the new wire, in respect of its low mileage resistance, was more than counterbalanced by the detrimental action arising from its increased inductive capacity.

It would appear, in fact, from the distance involved and the amount of surface exposed that the absorptive properties, or condenser-like action, of the conductor had increased in much greater ratio than the resistance of the wire had been decreased, and, as a consequence, the current waves became unduly retarded. This retardation was sufficient in amount to prevent the No. 2 relay after each "interval of no current"—from becoming energized with that rapidity and intensity necessary to counteract the tendency of its retractile spring to open the armature and thereby mutilate the signals during the aforesaid "intervals," or periods, when no magnetism is created in the receiving apparatus.

With a view to determine as closely as possible the KR conditions of the circuit, measurements were taken which showed that K = 13.4 microfarads, and R = 2,682 ohms, thus making KR = 35,938; a numerical value so much in excess of that of the regular successful quadruplex circuit as to clearly account for the difference in results obtained.

When the circuit was divided and repeatered at Pittsburgh, there was no difficulty whatever in operating all four sides of the system, although in this case the full strength of Pittsburgh's current did not amount to more than forty-one milliamperes (sixteen units less than that received from Chicago), which current, however, afforded a margin amply sufficient to allow a considerable range of adjustment on the No. 2 side without affecting the quality of the signals during the distant reversals.

The KR value of the circuit under these altered conditions was estimated at about 10,500, so that the following results may be said to have been fully established:

(1.) An excellent working quadruplex circuit when KR = 10,500.

(2.) An impracticable working quadruplex circuit when KR = 35,938, and between these two values are, of course, to be found the good, bad and indifferent grades, as well as the limiting figures representing the successful working quadruplex circuit.

According to the KR law, the speed of a current wave through wires of the same length varies inversely as the product of the inductive capacity and the resistance of their conductors. In wires similar in all respects except length, the speed of a wave in each is inversely proportional to the squares of their respective lengths, so that the carrying capacity of a wire of a given length ought to be four times as great as that of a similar wire extending through twice the distance.

As a matter of fact, the actual working capacity of a circuit divided in this way is not strictly in accordance with this rule—for reasons that need not be discussed here—but the applications of the rule nevertheless affords a clear indication of the advantage of repeatering a long telegraph circuit, the KR value of which will only be that of its longest section.

From these and other considerations the adaptability of the law to ordinary telegraphy will at once be apparent, and it may reasonably be inferred that the determination of the KR constants for aerial telegraph lines would prove as advantageous in this particular branch of electrical science as in those of telephony and cable working.

Advertising the Telegraph.

How to make the telegraph popular is a problem of prime importance in the telegraph field today. and the expedient of advertising its advantages in the newspapers is generously resorted to. The public is beginning to learn that the telegraph is so closely related to the telephone that when a person thinks of one he naturally thinks of the other also, and the two interests are now so closely related that what is beneficial to one has, generally speaking, a like effect upon the other.

With every telephone bill sent out to customers is a card to this effect: "If you want to send a telegram just take down your telephone and say 'telegram' and you will be connected with the nearest telegraph office. Then send your telegram by telephone and the cost will be charged on your telephone bill." This is an excellent way to advertise the telegraph if you have a telephone, but suppose you have no telephone how is the company going to reach you? This is the point where the press agent gets active and displays his ingenuity. The man without a telephone is not a hopeless case by any means. When he sits down to breakfast in the morning he finds his roll neatly wrapped in paper on which is printed: "If you want to send a telegram just take down your telephone receiver and say 'telegram,'" etc. As he sits in the street cars surveying the alluring advertisements of hair restorers and breakfast foods his wandering eye is likely to run up against the telegraph man beckoning to him and saying: "If you want to send a telegram just take down your receiver," etc.; and so it goes; whichever way one may turn he is likely to be informed of this easy way to send a telegram. A person with a passive disposition is sure to be profoundly impressed by these catchy suggestions, and he may even in his sleep dream of taking down his receiver and repeating the world "telegram." If he has no telephone these sugar-coated words are likely to impel him to order one put in at once so he can take down his receiver and say "telegram," and the company does the rest.

W. U. Standard Spindle File.

The engineer of equipment of the Western Union Telegraph Company, New York, has designed a standard spindle file for use on operating tables to hold messages after they have been transmitted. The spindles are ground to a chisel point, which, while allowing ready filling of the messages, offers no sharp point to injure the user.

The files are to be screwed to the tables at the left of the typewriter on a line with the back of the machine. Both ends of the spindle are alike so that if one end becomes broken or otherwise impaired it can be reversed.

United Wireless Affairs.

It is announced that the plan for reorganizing the United Wireless Telegraph Company has been agreed upon. According to Mr. A. P. West, chairman of the reorganization committee, stockholders of the United Company having more than 300,000 shares have subscribed to the reorganization plan and owners of 300,000 more shares have promised to come in on April 15, to which date the plan has been extended. There are about 1,200,000 shares in the hands of legitimate stockholders. The Chicago stockholders of the company have started a movement to organize for the purpose of protesting against the organization plan proposed, and similar movements, it is stated, have been started in other cities including Detroit, Cleveland, Buffalo and Pittsburg, where there are large holdings of this stock.

Mutilators of Telegraphy and Telephony.

BY FRANK M. EWING, ASSISTANT MANAGER TELEGRAPH DEPARTMENT, PENNSYLVANIA RAILROAD, WILLIAMSPORT, PA.

There is nothing in this world more exasperating or nerve-racking than for a train dispatcher or an operator to struggle along, quite frequently under great difficulties, trying to receive from a mutilator of the Morse telegraph code or converse with a person with indistinct articulate speech over a telephone circuit. When the quality of Morse is good it is a great pleasure to work and an experienced operator can answer questions or carry on a conversation without any discomfort, while they are receiving. If the sending is mutilated then the mechanism of the ear combines the functions of both separator and transformer, while almost every nerve is strained in order to properly translate the mutilations.

There is really no excuse for operators remaining in ignorance of their defects provided they are open to conviction. The poor senders endeavor to back up their claim of good Morse by mentioning one or two operators "who receive from them all day without breaking," not taking into consideration the fact that those patient and good-natured victims evidently familiarized themselves with their combinations and put down what they mean instead of what they send. The various characteristics of bad sending noticed are as numerous as those existing between the different styles of chirography or conversation of different people. The peculiarity of their sending lies in the lengthening of the first or last dot of a letter, running the spaced dot letters together, dropping dots off some of the letters, running some letters of words together and spacing the others, making different combinations out of them and not allowing the proper interval of time for the letter and the spaces. Thus R sounds like "Ti," C like "It," figure 3 like "V," the word coat like "Is at," them like "Thw," Emporium like "Wposium," Harrisburg like "Hasspburg," President "P R & I don't," etc., and almost every word transmitted must be deciphered by the receiving operator by making due allowance for the mutilation.

Accurate sending is more desirable than high speed. It is well to remember that operators are not judges of their own Morse, and, therefore, should not try to see how fast they can send until they have had considerable experience. Who has ever heard a mutilator admit that his sending was poor? Now and then one may concede that his speed is below standard, but as to the quality of the Morse, there can be no question, the fault is always with the receiver!

Some entertain the erroneous idea that firm transmission of the alphabet depends largely upon the pressure brought to bear on the key, and by pursuing that course do not allow the muscles of the fingers to fully relax between the formation of one dash or dot and another. The result is that a dot is lengthened into a short dash. The custom of timing for ascertaining the speed of sending should be very sparingly indulged in, for it is likely to produce careless habits.

The speed of sending should be graduated to suit the capacity of the receiver; the latter should never be crowded. Fast sending is seldom indulged in by strictly first-class operators, but fast time is made by them on account of their firm, steady, even gait.

Accept the average receiver's opinion regarding your sending before you decide for yourself that your sending is all right, for the poorest operators often think their sending is good. If the receiver tells you that you do not space properly, or calls your attention to some particular fault, do not get angry, but take the hint, and try to remedy your weak points. There should be no difficulty in correcting one's faults, as a mutilated Morse character can be detected instantly by anyone who will listen carefully to his own sending.

It was thought that the introduction of automatic transmitting machines would put a ban on the poor sender, hence his future toleration depended upon reform or a machine. Experience has shown that it simply divides mutilators into two distinct classes, those using the Morse key and those using transmitting machines. Statistics show that if a person is poor in handling one instrument, he rarely becomes an artist in handling the other. Of machine sending there is this to say: The class employing an ordinary typewriter keyboard like the Yetman transmitter, will transmit perfectly formed Morse characters provided the disks are clean and the electric contact is good, and they enable some senders who have lost their grip to do good work. The machines operated by a side motion of the Mecograph or Vibroplex type (with the exception of dot characters) require as many movements of the hand as the Morse Key.

Sending machines are trying to receivers and unsafe when not properly adjusted. They are very often so adjusted that dots are made at the rate of 80 or 100 words a minute, while the actual speed made by the operator is only 30 or 40 words a minute. Everyone, especially those at repeating stations, notices that the signals from sending machines are thin and drop out when the machines are not properly adjusted and manipulated. If a machine is properly adjusted and simply let alone it will remain so indefinitely, doing good work if proper care and judgment are exercised in handling it.

The "go as you please" sender, for whom no apology can be made, is the product of pure carelessness or indifference. He never sends two consecutive words or sentences at the same rate of speed or in the same style, and is never sure of a word until he hears the last letter completed and is then so surprised at his execution that he usually stumbles all over the word that follows.

Telegraph repeaters can be adjusted for both light and heavy senders, but not for an uneven sender. A telegraph repeater adjusted for either a light or a heavy sender might be out of adjustment for a perfect sender. In sending, the motion of the key should be directly up and down, avoiding all side pressure. Never of course, allow the fingers or thumb to leave the key; that is, do not tap, pound, or strike the key with the fingers, or allow the elbow to leave the table.

Since the typewriter has come into general use, there is no danger of worrying an experienced operator by sending too fast. A good typewriter operator can write from sixty to seventy words a minute and more, but an expert telegraph operator cannot send steadily over forty-five or fifty words a minute; consequently a receiver has plenty of time, in addition to writing the message, to insert the "time received," the operator's personal sign, etc., even when receiving at the fast rate mentioned. Every young operator should learn to operate the typewriter rapidly and accurately.

Mutilations and misunderstandings occur in telephony as well as telegraphy.

The letters T, V, B, P, and the words Weaver, Stever, Lever, confined, consigned, are difficult to distinguish over a telephone on account of the similarity in the pronunciation. I know of a message boy in receiving a message over a telephone about a car of brick that was consigned from Newberry to Harrisburg, Pa., received the message that the care of brick was "confined" to Harrisburg. The sound of the letter "S" in the word consigned was lost in transmission. On some railroads with two towers "P" and "B" misunderstandings have occurred over the telephone in getting the two towers mixed due to the similarity in the pronunciation of the letters "P" and "B." Quite frequently a doctor is called by telephone to see a patient and calls at the wrong house going many blocks out of his way on account of indistinct articulation or similarity of the pronunciation of names. Persons with an impediment in their speech who are not a success in speaking over a telephone circuit, make good telegraph operators and transmit good Morse. When the telephone receivers are off the hook any noise in the vicinity of the telephone passes through the transmitter making it difficult to receive conversation. When telegraph keys are open no noises pass out over the circuit.

Variable Condenser for Wireless.

A very serviceable variable condenser can be made, says Mr. John M. Blake in the *Electrical World*, by combining a number of fixed condensers which are graded in an ascending geometric series. It is essential that each step in the series should add the steps that have gone before; otherwise, the condenser would have much too sudden changes of capacity.

This form of condenser gives us a command in tuning which the rotary form of condenser does not fully meet, for the reason that after a satisfactory beginning has been made in adding capacity in the first part of the rotation the rest of the motion up to a half circle adds very little to the increase. The last quarter of a turn only doubles the capacity. With this system of fixed condensers the ratio of increase is constant, and each step is equally effective. Besides this, the capacity can be made quite large with very little weight as compared with the ordinary rotary plate form. The trial condenser actually made had a ratio of three to four increase, or thirty-three per cent.

The members were built up of measured areas of thin metal and foil, separated by freshly dipped sheets of paraffine paper. They would necessarily vary from the standard on account of accidental variation in distance of separation. Besides this, a serious error was made by not noting that a rolled condenser acts on both sides, while a folded or convoluted one has much less of the surface active. Notwithstanding these drawbacks, the result was very satisfactory, and the general working was excellent. The changes of capacity were not sufficiently sudden to be much noticed.

The series started with an active area of 0.6 sq. in. and increased about 300 times in twenty-one steps. An extra step was reserved for a short-circuit. The first member was a strip of brass 0.3 in. wide and 1 in. long. This was made active on both sides. This first member represents the sum of the series of smaller areas which, let it be imagined, have gone before, but which have not been developed. The next member, which gave an increase of one-third by its addition to the first, was 0.1 in. wide and 1 in. in length. Several of these small members, properly insulated, were placed between a folded brass sheet. This made them more compact and manageable. The remaining condensers were built up singly of tinfoil.

The series following deviates a little from the standard in order to make it more simple and to avoid fractions: 0.3; 0.1; 0.1; 0.2; 0.2; 0.3; 0.4; 0.6; 0.8; 1; 1; 2; 2; 3; 4; 6; 8; 10; 10; 20; 20. While this series will give practical results for a home-made condenser, it is probable that something more perfect would be expected from an instrument maker. It would seem that an ideal construction could be had by using a twenty-five per cent. increase series, with each member approximately adjusted for capacity. This should secure an even flow. This series would have the advantage that ten steps would represent ten times increase, the tenth root of ten being very nearly five-fourths.

The commutator used consisted of a row of springs or pins arranged in a little less than a half circle of 1-in. radius. These pins rubbed on a half-circular brass plate mounted on a short cylinder of wood. A pointer on top of the box rotated this cylinder upon a central peg. The details of connecting and arranging the condensers about the commutator and of packing all in the containing box need not be gone into. It is important to add a short-circuit step at the top of the scale. Puncture by atmospheric discharges would probably be in the main prevented by bridging with a short spark-gap. The pressure of the springs in the switch can be so adjusted that the movement of the pointer at 3-in. leverage is smooth and easy. This feature, together with the sustained rapid change of capacity, will be found to invite a free use of this variable condenser while tuning.

The Dot-and-Dash Alphabet.

In an interesting article in the *Century Magazine* for March, Mr. Edward L. Morse, of Stockbridge, Mass., son of professor S. F. B. Morse, inventor of the telegraph, presents newly discovered documentary evidence that the dot-and-dash telegraph alphabet was invented by his father.

Mr. Morse takes as the basis of his article the claims made by the late F. L. Pope, that many of the essential elements of the telegraph were the invention of Alfred Vail, including the dot-and-dash alphabet.

In 1895, Mr. E. L. Morse published a series of articles in the *Electrical World*, in which he says, "I was able to bring forward enough documentary evidence to prove to all but the most biased partisans, that Morse, and not Vail, was the inventor of the dot-and-dash alphabet." Since that time, Mr. Morse states, he has from time to time, and even quite recently, discovered further corroborative testimony, so that the matter can now be settled for all time.

"I must also disclaim any intention of casting discredit on the character of Alfred Vail," says Mr. Morse. "It is not with what he has claimed for himself, but with what is claimed for him, that I take issue.

"The first idea of his great invention," Mr. Morse continues, "was conceived by Morse while he was returning from Europe in 1832, on the packet-ship *Sully*, and he jotted down in his sketch-book, a certified copy of which is now in the National Museum in Washington, his first ideas, which are the basic principle of the telegraph of today.

"Among other things, the dots and dashes appear, but only to represent numerals, not letters. The alphabet does not come on the scene until some years later, but there can be no disputing the point that the dot and dash of the 1832 sketch-book were the embryo from which the alphabet was afterward developed.

"It was on Saturday, September 2, 1837, that Alfred Vail of Morristown, N. J., first saw the crude instrument which Morse, through lack of means, had been compelled to construct (most ingeniously, by the way) from an old canvas-stretcher and a wooden clock.

"Vail was impressed with the possibilities of the invention, and from this time, or, rather from September 23, 1837, was associated with Morse in the perfection of the mechanical parts of the invention, the latter paying him in the only way possible at that time, by making him a partner in the enterprise.

"Morse's first idea for the sending and recording of intelligence, as we shall see, was to use only numerals, corresponding with words in a specially prepared dictionary, and it was not until after his association with Vail that this plan was abandoned and the alphabet appeared, *although conceived and written before he met Vail.* It is from this circumstance that the confusion has arisen."

Mr. Morse then states first all the evidence that the advocates of Vail have been able to bring forward, and then the evidence on the Morse side, and then goes on:

"I have here given everything that I have been able to find bearing directly on the claim of Vail's advocates that he was the inventor of the code. Nowhere, to my knowledge, in any of Vail's letters or diaries, and these were voluminous, does there appear a written claim, or even a hint, on his part, that he had anything to do with the code. On the other hand, he vigorously claims the invention of the dry-point to emboss the characters, an ingenious, but now discarded, part of the instrument. In letters to Morse, moreover, he many times speaks of 'your system of marking, lines and dots.'

"Now let us see what we can find among the papers and letters and published writings of Morse to substantiate his claim. I say his claim, for he never refers to it except as (my conventional alphabet), and to those who knew Morse's scrupulous regard for the truth, this would be enough; but I have found among his papers many scraps of evidence to prove conclusively that he was claiming only what was his just due, and I shall here give some of the most important.

"The following is written in pencil on a scrap of paper, a method often employed by Morse in making the first rough draft of letters or articles:

" 'It is quite common to misapprehend the nature and extent of an improvement without a thorough knowledge of an original invention. A casual observer is apt to confound the new and the old, and, in noting a new arrangement, is often led to consider the whole as new. It is therefore necessary to exercise a proper discrimination lest injustice be done to the various laborers in the same field of invention.

" 'I trust it will not be deemed egotistical on my part if, while conscious of the unfeigned desire to concede to all who are attempting improvements in the art of telegraphy that which belongs to them, I should now and then recognize the familiar features of my own offspring and claim their paternity.'

"While this has no date, and evidently refers to some later attempts at improvement, I have introduced it as showing Morse's desire to do justice, and also as a very plausible explanation of Baxter's mistake in looking upon Vail's mechanical improvements as new inventions.

"The next note is also in pencil, with a few words added or interlined in ink, but all in Morse's handwriting:

" 'Mr. Vail in his work on the Telegraph at p. 32 intimates that the saw teeth type for letters as he has described them in the diagram (9) were devised by me as early as the year 1832. Two of the elements of these letters, indeed, were then devised, the dot and space, and used in constructing the type for numerals, but so far as my recollection now serves me it was not until I had experimented with the first instrument in 1835, that I added the — dash, which supplied me with the three elements for combination for letters. It was on noticing the fact that when the circuit was closed a longer time than was necessary to make a dot, there was produced a line or dash that, if I rightly remember, the broken parts of a continuous line as the means of imprinting at a distance, were suggested to me; since the inequalities of long and short lines, separated by long and short spaces gave me all the variations or combinations of long and short lines necessary to form the alphabet. The date of the code complete must therefore be put at 1835, and not 1832, although at the date of 1832, the principle of the code was *evolved*.'

"Here we have a definite claim in writing by Morse that his alphabet was devised in its first form two years before Vail came on the scene, and the opinion that Vail knew this, but had placed its invention at an earlier date than was historically correct, a proof of Morse's earnest desire to claim only what was his.

"Another pencil memorandum is even more illuminating:

"'It was believed for some time (even after the telegraphic alphabet had been composed and practically tested), that reducing the despatch to numbers (the numbers being those of the words in a specially prepared dictionary), would be found most convenient in practice; this numerical mode being in point of rapidity of transmission far beyond any previous mode of communicating intelligence at a distance. But it was soon perceived to be indispensable that alphabetic characters and not numbers, especially for proper names, should be adopted, and experience has proved the superiority of the alphabetic code for all purposes of communication. Consequently when experience had demonstrated the eligibility in practice of the alphabetic mode, the Morse code was ready and completely prepared for use in anticipation, it required no modification but the 4 or 5 combinations of the dot and dash which have been substituted for the "*space letters*" and the addition of new and special combinations for the additional letters in other languages than the English (the German and Russian for example).'

"This is certainly very clear and conclusive," says Mr. Morse, "but lest some skeptic may urge that this note, without date, but evidently written some time after the alphabet had come into general use, was a disingenuous attempt on the part of Morse to claim more than was his due, let us see if we cannot find evidence of a much earlier date."

Mr. Morse then introduces a letter from a certain Mr. Tracy, and other correspondence bearing on the subject, and says, in conclusion:

"To sum up in a few words the evidence on both sides: Vail has nowhere left a written claim, or even a hint, that he had anything to do with devising or modifying this telegraphic code, whereas he did leave a written claim to the invention of the dry-point for embossing the characters on the tape, and in his book on the telegraph he makes several claims. In view of these claims on Vail's part, the contention of his advocates that he remained silent with regard to the alphabet because of his contract with Morse falls to the ground.

"Morse, on the other hand, as we have seen, has specifically claimed in writing that he devised the code in its first form two years before Vail had heard of the telegraph, and Mr. Tracy's letter is corroborative evidence. He has left written proof of having occupied himself with the simplification of the code, and he never fails to refer to it as 'my conventional alphabet,' while Vail, in the letter of April 20, 1848, and in other letters, refers to it as 'your system of marking.'"

The article contains several illustrations, including facsimile reproductions of the most important documents referred to.

New Book.

TELEPHONY. By Samuel G. McMeen and Kempster B. Miller. 948 pages, 671 illustrations. Chicago: American School of Correspondence. Price $4.00.

This latest addition to the literature on the telephone has a decided advantage in being the product of two men whose knowledge of and experience and reputation in telephony are unquestioned. They are both among the most active and leading telephone men of the time, and what they say regarding the art may be accepted as authoritative and up to date.

The book is designed with the care that comes from knowledge and experience, and is a complete exposition of the art of telephony, both in theory and practice. Every drawing used was especially prepared for this work, and each one has the valuable merit of being clear and distinct.

The work has fifty-three chapters, Chapter forty being devoted to telephone train dispatching. A partial list of other subjects treated of in the various chapters includes: History and development, acoustics, lines, transmitters, receivers, primary cells, electromagnets and inductive coils, condensers, selective and non-selective party-line systems, protective means, switchboards, private branch exchanges, intercommunicating systems, traffic; phantom, simplex and composite circuits, lines, cables, poles, etc., underground construction, wiring, testing, etc. From this list an idea may be gained of the scope of the work, and railroad men will be especially interested in the book by reason of the special chapter on telephone train dispatching, which describes in a general way the various systems in use.

Copies can be procured of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, on receipt of price.

Grievances of English Telegraphers.—At a recent meeting of the London branch of the Postal Telegraph Clerk's Associtaion, a resolution was unanimously adopted protesting against the great increase in the late duties at the Central Telegraph Office, and the alleged disregard of the operators' comfort and convenience by the controlling officers.

Mr. J. C. Duane, district plant superintendent, Western Union Telegraph Company, Jacksonville, Fla., writes: "I could not get along without TELEGRAPH AND TELEPHONE AGE. It is very instructive and contains lots of interesting news to me."

CONSERVATION TALKS NO. 3.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLA.

Development.

The lack of development work by managers is wasted time. Few, if any, managers there are who have not some "dead time" on their hands and do not know what to do with it. The trouble is that only about 30%, if that much, of the managers of telephone plants have the commercial instinct. They dislike collecting and canvassing, and either leave this important duty alone or delegate it to others.

Telephone economic efficiency consists of (1), maintaining the plant, (2), giving the service, (3), getting the money, (4), developing new business and holding the present patrons.

In developing new business, good judgment must be exercised to get only paying business, *i. e.*, development work should not be done when new investment would be necessary without proper authority.

In development work, the manager should strive to have the co-operation and help of every employe of the company and frequent meetings of employes should be held with the co-operative end in view. When business is secured it should be cared for promptly. To hold old business and get new business the following basic principles should be borne in mind: (1), efficiency, (2), economy, (3), dispatch and (4), honesty in management.

Such will result in (1), the best service possible at fair rates, (2), adjustment of differences promptly and fairly. Reasonableness on the part of the company results in reasonableness on the part of others, whether regular or transient patrons. The personal appearance of employes and of companies' offices are also great factors in development. Develop neatness and avoid "frills."

Managers should keep posted on up-to-date methods, and the company should assist and encourage them along these lines by frequent booster bulletins and tables comparing his exchange with others of a similar class and character.

The manager should have data showing the commercial details of his plant. This should be in the form of maps, records, etc., showing work done, present and prospective patrons. He should be a member and regular attendant at and worker in the commercial club and active in assisting in every proper manner the development of the town or city.

It is also well for him to be an active member and worker in one or more of the best fraternal societies, church work, etc., using discretion to get into the channels that will make him a better man and a more valuable employe. The people who patronize the telephone, as a rule, are not frequenters of pool rooms and like resorts.

He should be a "telephone man" who knows his business thoroughly. He should cultivate an even temper and a smiling face regardless of the abuse which must be heaped upon him by those not familiar with conditions and often unreasonable in their demands because of this.

The company, on the other hand, should encourage the manager; there will be plenty of others to slap him in the face and discourage him.

The work of development should be thoroughly systemized so that no time is lost in beginning a new day's development work.

Be courteous, it costs effort, but pays big dividends. Satisfy your patrons if possible and practicable to do so.

If advertising is authorized see that it is truthful, consistent and proper. If you do not get up your own copy and do not like it, say so.

Be above criticism and strive to make and keep the public and the company proud of you.

Progress.

BY JOHN F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

How often we hear the complaint "Oh, if I only had—almost anything you could name—how much better off I'd be," and then there is a sigh, and not infrequently a comparison with the lot of someone whom the complainer considers more fortunate.

Quite often the question is asked, "why don't you take — something the complainer already owns—and fix that over, or improve it, for the purpose in mind?" The answer comes, "That old thing; why I'd be ashamed of it. I wouldn't waste my time on it. If I can't have the very newest and latest I don't want any."

Far be it from the intention of the writer to deprecate the abandonment of the outworn or antiquated, for of all men the engineer perhaps best knows the value of a judicious use of the scrap pile in the furtherance of both present economy and future progress. The thought, however, that obtains in so many minds that everything old and dingy or not of the latest type is not worth house room is a poverty-breeding germ.

"Take what you have and make it better" is a good slogan for both business and home affairs, and if you use your powers of observation you will notice that those who follow this precept make continual progress, and hold the ground they gain. It is also noticeable that these same people are often eventually in a position to invest in "worth while" new things that the "all-new or nothing-for-me" folks seldom attain.

Try the application of this precept to your office and home affairs, and you will soon find waste eliminated and secure an attitude of mind that will make for real progress. Fix up what you have—clean it up—improve it—the difference between new and old is often merely a matter of paint or elbow grease. Don't talk or think about displacing what you have until both the need for the new and its worth have been demonstrated beyond question.

Mr. Alfred Williams of Wichita, Kan., in renewing his subscription, writes: "I find TELEGRAPH AND TELEPHONE AGE most interesting and instructive. Kindly continue sending me the paper."

Reinforced Cement Poles.

Among the troubles met with in the manufacture of reinforced cement poles, is holding the reinforcement in place, and its tendency to separate from the concrete when the pole is subjected to uneven strain. These, and other difficulties, are claimed to be overcome, in the Rubello-Santi system of pole construction.

In this construction the reinforcement is held rigidly in position as though it were one piece, and the concrete may be applied with the reinforcement in an upright position for large poles or in a horizontal position for smaller sizes, with no danger of displacing the reinforcement.

The spacing or reinforcing rings or squares hold the entire reinforcement at predetermined distance from the walls of the mold, producing a uniformity in the concrete surrounding the reinforcement, and a corresponding uniformity in resistance against strain in any direction. The rings have a powerful binding effect, which prevents the concrete from crushing or shelling off.

FIG. 1.—ROW OF THIRTY-FOOT POLES ERECTED IN BOGGY GROUND.

Fig. 1 shows a line of concrete poles erected in boggy ground and Fig. 2 shows the method of reinforcement with steel rods held in place by spacing rings. This method of reinforcement is adaptable to either solid or hollow poles, and the patents thereon are owned and controlled by the Standard Cement Pole Company of America, 25 Broad Street, New York.

Pole License Sustained.—The Illinois supreme court has sustained the decision of the appellate court in the case of the city of Springfield vs. the Postal Telegraph-Cable Company. The decision holds that the imposition by a city of a charge against telephone and telegraph poles is not a tax, but is a license properly imposed by the city in the exercise of its police powers.

FIG. 2. MOULD SHOWING DISTRIBUTION AND METHOD OF REINFORCEMENT WITH STEEL RODS HELD IN PLACE BY SPACING RINGS.

Helps for the Business Man.—There are to-day many business men who unfortunately for themselves are doing without many things which would enable them to work in greater comfort and, in general, conduct their business with increased efficiency. That such a state of affairs exists is not the fault of the business men, but rather due to the fact that they have not been told in the right way. Realizing this, the Western Electric Company has recently published an attractive little book aptly named "The Silent Partners—A True Story." The book is written in an easy, colloquial style, and the advantages of Western Electric inter-phones as time and step savers; of desk, bracket, ceiling and counter fans as creators of coolness; of ventilating or exhaust fans as fresh air producers and of large and small motors for shop and factory use, are cleverly set forth.


KERITE
DAYS
KERITE
KERITE is time-proof. Installations, of which records extend back over thirty years, show no impairment in its reliability, and no variation in efficiency
KERITE INSULATED WIRE & CABLE COMPANY
INCORPORATED BY W.R. BRIXEY
General Offices, Hudson Terminal, 30 Church St., New York. Western Office, People's Gas Building, Chicago.

The Railroad.

Mr. L. S. Wells, superintendent of telegraph of the Long Island Railroad, New York, has resumed duty after an absence of several weeks on account of illness. He is now fully recovered.

Convention of Railway Signal Association.—The Railway Signal Association held its Spring meeting in Chicago on March 18. The next convention of the association will be held in New York some time in June. C. C. Rosenberg, of Bethlehem, Pa., is the secretary.

New Copper Telephone Circuit on Lackawanna.—The Lackawanna Railroad recently put in operation a second commercial telephone circuit, between its general office in New York and Scranton, Pa., using 350-pound copper wire. This circuit will be extended to Buffalo in the near future.

Bronze Tablet in Memory of Mr. Harriman.—A large bronze memorial tablet is to be placed by the directors of the Erie Railroad Company, in the station at Harriman, N. Y., in memory of the late E. H. Harriman, the well-known railroad manager. It is at the Harriman station where the so-called Turner Monument is to be erected on May 2 to commemorate the sending of the first train order by telegraph.

The Turner Monument Fund.

The bronze tablet of the Turner monument is now on exhibition at the office of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, and all interested are cordially invited to call and examine this excellent bronze product of the sculptor's art.

Thursday, May 2, has been selected as the day for the dedicatory ceremonies.

The monument fund now stands as follows:

Previously acknowledged, $2,325.09; James Kent, manager Canadian Pacific Railway Companies' Telegraph, Montreal, Que., $5.00. Total, $2,330.09.

Train Dispatching by Telephone in the South.

During the past few months a number of Southern railroad systems have decided to adopt the telephone for dispatching their trains and to discard the telegraph. There are eighteen Southern railroads using the telephone at present, with about 7,800 miles of line so equipped, and a total of fifty-six circuits, equipped with a little over 1,500 selector way stations. The new roads to join the ranks of the telephone users are the Central of Georgia, which is equipping a 160-mile stretch, with thirty-one stations, the Florida East Coast, which has just about completed the installation of 478 miles of line, covering four circuits and forty-six stations, the Atlanta & West Point, which is about to equip 225 miles of line with thirty-one stations, the Piedmont Traction Company, which is equipping twenty-four miles of line with both selector and selectively operated semaphore equipment, the Gulf, Florida & Alabama, where 100 miles of line with twenty stations is to be installed, and the Greenville, Spartanburg & Anderson Railway, which has ordered selector and selectively operated semaphore equipment for fifty-eight miles of line and nineteen stations. All of these roads use the Western Electric Company's apparatus.

Meeting of Railway Telegraph Superintendents in Chicago.

A joint meeting of the Eastern and Western Divisions of the Association of Railway Telegraph Superintendents was held in the assembly room of the Chicago & Northwestern Railway, Chicago, on March 20.

A meeting of the Committee on Wire Crossings was held in the office of general superintendent of Telegraph, W. W. Ryder, of the New York Central Lines, on March 19, and discussed fully the question of proposed agreements.

At 2:00 p. m., March 19, the Executive Committee held a meeting at the Pennsylvania Railroad Company's office, at which it was decided to change the date of the next annual meeting, which is to be held in New York, June 4, on account of the former date being so near the National Republican and Democratic conventions. It was also decided to make the Waldorf-Astoria the headquarters, but the meetings will be held in some building other than the hotel. The change in date of the annual meeting was announced by president G. A. Cellar at the divisional meeting.

The association has received an invitation to visit the Edison plant at West Orange, N. J., and it has also been decided to hold a banquet at the Waldorf during the convention, or a shore dinner at the Country Club, on Travers Island, New York.

At the divisional meeting there was a general discussion in reference to the telephone, and the chairman of the topics committee made an urgent appeal to the members for papers to be read at the convention. Mr. W. W. Ryder is to furnish a paper on the operation of the telephone and Mr. L. B. Foley on the economies of the telephone on the Delaware, Lackawanna & Western road.

A number of the members visited the Manufacturers' Exhibition which was being held at the Coliseum.

Mr. W. J. Camp, assistant manager of telegraphs, Canadian-Pacific Railway, Montreal, Que., denied emphatically the newspaper statement that the Canadian-Pacific had abandoned the use of the telephone for train dispatching, etc., and stated that they were moving the dispatcher's headquarters from one point to another, which necessitated changing the resistances at the different offices, and, therefore, the offices were temporarily out of service.

Among the superintendents present were E. A. Chenery, Missouri Pacific Railway, St. Louis, Mo., who presided; W. W. Ashald, Grand Trunk, Montreal, Que.; Wm. Bennett, Chicago and Northwestern, Chicago, Ill.; F. E. Bentley, Terminal Railroad Association, St. Louis, Mo.; C. W. Bradley, Chesapeake & Ohio, Richmond, Va.; W. J. Camp, assistant manager of telegraphs, Canadian Pacific, Montreal, Que.; G. A. Cellar, Pennsylvania Lines West of Pittsburgh, Pittsburgh, Pa.; M. H. Clapp, Northern Pacific, St.

Paul, Minn.; W. P. Cline, Atlantic Coast Line, Wilmington, N. C.; J. H. Ditch, chief telephone inspector, Pennsylvania Railroad, Altoona, Pa.; G. A. Dornberg, general foreman, Pennsylvania Lines West of Pittsburgh, Pittsburgh, Pa.; P. W. Drew, Minneapolis, St. Paul & Sault Ste. Marie, Chicago, Ill.; L. B. Foley, Delaware, Lackawanna & Western, New York; U. J. Fry, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.; E. P. Griffith, Erie, New York; T. M. Haston, Toledo, St. Louis & Western, Bloomington, Ill.; E. D. Hubbard, general foreman, Grand Trunk, Battle Creek, Mich.; L. M. Jones, Atchison, Topeka & Santa Fe, Topeka, Kan.; E. C. Keenan, Lake Shore & Michigan Southern, Cleveland, Ohio; G. C. Kinsman, Wabash, Decatur, Ill.; C. L. Lathrop, Pittsburgh, Shawmut & Northern, Angelica, N. Y.; L. A. Lee, Pittsburgh & Lake Erie, Pittsburgh, Pa.; E. J. Little, Great Northern, St. Paul, Minn.; R. L. Logan, Kansas City Southern, Kansas City, Mo.; W. P. McFarlane, assistant superintendent, Chicago & Northwestern, Omaha, Neb.; W. S. Melton, Queen & Crescent, Danville, Ky.; W. H. Potter, Southern, Washington, D. C.; C. S. Rhoads, Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind.; Thos. Rodger, inspector, Grand Trunk, Montreal, Que.; W. W. Ryder, general superintendent, New York Central Lines, Chicago; C. Selden, Baltimore & Ohio, Baltimore, Md.; F. S. Spafard, Chicago, Rock Island & Pacific, Chicago; F. H. Van Etten, Chicago, Terre Haute & Southern, Chicago; J. M. Walker, Denver & Rio Grande, Denver, Col., and W. C. Walstrum, Norfolk & Western, Roanoke, Va.; and the following associate members, W. L. Cook, Chicago; A. P. Eckert, New York; A. G. Francis, Chicago; W. E. Harkness, New York; E. E. Hudson, Orange, N. J.; B. A. Kaiser, New York; M. E. Launbranch, Chicago; H. E. Merrell, New York, and A. D. Smith, Montreal, Que.

Mr. P. W. Drew, superintendent of telegraph, Minneapolis, St. Paul & Sault Ste. Marie Railway, Chicago, Ill., is secretary of the association.

Testing on Railroad Telephone Circuits.

BY K. W. ENDRES, NEW YORK.

GENERAL.

An essential part of every wire circuit transmitting electricity is a means of locating trouble on this circuit with some degree of accuracy This holds true whether the line in question be carrying heavy currents for power purposes or the almost infinitesimal currents used in transmitting speech. Tests are a necessity in both cases. They are more necessary in the case of telephone circuits than with power circuits, because the former are of a small size of wire with correspondingly lower tensile strength and are, therefore, more liable to breakage.

In a modern telephone office the testing facilities form a very important portion of the equipment. Arrangements are made so that all opens, crosses, leaks, grounds, and in fact every possible kind of trouble can be accurately and quickly located. With the multiplicity of lines entering a telephone exchange this is important and the methods used are rather elaborate. With railroad circuits the need for such tests is just as important, but owing to the smaller number of circuits, much simpler apparatus can be employed.

CLASSES OF RAILROAD TELEPHONE CIRCUITS.

In dealing with railroad telephone circuits they may be divided into two general classes. The first of these covers the telephone train dispatching circuits and others of the same type; for instance, message circuits which also employ the selective signaling system. The second class are the railroads' ordinary private lines which may be in the nature of long distance circuits or may consist merely of short lines extending from the different private branch exchanges owned by the company. Under these two headings the matter of testing will be treated in these papers.

TRAIN DISPATCHING LINES.

The telephone circuit as applied to train dispatching is somewhat of the nature of a long distance circuit. It has, however, very important differences from the ordinary commercial telephone circuit which, as we all know, is merely a pair of copper wires with a telephone set at either end. The train dispatching circuit consists, likewise, of a pair of copper wires extending in length from 30 to 400 miles or more, but having bridged across it at frequent intervals, telephone and selector equipment placed at the different way-stations along the railroad's right-of-way.

Each one of these stations is called selectively, and it is possible with the circuit arrangement employed for any number of telephone sets to be connected across the circuit at any one time. As a matter of fact, probably there are never more than from six to ten operators listening on the line at once.

In this railroad work on train dispatching circuits the object of prime importance is to keep at least one through circuit in operation—no matter what happens to the others. The shorter, less important lines are sacrificed in times of emergency for the benefit of the one circuit that counts. This, needless to say, is the train dispatching wire. A railroad is in business to keep its trains moving, and, as long as this can be done, all the other circuits can be neglected for the time being.

(To be continued.)

Western Electric's Business.—Goods billed by the Western Electric Company during February totaled about 2 per cent. less than for February, 1911. The first two months of the current year indicate a total business for 1912 of approximately \$67,000,000. Sales for 1911 totaled \$66,300,000. In several lines, notably in sales to companies outside of the Bell interests, business last month was the best for any one month in the company's history. Bell estimates of telephone construction requirements during 1912 call for a total of slightly over \$55,000,000 of new work.

Obituary.

J. C. Dye, a lineman for the Postal Telegraph-Cable Company at Cumberland, Md., died March 19.

Robert C. Daw, aged 30 years an operator for the Western Union at Denver, Col., died in that city March 6.

D. C. Thompson, aged 47 years, cashier of the Western Union Telegraph Company at St. Joseph, Mo., died at that place on March 12.

Frank Benton, a blind telegrapher, died at York, Pa., March 16. Messages to be transmitted were read to him, and in receiving he copied on the typewriter.

Charles H. Currier, aged 76 years, for many years manager of the Western Union Telegraph office at Fort Wayne, Ind., died in that city March 10. He retired from the telegraph service ten years ago.

Isabel Bamford, wife of Richard L. Bamford, superintendent of telegraph of the New York Stock Exchange, died in New York on March 24. The funeral services and interment were held at Valcartier, Quebec, Canada, her former home.

Charles W. Henderson, aged 68 years, a well-known telegrapher in New England, died in Dorchester, Mass., on March 20. He was for twenty years manager of the Western Union office in Boston. Ten years ago he was appointed solicitor and claim adjuster, and last summer was retired on a pension.

W. C. J. Edwards, aged 49 years, until recently with the Commercial Cable Company at Boston and Rockport, Mass., died in Boston, on March 12. He was a native of England. The funeral services, which took place on March 14, were attended by superintendent F. H. Putt and Mr. Frank Wilson, formerly superintendent of the Commercial Cable Company, Boston.

F. J. Krumling, manager of the Western Union Telegraph office at Toledo, Ohio, fell dead at his desk on March 7. Mr. Krumling was born in Toledo, February 21, 1859, and lived there the greater part of his life. He was operator for the Associated Press in St. Louis, Mo., between 1883 and 1888, when he returned to Toledo. In 1903 he was appointed chief operator and in 1908 manager of the office.

The Late H. H. Matlock.

H. H. Matlock, whose death at Springfield, Ill., on March 6, was announced in our issue for March 16, is the twelfth member of the Society of the United States Military Telegraph Corps to pass away since the Atlantic City reunion last September. He was employed in the war department at Washington with Col. A. B. Chandler, Chas. A. Tinker and David Homer Bates, and was highly esteemed by these gentlemen.

Mr. Matlock was on the private telegraph staff of Secretary of War Stanton and while occupying this position he became acquainted with President Lincoln through a message which Mr. Lincoln sent to Col. Haupt, at Alexandria, Va., on August 30, 1862. On receiving the reply to the message, which was of a quieting nature, Mr. Lincoln laid his hand on Mr. Matlock's shoulder and remarked: "This takes a great load from my mind." Mr. Matlock asked permission to keep the original message, to which Mr. Lincoln agreed, after endorsing it.

Telegraphers' Aid Society.

The New York Telegraphers' Aid Society's financial statement for the year ended March 6, is as follows:

Balance on hand March 6, 1911		$25,077.16
Receipts		6,838.60
Total		$31,915.76
DISBURSEMENTS.		
Sick Benefits	$4,183.76	
Death Benefits	1,300.00	
Expenses	771.88	6,255.64
Balance on hand March 6, 1912		25,660.12
Total		$31,915.76
RELIEF FUND.		
Balance on hand March 6, 1911		$ 5,404.64
Receipts		1,034.94
Total		$ 6,439.58
Disbursements		511.15
Balance on hand March 6, 1912		5,928.43
Total		$ 6,439.58

"Bugs" and Bug Hunters.

The average operator is constantly confronted with the possibility of a physical breakdown resulting from the continuous strain upon his mental and nervous energy, and when that condition is reached his days of usefulness are over. The wise operator of today appreciates this fact and does not wait for his arm to give out before getting a sending machine, commonly known as a "bug." Many of the best positions in the telegraph service today are held by operators, the majority of whom are using a standard, up-to-date sending machine.

It is true that many operators, so broken down that they cannot send on a Morse key, are now sending rapidly and with ease on a transmitting machine. The standardized transmitter of this type is unquestionably the best investment an operator can make. It means insurance to his arm, on which his livelihood depends. It gives him greater efficiency and puts him in line for promotion, and last, but not least, it saves him sixty per cent in labor compared with hand sending.

The selection of a reliable sending machine is not a difficult matter. At the present time the Mecograph Company, Cleveland, Ohio, has on the market a machine called the "Mecograph Premier," which is a practical instrument, of excellent workmanship and is simple and scientific in design. This machine overcomes all the objections to sending machines. There is no chance for split dots. The adjustments are extremely simple and can be made instantly for long or short distances on multiplexed wires.

D. Van Nostrand Company, the well-known scientific book publishing house, has moved from 23 Murray and 27 Warren streets, to larger and better quarters at 25 Park Place, New York.

T. M. B. A. Assessment.—Assessment No. 536 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of E. N. Cobb at Houston, Tex., E. N. Dennis and W. L. Allen at Richmond, Va., and E. L. Graul at Philadelphia, Pa.

LETTERS FROM OUR AGENTS.

New York Western Union.

"Senator" Wm. L. Ives having fully recovered from his recent illness has resumed duty and is once more in full control of his circuit, 151 East, which he has handled continuously for the last twenty-five years.

The annual election of the New York Telegrapher's Aid Society was held on March 26 and the following officers were elected: President, A. M. Lewis; vice-president, J. F. Zeiss; treasurer, T. M. Brennan; financial secretary, C. A. Kilfoyle; recording-secretary, Mary E. Saunders. Executive Committee: J. F. King, J. J. Keefe, D. H. DeBaum, A. J. Gilman. Auditors: F. J. Nurnberg, J. F. E. Hopkins and H. M. Heffner. The annual meeting of the society was held March 27.

Mr. T. M. Ragen, assistant Southern traffic chief, has resigned and has left New York to settle on the Pacific Coast.

Mr. N. B. Maresca has been appointed manager of the 426 Columbus Avenue office, vice W. A. Sanford, resigned. Mr. E. S. Lonergan has been appointed manager at 70 Eighth Avenue, vice R. Brown who has been transferred to the managership at Fourteenth Street and Third Avenue, in place of Mr. M. W. Russnow, resigned.

Mr. W. E. Heady, of the general operating department, has recently been transferred to the executive offices of the company as stenographer.

The Morse Dramatic Club, a recently organized society, consisting chiefly of members of the telegraph fraternity in New York, will play "The Professor's Secret," a four-act comedy, by Robert M. Baker, Friday evening, April 12, at Murray Hill Lyceum, 34th Street and Third Avenue, New York. Dancing will follow the performance. There will also be several other interesting features, and, judging from the interest taken, the event promises to be a success. The following operators will take parts in the play: W. J. Keegan, W. F. Packard, Stanley Gross, Joe McGivern, Alphonse Hirsch, Nonita Dooley, Helen Mahoney, Florence Webber, and Margaret Curran. All are employed at 195 Broadway, except Mr. Hirsch who is now engaged in other business.

New York Postal.

Mr. T. V. Rhates, formerly of the Pennsylvania Railroad, New York, has been appointed manager of the 696 Columbus Avenue office vice A. Butscher who has been transferred to the 944 Broadway office.

Philadelphia Postal.

The sympathy of the entire office is extended to repeater chief Chas. S. Almes upon the sudden death of his mother.

Houston, Tex., Western Union.

J. A. McNabb, traffic chief, has resigned to assume a position at the key. He has been with the company at this point nearly thirty-five years and has made an enviable record. He served as wire chief for over fifteen years. He was presented with a gold handled umbrella by his associates upon his retirement from the floor as a token of appreciation of his gentlemanly and courteous treatment.

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.

Telegraph and Telephone Age

No. 7. NEW YORK, APRIL 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Milliammeter in Connection with Multiplex Operation.

The milliammeter is an instrument used for measuring current in a circuit and it will also indicate its polarity. Owing to its extreme sensitiveness to minute fluctuations in the current, and to the reliance which may be placed upon the accuracy of the readings as indicated by the needle's deflection, its use in connection with the handling of bridge duplexes and quadruplexes, where it is permanently connected in the bridge in series with the polar relay, is now considered almost indispensable. Not that it takes any part in the actual operation of the apparatus, but as a guide which enables the attendant to balance the apparatus and otherwise work in a more intelligent and confident manner. Without the aid of a milliammeter the attendant is compelled to do more or less guesswork in some situations, and at best, is not sure of the degree of success he has attained, with no other guide than that of "sound" or "feel," to direct him, as is always the case, when balancing without it.

To prove this statement let us take for an illustration the operation of obtaining a "static" balance. Assume that an ammeter is connected in the circuit as usual, but that the attendant disregards it temporarily and endeavors to eliminate the effect of the line discharge by the sense of sound, or "feel" alone. If he is not an expert, or particularly well informed, he may conclude that he has eliminated the disturbance entirely the moment the "kick" disappears, whereas he may possibly have only weakened its power in so slight a degree that interference is merely smothered to a point just below the danger mark, and he is none the wiser. If he had been guided by the needle of a milliammeter he would have noticed that although the sounder failed to respond, the needle would still have continued to be affected, thus indicating that the compensation was not complete. He would, therefore, have continued his readjustments until the deflections ceased and would have thus created a wider margin between interfering and non-interfering conditions. Of course an expert, by the sense of touch, might have reduced the strength of the remnant discharge a little more, but he could not by that means judge to what degree.

The deflections of the needle enable one to work more intelligently, as previously stated, for the reason that the direction of its swing indicates the direction in which the attendant should work. For example, when he closes his key to produce a static "kick," he knows, or should know, if he has read the instruction papers furnished him, that in the standard arrangement of negative polarity for the "marking" current, if the needle is jerked upward, or in a spacing direction, it indicates that more capacity must be added to the condenser, and *vice versa*, diminished if it swings in the opposite direction. Hence he proceeds to insert or remove the condenser plugs as is required without having to resort to the old method of trial balancing in order to ascertain his bearing.

The milliammeter will also indicate which side of a repeater station a long two-section circuit has "failed," when an interruption occurs, by indicating normal deflections of the needle when the trouble is beyond, and abnormal deflections when the trouble is on this side of the repeater. Without a meter the location of the fault is more or less a matter of guesswork until the repeater attendant reports, as the situation must otherwise be judged by the character of the signals made on the relay by operating the home key, and as these vary in accordance with the nature of the trouble they are often misleading.

In conclusion it may be stated that so much reliance is now placed on the accuracy of the readings and actions of the needle in every situation met with in connection with bridge duplex and quadruplex operation, that its adaptation has possibly led to the adoption of the present standard method of balancing directly to the distant battery instead of to a "ground" as the old method required; thus eliminating the time previously lost waiting for the repeater attendant to come in and turn the switch.

Recent Telegraph and Telephone Patents.

ISSUED MARCH 19.

1,020,898. Telephonic Apparatus. To E. A. Graham, Brockley, Eng.

ISSUED MARCH 26.

1,020,975. Selective Signaling System. To E. R. Gill, New York, and O. J. Hamlin, Smethport, Pa.

1,020,976. Apparatus for Metering Conversations in Automatic Telephone Exchanges. To G. Grabe, Berlin, Germany.

1,021,132. Space Telegraphy. To S. Cabot, Brookline, Mass.

1,021,434. Portable Face Mask for Telephone Use. To L. C. Stockton, Denver, Col.

1,021,494. Telephone System. To S. C. Van Aiken, Jr., Liverpool, N. Y.

1,021,717. Combined Telephonic and Telegraphic System. To E. R. Gill, New York, and O. J. Hamlin, Smethport, Pa.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange April 10.

Amer. Telep. and Teleg. Co.	145¾
Mackay Companies	84¾
" " pfd.	69⅛
Western Union Tel. Co.	83

Personal.

Mr. C. C. Marsh, general manager of the Mecograph Company, Cleveland, Ohio, was a recent business visitor in New York.

Dr. L. M. Rheem, the well-known, old-time telegrapher of Minneapolis, Minn., formerly, and for many years a prominent citizen of Omaha, Neb., has been elected manager and secretary of the Helena, Mont., Commercial Club.

Mr. A. B. Banker, an old-time New York telegrapher but for the past fifteen years identified with the Paul Smith Hotel property at Paul Smith's, N. Y., was a recent New York visitor and made his visit the occasion to call on many of his old time friends.

Mr. David Homer Bates will deliver a lecture on "Lincoln in the Telegraph Office," at Wadleigh High School, One Hundred and Fifteenth St. between Seventh and Eighth Aves., New York, April 16, at 8 p. m. Members of the telegraph and telephone professions and their friends are cordially invited to attend. Admission free.

Mr. A. S. Duncan and Mr. A. Podmore, members of the National Telephone Company's engineering staff, who were transferred to the English Post Office, have been appointed assistant electrician and assistant engineer respectively to the Constantinople Telephone Company, and will shortly proceed to Constantinople to take up their duties.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Jesse Hargrave, division superintendent of the Southern Division of this company, with headquarters at Atlanta, Ga., was in Buffalo, N. Y., on March 30 where he examined the new and up-to-date equipment of that office. He was accompanied by Mr. J. P. O'Donohue, division electrical engineer, New York.

Mr. F. W. Conger, division superintendent of the Mackay Telegraph-Cable Company, with headquarters at Dallas, Tex., who has been in New York for the past two weeks on business connected with the service, returned to Dallas, April 5.

Postal Charges Against Telephone Companies.

The New York Telephone Company has investigated the charges made by the Postal Telegraph-Cable Company that the Bell Companies in various parts of the United States are diverting the business intended for the Postal Company to Western Union offices. The Postal Company charges that when its patrons call upon the telephone and ask for the Postal Company for the purpose of telephoning telegrams they are often connected with Western Union offices instead, and many instances are cited as proof that the practice is general.

The New York Telephone Company states that it has instructions posted in its Cortlandt Street Exchange regarding this matter. When the call is merely the one word "Telegram," the order is to give the call to the Western Union. But if a call comes in "Telegram, Postal," then the connection is made with the Postal line.

If in any case it is not done, the company asserts, it is an operating error which may be the fault of the user of the telephone, who might say "Telegram" in a clear voice and "Postal" in an indistinct voice. But where the request is for the Postal, it is stated, the connection always will be made.

Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company, New York, issued a statement in which he says:

"The telephone company says the reason why the Postal's business has been diverted to the Western Union is because the telephone operator made a mistake. I should like to ask how does it happen that the same mistake is being made all over the United States of late? Telegrams have been handled by telephone all these years and the Postal Company has impartially received its share until very recently; all of which bears evidence of an intent and not a mistake. Is it reasonable to suppose that the telephone girls would divert our business in such country-wide fashion unless they had been encouraged to do so? The trouble is with the new policy of the telephone company and not with the telephone girls.

"Then the telephone company says that the Western Union has advertised that its messages will be received by telephone. So has our company advertised, but the people who read our advertisements and who attempt to send messages by the Postal lines are given the Western Union office instead of the Postal office.

"The whole argument of the telephone company in its answer is too flimsy to convince any one.

"I have issued instructions to our thirty-six superintendents throughout the United States," Mr. Nally said, in conclusion, "to make complaint to the Public Service Commissions in their respective states where these things continue to occur, and we shall see whether this discrimination can be carried on indefinitely."

Magnetic Club Spring Dinner.—Arrangements have been completed for the spring dinner of the Magnetic Club, which will be held at Mouquin's, on Fulton Street, New York, on April 24. The guest of honor will be Hon. William A. Prendergast, Comptroller of the City of New York, who will address the Club. The location of the meeting place is central and a large attendance is expected. Mr. W. B. Dunn, 253 Broadway, New York, is the secretary of the Club.

W. S. Hallett, Superintendent of Supplies, Postal Telegraph-Cable Company, New York.

Mr. W. S. Hallett, acting superintendent of supplies of the Postal Telegraph-Cable Company, New York, was recently appointed superintendent of supplies for the same company. For several years he was connected with a firm of provision brokers, and, after the firm wound up its affairs,

W. S. HALLETT,
Superintendent Supplies Postal Telegraph-Cable Co., New York.

he entered the employ of the Postal Company, in October, 1895, in the supply department where he has since continuously remained. He has filled the positions of clerk, storekeeper and chief clerk, and was appointed acting superintendent of supplies on the death of W. D. Francis in August, 1911.

Mr. Hallett was born in Provincetown, Mass., December 20, 1868. His long and varied experience in the supply department of the Postal Company eminently fits him to assume the added responsibilities placed upon him.

Miss Nally Sponsor for the "Jouett."—Miss Marylee Nally, daughter of Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company, New York, has been selected by the Navy Department to act as sponsor for the U. S. S. *Jouett*, at Bath, Me., on April 15. Mr. Nally, together with his entire family, was present at the launching. Miss Marylee was the favorite of the late Admiral and is related to him, her grandfather and Admiral Jouett being sisters' children.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr G. M. Yorke, engineer of this company, New York, was in Detroit recently on business connected with the service.

Mr. W. N. Fashbaugh, traffic engineer, together with Mr. S. B. Haig, general supervisor of traffic, New York, have returned from Denver, Col., where they took part in the general conference of western officials of the company.

Mr. H. C. Worthen, general superintendent, Atlanta, Ga., announces that the position of division commercial superintendent of the Southern Division has been discontinued. Mr. J. M. Stephens, who formerly filled that position, has been appointed assistant general superintendent of the Southern Division with headquarters at Atlanta.

A conference of district commercial superintendents was held in New York, April 6. Among those present were C. F. Ames, Boston, Mass.; A. C. Terry, Pittsburgh, Pa.; J. W. Reid, Philadelphia, Pa.; J. F. Nathan, and W. A. Sawyer, New York.

Mr. Shirley M. English, president and general manager of the Postal Telegraph-Cable Company of Texas, Dallas, Tex., was a recent New York business visitor.

Mr. H. W. Drake of the office of the engineer of equipment, New York, is in Chicago on company business.

L. J. Maxwell, district superintendent, Jacksonville, Fla., has been appointed a member of the executive committee by President W. S. Jordan, of the Old Time Telegraphers' and Historical Association.

Mr. W. F. Orr, district commercial manager for western Massachusetts and Vermont, Boston, Mass., has been appointed acting manager of the Boston office, vice O. A. Conner, resigned.

Mr. J. E. Rowe, chief operator of the Nashville, Tenn., office, has been promoted to a position in the general traffic department of the company, with headquarters at Atlanta, Ga. Mr. T. B. Adams has been appointed to succeed him as chief operator at Nashville. Mr. Adams has been identified with the Nashville office for over twenty years beginning his telegraph career as a messenger.

Mr. F. R. Veale, chief operator at Richmond, Va., was a recent executive office visitor in connection with the cable service.

A three days' conference of traffic representatives was held at the Albany Hotel, Denver, Col., beginning March 20. The meeting was presided over by Mr. W. N. Fashbaugh, traffic engineer, assisted by Mr. S. B. Haig, assistant traffic engineer, New York, Mr. J. C. Nelson, general superintendent, and Mr. B. L. Brooks, division traffic superintendents, Denver, Col. The following were in attendance: Messrs. W. J. Lloyd, division traffic superintendent, J. J. Welch, district traffic superintendent, M. J. Duggan, overland division chief, and C. H. Finley, chief operator, Chicago; R. W. Kean, district traffic superintendent, Minneapolis, Minn.; W. H. Strong, chief operator, St. Paul, Minn.; W. J. Armstrong, district traffic superintendent, St. Louis, Mo.; H. C. Chace, division traffic superintendent, H. J. Jeffs, district traffic superintendent, and H. S. Converse, chief operator, San Francisco, Cal.; G. D. Hood, district traffic superintendent, Seattle, Wash.; R. H. Miller, district traffic superintendent, Los Angeles, Cal.; J. C. Smith, division Commercial and traffic superintendent, W. P. Davis, district commercial superintendent, and W. S. Strawbridge, chief operator, Dallas, Tex.; H. Vandevender, district commercial superintendent, New Orleans, La.; J. W. Brooks, district commercial superintendent, Oklahoma City, Okla.; E. C. Labadie, district traffic superintendent, and L. P. Grover, chief operator, Salt Lake City, Utah; E. S. Peterson, chief operator, Helena, Mont.; J. P. Barnhart, district traffic superintendent, C. B. Horton, district commercial superintendent, and J. W. Dudley, chief operator, Omaha, Neb., and W. G. Bennett, chief operator, Wichita, Kan.

Mr. C. F. Ames, district commercial superintendent of the Western Union Telegraph Company, Boston, Mass., made an address March 22 before the Bangor Chamber of Commerce, Bangor, Me., on the evolution of the telegraph. Mr. Ames' address was historical in character, and touched upon the methods employed by man, to signal between distant points, from the earliest times to the present. Modern telegraph methods were fully described and the lecture made a deep impression upon the audience. It was effectively illustrated by lantern slides. Mr. Ames addressed the Lewiston, Me., Board of Trade on the same subject on March 28.

Cities Have Right to Regulate Stringing of Wires.—In the action brought by the Western Union Telegraph Company against the city of Richmond, Va., a decision was handed down by the Supreme Court of the United States upholding the right of cities to regulate the stringing of telegraph wires.

Importance of Engineering Societies.

Mr. W. E. Athearn, engineer of equipment, Western Union Telegraph Company, New York, on March 28 delivered an address before the New England Telephone and Telegraph Society, Boston, on the utility and importance to employes of engineering societies, and their relations to the present and future needs of handling business. He encouraged all those present to make suggestions to their superior officials in matters where they thought the service could be improved; the companies, he said, want suggestions.

There was a large and attentive audience and a full discussion followed Mr. Athearn's address.

The Cable.

Dinner to Mr. Sherry.—On March 30 the New York staff of the French Cable Company gave a dinner to Mr. Frank J. Sherry, auditor, to celebrate the twenty-fifth anniversary of his service with the company.

Report of Central and South American Telegraph Company.—The report of the Central and South American Telegraph Company for the year ending December 31, 1911, shows that the gross business was $1,646,931, as compared with $1,755,166 during the year 1910. Expenses amounted to $698,226, compared with $700,224 in 1910, leaving a net amount of $948,705. Out of this, dividends of $574,260 were paid which left $374,445 surplus, as against $480,682 for 1910. The total surplus of the company at present on hand is $2,607,919.

The Mexican Telegraph Company reports for the year ending December 31, 1911, gross earnings of $946,907, as compared with $939,109 for 1910. Expenses, taxes, repairs, etc., were $192,207, and $45,500 were paid to the Mexican government. After deducting dividends of $358,940 there is a net surplus of $350,259, which, as against $361,941 for 1910, combined with the surplus of preceding years, gives a total of $2,935,376.

Proposed Rehearing of Dick Patent Case.—Attorney-General Wickersham has made application to the Supreme Court on the part of the United States government for leave to intervene and for a rehearing of the Dick patent case, which recently was the subject of a decision by that court of far-reaching effect on inventors and manufacturers in general. In support of its application, the government states that the Dick case is not limited in its significance and consequences to the parties of record, but is of the gravest import to the people of the United States and concerns the government in a number of cases, civil and criminal, now pending, for the enforcement of the anti-trust laws.

The Telephone.

Mr. Union N. Bethell, president of the New York Telephone Company and vice-president of the American Telephone & Telegraph Company has been elected a director of the Western Electric Company to succeed Mr. F. R. Wells.

Mr. Bancroft Gherardi, engineer of plant, American Telephone & Telegraph Company, New York, on March 19 addressed the Telephone Society of New York on the subject of "Telephone Transmission."

Mr. Charles F. Mason, formerly of the Postal Telegraph-Cable Company, New York, has been appointed division commercial superintendent of the Pacific Telephone & Telegraph Company with headquarters at Los Angeles, Cal.

Mr. Charles Kinyon, repeater operator of the American Telephone & Telegraph Company, at Oklahoma City, Okla., has been advanced to the position of test board man at Joplin, Mo.

Mr. J. W. Wilson, district general commercial superintendent of the Pioneer Telephone & Telegraph Company at Arkansas City, Kan., died on March 30. Mr. Wilson entered the service in 1885 and through his knowledge of the requirements of the business obtained by diligent study he occupied at various times many of the most important positions in the service of the company. He was a member of the Telephone Pioneers of America.

New Telephone Exchanges in London.—Three new telephone exchanges are in course of construction in London for the relief of exchanges which are heavily loaded.

Independent Telephone Company's Interest Default.—The Interstate Independent Telephone & Telegraph Company, of Chicago, has defaulted on the semi-annual interest due on its $2,200,000 first mortgage 5-per-cent. bonds.

New York to Dallas by Telephone. — Telephone conversation was held recently between New York and Dallas, Tex. The test was made over two routes, one circuit going by the way of Chicago and the other via Philadelphia and St. Louis. The Chicago circuit was 2,500 miles long, but gave better results than that over the St. Louis route, which measured 2,000 miles.

Chinese Telephone Operators.—The San Francisco Chinese telephone office has, at present, 1,284 subscribers. The young ladies who operate the switchboard are Chinese, but speak English fluently, as on calls outside of the Chinese exchange they are required to pass the number in English.

Emergency Telephone List.—The Cumberland Telephone & Telegraph Company, New Orleans, La., uses the first inside page of its directory for an emergency list, containing the telephone numbers of hospitals, the various police precincts and police and fire headquarters.

Dr. A. G. Bell an Editor.—Dr. Alexander Graham Bell has assumed the editorship of the *Volta Review* at Washington, D. C. This paper has been published for thirteen years by the American Association to Promote the Teaching of Speech to the Deaf, an organization founded by Dr. Bell. A new department dealing with scientific problems will be a feature of the paper under Dr. Bell's direction.

Government Telephony in Japan.—Government ownership of telephones in Japan cannot be cited as an instance of efficient and speedy service. The average lapse of time between the signing of the contract for service and the actual installation of the instrument is, it is stated, about three years. This situation has created a new profession, that of the telephone broker, who purchases the prior right of installation from one person and sells it to another who is in more urgent need of the service.

Switchboard for Deaf Mutes.—A telephone for the deaf and dumb was recently exhibited by William E. Shaw, of Lynn, Mass. It comprises an electrical keyboard, differing slightly in appearance from that used on a standard typewriter. This is connected with a signal board on which are thirty-six incandescent lamps, the bulb end of each of twenty-four globes bearing a letter of the alphabet, while twelve of the bulbs bear the numerals. With two or more outfits in place and connected together, should one mute wish to call up another he presses a key, which lights a lamp on the signal board. Upon receiving a return signal, he begins to talk by pressing the various levers on his keyboard. The instrument was invented by Mr. Shaw and his wife, both of whom are deaf mutes.

The Telephone the Cause of High Cost of Living. — The high cost of living and the causes thereof form subjects for endless speculation, and the causes assigned are as numerous as are individual ideas on the subject. A dealer in dairy products recently testified before the Food Investigating Committee in New York, that the telephone was to blame for the high prices of foodstuffs. He said that the department store custom of educating customers not to carry their purchases home and to a great extent to have their orders transmitted by telephone has become so general that consumers have extended this method of shopping to include marketing. So many small orders are received by telephone, he said, that the cost of delivering them exceeds the profit of their sale. As a consequence prices go up. Other retail dealers accused the telephone also, and said that a customer finds use of the telephone so convenient that it is seldom a full order is contained in one message. This means it was said, that two and more deliveries to the same houses, instead of one, must be made.

Telephone Pioneers of America.

Mr. Theo. N. Vail, president of the Telephone Pioneers of America, New York, was, on March 26, presented with a handsomely framed group-portrait of the Telephone Pioneers taken on the occasion of the organization meeting in Boston, November 3, 1911. On the frame is a silver plate suitably inscribed. The souvenir was presented by Secretary Henry W. Pope, on behalf of the executive committee and in acknowledging its receipt President Vail thanked the committee for it and stated that he would treasure it very much.

The Transmission of News.

In an address before a recent meeting of the New York Telephone Society, Mr. S. M. Williams, manager of press service, Western Union Telegraph Company, New York, gave some interesting facts regarding the early and modern methods of transmitting news. The first recorded transmission of news, he said was in 1084 B. C., about 3,000 years ago.

Coming down to the time of the invention of the telegraph by Prof. Morse, Mr. Williams pointed out how quickly the telegraph was availed of for the transmission of important news, after the first line was opened to the public.

"Every school history," he said, "tells about the first dispatch transmitted over the Morse electric telegraph—that on May 27, 1844. There was sent over the line between Washington and Baltimore these words: 'What hath God wrought?' But the first news dispatch is less well known.

"Morse, with the aid of a $30,000 appropriation by Congress, had built a telegraph line between those two cities. Just as the work was completed, the Democratic National Convention met in Baltimore. On May 29, 1844, two days after the What-hath-God-wrought message, the convention on the eighth ballot nominated James K. Polk for president. Alfred Vail had made all arrangements for a spectacular demonstration in connection with the convention. Nowadays the newspapers would class it as a press agent stunt.

"There were no wires run into the convention hall, but a hustling messenger plan was fixed up, so that the moment it was apparent that Polk had the necessary votes, a message was telegraphed to Washington, where the wire terminated in the capitol and the news was announced on the floor of Congress. Then there went back over the wire this message:

"'The Democratic members of Congress to their Democratic brethren in convention assembled send greetings. Three cheers for James K. Polk.'

"This was read out in the convention before the cheering for the winner had died down or the announcement of the result officially made by the presiding officer."

Referring to the National Convention to be held in Baltimore in June, he said:

"The wire traffic loads from Baltimore during this convention will be particularly heavy, because of the proximity of a number of the largest cities of the country. Newspapers in New York, Philadelphia and Washington will treat it almost as a local event and, if the proceedings are at all interesting, will give more columns of space to it than to conventions at more distant points. The very low toll rates, both for telegraph and telephone, from Baltimore to these three cities will induce a liberal use of the wires for dispatches and conversation. In this service the new underground cable from New York to Washington, now just completed, will play an important part."

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. The review of Maver and Davis' book, "The Quadruplex," was completed in our issue for February 16, and the next book to be taken up and treated in like manner is "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

GALVANOMETERS (Continued)

What type of galvanometer is the D'Arsonval instrument?

How are the coil and mirror of the D'Arsonval galvanometer suspended?

What is the advantage of this particular form of construction?

What is the relation of the deflections to the current?

What is the character of the moving system of this galvanometer?

What is the ballistic type of galvanometer adapted for?

State the difference between a dead beat and a ballistic galvanometer.

What are the principal features of the wall galvanometer?

What is the sensibility of the wall instrument shown in Fig. 12?

Are the D'Arsonval galvanometers affected by external magnetic fields?

State the reasons why.

How are the oscillations of a galvanometer mirror read?

RHEOSTATS.

What is a rheostat?

What special properties are requisite in the wire used in rheostats?

How are the rheostat coils wound, and why are they so wound?

How does the current flow around rheostat coils?

Why should the binding posts of rheostats be made large?

What means are employed to vary the resistances of rheostats?

What is the principal disadvantage of the plug switch?

In selecting metals for resistance wires what properties should they possess.

In the manufacture of high resistance wires is any standard alloy preferred?

Name some of the resistance wires in common use.

What alloys seem to be generally preferred by instrument makers?

Telephone Pioneers of America.

J. N. KELLER

Mr. Jasper Newton Keller, president of the New England Telephone & Telegraph Company, Boston, Mass., is one of the best known of the Telephone Pioneers, and has achieved a wide reputation as an able and progressive executive officer in the telephone field. The New England company under Mr. Keller's administration has been highly successful and serves a large and important area of the country in the most approved manner.

Like many other successful telephone managers, Mr. Keller was graduated from the telegraph ranks, where are found those essential elements that combine to make the successful business man. Mr. Keller is a native of Iowa, being born in Burlington on January 22, 1846. His first experience in telegraphy was in Mansfield, Ohio, entering the service about the year 1862. After varied experiences in the west he became general agent of the Union Pacific Railroad at Ogden, Utah, where he was one of the founders of the Ogden Telephone Company. He next went to Texas and Arkansas where he filled the positions of general superintendent, general manager and vice-president of the Southwestern Telegraph & Telephone Company, which he built. About 1884 he moved to New England where he now occupies the position of president of the

JASPER N. KELLER,
President New England Telephone and Telegraph Company, Boston, Mass. (1879).

New England Telephone & Telegraph Company, with headquarters at Boston. It is of interest to note that Mr. Keller has a son who is also a Telephone Pioneer—Mr. C. T. Keller, general commercial superintendent of the New England Company, Boston.

C. R. TRUEX.

Mr. Charles R. Truex, special agent of the commercial department of the American Telephone and Telegraph Company, New York, is well-known to telephone men, both pioneers and

CHARLES R. TRUEX,
Special Agent, American Telephone and Telegraph Company, New York (1879).

moderns, through his long association with the telephone service, and especially through his activities in connection with the organization of the Telephone Pioneers of America. He, with Mr. Henry W. Pope, secretary of the Association, and Mr. Thomas B. Doolittle, conceived and carried out the idea of organizing an association of telephone pioneers, and the fruition of their thought and labors was realized on November 2, 1911, when the organization of the Telephone Pioneers of America was effected in Boston.

Mr. Truex was born in New York City, September 3, 1845. On October 1, 1879, agreeable to an arrangement with Mr. Theo. N. Vail, general manager of the National Bell Telephone Company, Mr. Truex engaged with that company to exploit and establish the telephone exchange business in different sections of the country, and as a special agent of the National Bell Telephone Company started the telephone exchange business at various places in Connecticut, Pennsylvania and the west and reorganized and stimulated many others.

Following the consolidation of exchanges which were merged into companies operating large territories he represented the American Bell Telephone Company on the executive committee and board of directors of the Philadelphia Bell Telephone Company, the Central District and Printing Telegraph Company, the Pennsylvania Telephone Company, the Central Pennsylvania and Supply Company, the New York and Pennsylvania Telephone Company, and others.

January 1, 1893, he was appointed general contract agent of the American Telephone and Telegraph Company and remained in charge of that department until 1908 when the department was abolished, after which he became attached as a special agent of the commercial department, New York, of which Mr. Henry Stanford Brooks is the commercial superintendent.

The Turner Monument Dedication.

The monument now being erected at Harriman, formerly Turner, N. Y., to commemorate the sending of the first train order by telegraph, will be dedicated on May 2, under the direction of the chairman of the committee, Mr. E. P. Griffith. Following is the order of exercises: Opening prayer by the Rev. J. Holmes McGuinness, rector of the Episcopal Church at Arden, N. Y.; singing of "America"; address by Mr. H. D. Estabrook. Mr. David Homer Bates will present the monument to the Erie Railroad Company, and then the monument will be unveiled by Miss Gertrude M. Griffith, daughter of Mr. E. P. Griffith. President F. D. Underwood, of the Erie Railroad, or his representative, will accept the monument for the railroad company, after which the Ode to Morse, by Mr. Marion H. Kerner, of New York, will be sung. The exercises will then be closed by the Rev. J. Holmes McGuinness.

Mr. Andrew Carnegie has been invited to be present at the unveiling, and if it is possible for him to attend he will do so. His private secretary, Mr. Jas. Bertram, says, in a letter to Mr. David Homer Bates: "Mr. Carnegie's movements are so uncertain he cannot positively accept, but he is anxious to be present and will attend if practicable."

Mrs. E. H. Harriman, of Arden, N. Y., in a letter to Mr. E. P. Griffith, accepts for herself and family the invitation to be present at the dedication.

The bronze tablet for the monument which was on exhibition in the office of TELEGRAPH AND TELEPHONE AGE was viewed by several hundred persons and much admired. It has been shipped to Harriman and has been affixed to the monument.

All railroad, telegraph or telephone employes and dependent members of their families entitled to transportation, can obtain the same over the Erie Railroad to attend the dedication ceremonies by making application in the usual way.

Messrs. E. P. Griffith, D. H. Bates, Chas. Keck, and J. B. Taltavall, visited Harriman, April 10, and witnessed the attachment of the bronze tablet to the granite monument. The monument is now ready for the dedication ceremonies. It occupies a commanding position near the station and will attract the attention of passengers on passing trains. A more satisfactory site could not have been found, and the committee is highly pleased with the selection.

The Reid Memorial.

The James D. Reid Memorial Committee, New York, has prepared a pamphlet for general distribution giving brief accounts of Mr. Reid's relations to the telegraph, a sketch of his life and a history of the movement to erect a suitable memorial to commemorate his life and telegraph work. The frontispiece consists of an excellent autographed portrait of Mr. Reid. Subscriptions toward the memorial fund are solicited.

The officers of the Memorial are: Charles P. Bruch, president; Col. A. B. Chandler, treasurer, and W. B. Dunn, secretary.

The executive committee consists of David Homer Bates, William J. Dealy, James R. Beard, Lewis B. Foley and Robert J. Marrin.

The following gentlemen compose the board of trustees David Homer Bates, James R. Beard, Thomas M. Brennan, Charles P. Bruch, Albert B. Chandler, William J. Dealy, Louis Dresdner, William B. Dunn, Lewis B. Foley, Edward P. Griffith, William Holmes, Edwin F. Howell, Walter C. Humstone, Gardner Irving, Robert J. Marrin, Michael J. O'Leary, Franklin J. Scherrer, Frederick G. Sherman, Charles A. Tinker and John B. Taltavall, New York, and George H. Usher and William C. Daviet, Atlanta, Ga.

Mr. Reid's fatherly interest in his employes when he was telegraph superintendent at different places in the early days of the telegraph is well known. When he made business visits to the various offices under his jurisdiction he always made it his duty to shake hands with the messengers and give them some words of encouragement and fatherly advice, urging them to make themselves useful and remain in the service permanently. Many telegraph officials of today state that it was largely by reason of this early advice that the operators of forty or fifty years ago were men of unusual intelligence and ability.

Invention of the Telegraph.—In a paper read recently before the Philadelphia Academy of Natural Sciences, by Mr. W. J. Holland, director of the Carnegie Museum at Pittsburgh, Pa., Dr. David Alter, of Freeport, Pa., was credited as having preceded Prof. Morse in the invention of the telegraph. Dr. Alter, said the speaker, was a physician of inquiring and ingenious mind, and invented a crude system of telegraphy independently of Morse's. Dr. Alter was most emphatic. the speaker said, "in disclaiming any credit for the introduction of the telegraphic apparatus which the genius of Morse involved."

Get-Rich-Quick Losses. — Postmaster-general Hitchcock estimates that the American public has, within the last year, been swindled out of $100,000,000 by get-rich-quick schemers, who make illegitimate use of the mail to carry on their work. He states that about $6,000,000 was obtained by the promoters of the United Wireless Telegraph Company before the post office inspectors became aware of their operations.

A New Morse Telegraph System.

J. W. LARISH, NEW YORK.

Mr. Patrick B. Delany, the well-known inventor, has devised and brought to perfection a new system of Morse telegraphy, possessing greater efficiency than the present methods. It requires one-third less labor in the manipulation of signals; it has greater "reaching" quality due to the character of the impulses, and what has long been desired in simple Morse operation, it possesses complete secrecy.

The apparatus consists of the ordinary instruments of the telegraph, and the operation is by means of the usual auto-dot or vibroplex transmitters.

The employment of polar relays makes the system practically self-adjusting, and as all the characters of the Morse code, except the letter "e", or single dots in combination with dashes, while being rendered in the usual form of dots and dashes at the sending and receiving points, really pass over the wire as dashes only, which necessarily gives them better carrying qualities over direct lines and through repeaters. The system can be operated singly or duplex, and repeatered.

While the aim of the inventor was to evolve a secret method of simple Morse operation, he discovered that he could not only do this without sacrifice in efficiency of the old methods, but that it was practicable to exceed the possibilities of the present Morse to a large degree. Actual demonstration has repeatedly shown this.

In Fig. 1, K is a transmitting key of the usual auto-dot type, each arm of which is connected with main batteries of opposite polarity. The "dash" and "dot" polar relays are joined oppositely. When the dash lever of K is moved over against L the dash relay responds to operate the

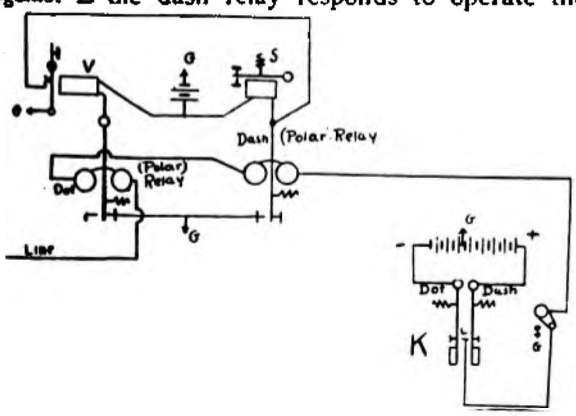


FIG. 1.—DIAGRAM OF SECRET TELEGRAPH SYSTEM.

sounder S (the dot relay remaining quiet) in accordance with the duration of the key contact at L. When the dot lever of K is connected to L the dot relay responds releasing vibrator V which then automatically makes and breaks the sounder circuit, for dots, in the usual auto-dot or vibroplex fashion (the dash relay remaining quiet), the number of dots depending upon the duration of the dot lever contact with L at K.

In both cases, with either dots or dashes, a constant current passes to line varying in duration, in the case of the dots, according to the number of impulses in the letter, and with the usual interval in the dashes. For example, the word "shipping" would pass over the main line as shown in Fig. 2, but be resolved at the receiving points, into the usual Morse characters, as shown also in Fig. 2.

A modified arrangement requires but one relay for both dots and dashes, but the sketch shown here is of simple form for description.

With a simple 3-point switch at each station, the "secret" transmission may be changed to the

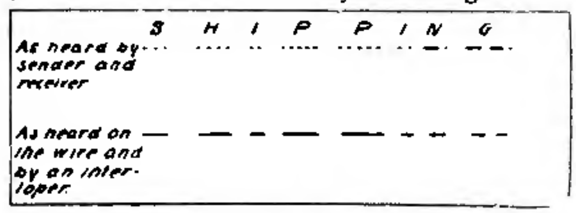


FIG. 2.—DIAGRAM SHOWING HOW MORSE CHARACTERS ARE TRANSFORMED.

usual Morse, so that two or more offices can quickly change from one to the other without considering the intermediate or other disinterested stations.

An analysis of the Morse alphabet from A to Z, shows that the total impulses are:—

	Present Method	New Method
Letters	77	52
Numerals	41	25
	118	77

which means practically one-third less movement of the hand by the Delany method.

Other features of advantage are:—

1.—The dots being made mechanically and locally are not subject to the erratic characteristics, or personal equation of the operator, nor can they be affected by the extraneous influences on the wire, such as inductive disturbances, etc., which are much more likely to attack dots than to distort the dashes, in which form they are transmitted.

2.—The fewer and longer impulses are advantageous in repeatering, and also cause less inductive interference with adjacent wires.

4.—Simplification and increased efficiency are the chief advantages of this system. Usually one of these advantages suffers more or less when it is desired to emphasize the other, but in this instance there is gain in both.

The value of secrecy in the telegraph is, of course, obvious. It is desirable in government matters; in newspaper work and for private lines, and when it can be obtained in so simple a way, there can be no question that this system will find a useful field of application.

Mechanical Stress in Lines.—The engineering experiment station of the University of Illinois, Urbana, Ill., has issued Bulletin No. 54, on the subject of "Mechanical Stresses in Transmission Lines," by A. Guell. It is a mathematical discussion of the subject.

The Majorana System of Radio-Telephony.

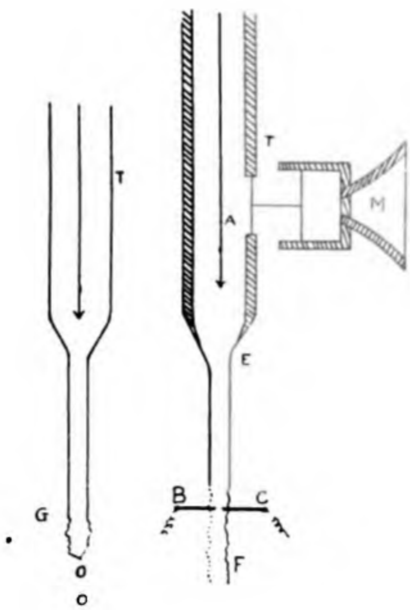
BY SAMUEL WEIN, NEW YORK.

One of the most successful systems of radio-telephony is that of Prof. Quintana Majorana, the director of the Telegraphic Institute of Rome, Italy. With his system he has been enabled to carry on a conversation between Rome and Messina, a distance of 312 miles.

The method of producing the required undamped oscillations is identical with that of the Poulsen system.

The essential features of the transmitting station consist of a peculiar method of superimposing the radiated undamped oscillations. It consists of a "liquid or hydraulic microphone," shown in Figs. 1 and 2.

At T is a tube in which there is water or another liquid flowing in the direction of the arrow. As



FIGS. 1 AND 2.—HYDRAULIC MICROPHONE.

the bottom of the tube is contracted so as to give a small opening at this point the water will come out of the bottom of the tube in a somewhat fine stream. Such a stream continues in regular smooth form for some distance below the tube, and then at G it begins to break up and falls in drops. It is found that when we give a shock or other disturbance to the main tube, this favors the breaking up of the water stream to form drops, and the shocks, especially if they are sudden and frequent, act so as to shorten the distance of the breaking point G from the tube end. The tube is also sensitive to sound vibrations, so that when a sound is made in the tube there is an action on the water stream which depends on the nature of the sound. Prof. Majorana was thus able to make the water column sensitive to the sounds of the human voice, but it was only after a considerable amount of experimenting that he succeeded in using such a device as a microphone transmitter. This he carries out in the arrangement shown in Fig. 2, his design being to make the voice act directly on the water inside the tube so as to change the pressure, and this very near the lower opening of the tube. To do this, he makes the tube of a strong and solid material, except at one part, A, where he makes an opening and places across it a thin and elastic partition. This is connected by a cross rod with a diaphragm of the usual kind belonging to the transmitter mouthpiece M. Speaking into the mouthpiece or making any kind of sound will cause the diaphragm to vibrate, and this movement is transmitted to the liquid within the tube and has an action on the stream of water. In the usual condi-

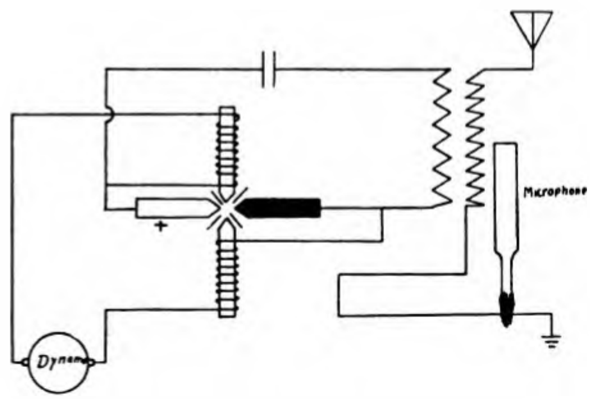


FIG. 3.—TRANSMITTING APPARATUS.

tion of the stream, when there is no sound made, there is a straight and unbroken water column from E to F, as the drops commence to form below F. However, when we make a sound of a given rate, such as a musical note, in the microphone, the water column is found to contract in a certain way, as seen in the dotted lines, and the contractions increase as we come to the lower part of the columns near F. The drops commence to form higher up in this case.

A pair of fine wires B C are inserted in the column near the lower part where the contractions are the strongest, and they are connected across

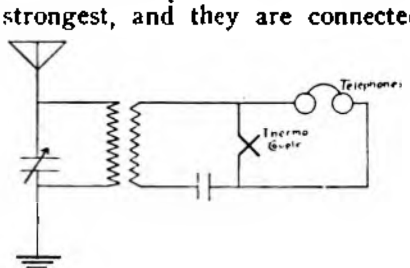


FIG. 4.—RECEIVING APPARATUS.

by the liquid. A current passing in the wires will thus depend upon the shape of the water column at this point, as when the stream is narrow, we will have a higher electrical resistance between the points than when the stream is expanded from the effect of the vibrations, as in the dotted lines. On the other hand, this action of the water is variable and depends on the kind of sound given in the microphone, so that the electrical resistance between the points depends on the sound in the transmitter.

A higher current than usual can be employed in this case, seeing that the part of the liquid which carries the current is always renewed, so that it does not heat to any extent. Prof. Majorana is also able to regulate the conductibility of the stream by changing the nature of the liquid (acidulated or salted water, mercury, etc.), and also the diameter of the stream, and he can, furthermore, adjust the distances between the metal points as well.

The transmitting hook-up is shown in Fig. 3. There is no danger of burning or heating of the microphone.

A thermo electric couple has been used by Prof. Majorana as the detector. The receiving apparatus is shown in Fig. 4.

The writer's thanks are due to Mr. Nathan Levy for the assistance he has rendered in preparing this article.

CONSERVATION TALKS—IV.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLA.

Toll Supervision.

Lost circuit time on toll lines constitutes one of the greatest wastes the telephone company has to contend with and possibly one of the easiest to overcome. There are many complicated and expensive methods now in use to avoid such loss, but few seem to completely meet the requirements. It remains, therefore, for us, as telephone men, to pattern our supervision after telegraph practice, by using the daily log, which has for years been used by telegraph operators on important circuits.

This log of a memorandum sheet or book in which is noted all irregularities occurring during the day. This scheme was tried some years ago at exchanges in Oklahoma but was not as successful as expected due to the fact that it was not properly maintained and the plan did not go far enough. Most toll wire chiefs have been accustomed to using such a daily log to good advantage, but it remained, so far as I know, for the Southeast Missouri Telephone Company's traffic department to elaborate on the daily log and put it into such shape as would insure the best results from a telephone traffic standpoint.

The matter was suggested and adopted at a traffic conference at Sikeston, Mo., when every traffic representative present pledged himself to give it a fair and impartial trial. As a result of this conference and the adoption of this inexpensive supervision, the service was improved 100 per cent. almost immediately. At first the service and circuit logs were full of notes and memoranda, which became less every day. After one month's trial the logs have become almost clear, every operator along the line realizing and knowing that she is watched by every other operator, every chief operator working with and for one another.

The following extracts from instructions issued by the traffic manager explain in detail the working of a scheme which will bear investigation and trial by any company not now getting toll line co-operation.

Three forms are used; one a service log, one a circuit log and the other is used for communicating the notations made, to another exchange when necessary. This may be done over the wire at night or when the lines are not busy. Such communications are also used for reporting irregularities on other company lines to headquarters. The purpose of the circuit log is to keep a record of the working condition of our circuits, noting thereon irregularities of any kind affecting their working efficiency.

The circuit log is started each day at 7 a. m. and states the conditions of each circuit by number when tested. The day closes about 10 p. m. and shows the condition at that hour. If no trouble has been noticed the notation is made: "Clear all day," in addition to the other two entries. When trouble is cleared, the circuit number and time O. K. is noted. Each sheet has space for seven circuits. When a circuit is out of order it should be tested frequently to see if it is cleared.

The service log is for the purpose of recording all happenings of interest during the day affecting the toll line service, such as, 1, When an office does not give a verbal clearance on a tandem circuit; 2, Delays in answering; 3, An office refusing to give filing time; 4, Calculagraph not working well; 5, An office failing to report on calls, etc., etc., remembering to note anything which will tend to improve the toll line service whether it is an error of omission or commission.

A code is used in connection with the log to reduce writing to a minimum and chief operators revise the logs each morning, take such action as is necessary and then file them away for reference.

Mr. J. C. Smith, formerly manager of the Western Union office in Detroit, Mich., and now in other business at Toledo, Ohio, writes:

"I am a subscriber to TELEGRAPH AND TELEPHONE AGE and have been for a number of years. To me it is the most interesting publication I receive. It is full of good things and if the operator who has ambitions to improve his position and make himself of greater value to his employers would not only read your publication, but study the things and subjects it discusses, he would find that his knowledge of the practical telegraph business would grow rapidly and that, in itself, would inspire him to greater efforts. The trouble with a great many telegraph operators of today is that they allow themselves to become part of the mechanical apparatus and then find fault because they are not singled out for promotion instead of those who study the conditions, improve their minds and show themselves fit for larger responsibilities."

Wm. Slingo, Engineer-in-Chief British Postoffice, London.

Mr. William Slingo, the new engineer-in-chief of the British Postoffice, London, England, commenced his business career on the commercial side of the telegraph department of the General Postoffice, at the Central Telegraph Office, in 1870. Mr. Slingo is regarded as one of the pioneers of technical electrical education, for in 1876 he founded the Telegraph School of Science

WM. SLINGO,
Engineer-in-Chief British Postoffice, London.

at the General Postoffice, London, and remained as principal of this school until 1898, when it was closed. He was also head of the electrical section at the People's Palace, which is now known as the East London Technical College. On the close of the postoffice telegraph school Mr. Slingo's services were transferred to the engineering department of the postoffice, where he was employed in the first instance as a first class technical officer. In this capacity he established Hughes duplex working between London and the continent of Europe, and he also developed a system of accumulator working which was applied to a considerable extent to the telegraph offices in the United Kingdom. At the close of 1903, Mr. Slingo was promoted to the position of superintending engineer of the North Wales Engineering District with headquarters at Liverpool, where he acquired considerable practical experience in telegraph and telephone engineering practice. In January of last year, he returned to the General Postoffice, London, to fill the position of assistant engineer-in-chief.

His appointment to the position of engineer-in-chief dates from March 1, succeeding Major W. A. J. O'Meara, who recently resigned on account of ill health. In the first year of his postoffice service the transfer of the telegraphs to the State was accomplished; in 1889 the undertakings of the submarine telegraph companies were absorbed in the postoffice service; in 1896 the trunk long distance telephone services were transferred to the State, and at the dawn of the present year, the local telephone services, hitherto controlled by the National Telephone Company, were transferred to the postoffice.

In view of the transfer of the company's plant and staff to the State, the preparation of the inventory, the valuation of the plant and the forthcoming arbitration proceedings in connection with that valuation, it will be realised that Mr. Slingo has taken up the reins of a great department at a time of considerable public importance. Mr. Slingo's reputation as an author of technical literature is world-wide. Chief among his publications is a book on electrical engineering, the authorship of which he shared with Mr. A. Brooker. Mr. Slingo was born in London and is 56 years of age.

Retirement of Samuel Reese, an Old Timer.

Mr. Samuel Reese, manager at Cleveland, Tenn., has retired on a pension after a service of fifty-two years with the Western Union Telegraph Company, forty-three of which were spent in Cleveland. He entered the telegraph service with the East Tennessee, Virginia and Georgia Railroad and was for five years at London, Tenn.

Mr. Reese was a military telegrapher during the civil war and in 1863, '64 and '65 served in eastern Kentucky and in eastern and middle Tennessee under military superintendents, Captain

SAMUEL REESE,
of Cleveland, Tenn., an Old-Timer Just Retired.

W. L. Gross of Danville, Ky., and Captain J. C. Vanduzer of Nashville, Tenn. During the early part of his military telegraph career he was an operator in the Confederate service and was captured by the Federal troops in Tennessee, and pressed into the Federal telegraph service, remaining loyal to the cause until the end.

Appendicitis is becoming a fashionable ailment among telegraphers, no less than six operations for this disease having reached our knowledge within the past two or three weeks. It is an expensive fashion too.

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April 16, 1912.

Delayed Newspaper Mail.

Much annoyance is caused to subscribers to this journal, as well as all other journals, living at distant points by the delay in the receipt and delivery of their copies by the post office authorities. In his zeal to put the postal service on a profitable basis Postmaster-General Hitchcock has incommoded the reading public by requiring that newspaper mail shall be forwarded to destination by fast freight. What "fast freight" means is a question. Practically, it means that our paper is delayed in its delivery in the middle western states from nine to sixteen days. All trade papers are subject to the same delay, and much dissatisfaction is expressed over the results of the postmaster-general's ruling.

The Western Union Pension Plan.

Large business concerns are more and more realizing the justice and advantage of retiring faithful long-service employes on pension. It is justice to the employes so retired, because it provides them with a competence that will insure them a living during their remaining years of life, and it is advantageous to the employing interests because it enables them to keep younger and more active men in the service.

The Western Union Telegraph Company is the most recent of the large concerns to adopt a pension plan for the benefit of its employes. In justice to the company, however, it should be pointed out that as far as the public knowledge of the matter is concerned, it is new, but practically it is not new because the company has for many years been retiring old employes on pension. In the meantime, it has been perfecting the plan and arranging the details.

The announcement of the institution of the pension scheme was recently made in official form, and that means that the principle alone was stated. Its practical application and operation seem to be interpreted differently according to the individual attempting to interpret the provisions, but, of course, there is only one right way, and that way we have attempted to point out by means of a few examples, as printed on another page in this issue. These will enable any one interested to calculate the pension allowance under any conditions coming within the scope of the plan.

Where so many employes are concerned, as in the case of the Western Union—30,000—the problem of arranging an equitable pension scheme is not an easy one of solution in view of the large territory over which the system extends and the widely diversified occupations of the employes. But the company has dealt fairly in the matter and it hopes that this beginning will extend to further protection of the employes.

The pension budget will, of course, add a large item to the company's expense account, but what it loses in money will be largely offset by the gain in efficiency in the service. This gain will be brought about in two ways; first, by keeping younger and more active men at work, and second, by promoting that peace of mind that comes from the knowledge that they will be provided for in their old age if they are faithful in the performance of their duty toward the company.

We have received several letters expressing gratitude and appreciation on the part of managers and employes of the good feeling of President Vail and his administration toward the faithful old employes of the company, and there is no doubt of the existing sentiment in the minds of the fraternity at large that the pension plan will have a great influence in bringing the officers and employes into more harmonious relations. No one can deny that contented employes constitute the greatest and most valuable asset a company can possess, and now that the telegraph company has given abundant evidence—in the supplying of typewriters and instituting a pension scheme—that it has the welfare of its employes at heart, the employes, on their part, will naturally show their appreciation for these benefits in the form of greater ambition, loyalty and efficiency.

Wireless Treaty Ratified by United States.

The United States Senate, on April 3, ratified the International Radio-Telegraph Conference, signed at Berlin, Germany, in November, 1906. This government will therefore be represented on equal terms with the other signatory powers at the London Conference which is to be held on June 4, and ships flying the American Flag will hereafter be accorded all the rights guaranteed by the conference. The treaty has lain dormant in the pigeon-hole of the Senate Committee on Foreign Relations at Washington since 1906. It was favorably reported to the Sixtieth Congress but the session adjourned without action upon it, and on account of the great importance of the approaching conference in London it was brought before the present congress and finally ratified.

The naval delegation from the United States will consist of Rear-Admiral John R. Edwards, U. S. N., head of the American delegation; Lieutenant-commander David W. Todd, U. S. N., and Dr. Louis W. Austin, Ph. D.

The "All-British" Cable Not Favored.

Postmaster-general of England, Hon. Herbert L. Samuel, stated in the House of Commons on April 2, after referring to the reductions in cable messages between England and America, that he did not wish to regard these reductions as final, but did not see his way to demand further reductions at present.

"Any company," he said, "coming forward to lay a cable, owned by British subjects, between Canada and the United Kingdom, either with a reduced tariff or at the rates in force, would be welcomed by the government, but it is not prepared to grant a subsidy for the formation of such a company."

The postmaster-general further stated that the government was not in favor of a state-owned cable across the Atlantic.

During a debate on April 3, Mr. Samuels stated that in order to improve strategic communication and obtain a prospect of further reduction in press and other rates, he had entered into an arrangement with the Marconi Company for the erection of a chain of wireless stations to connect this country with India, Australia, and New Zealand, at a total expense of $2,500,000.

"This plan," he said, "will place the British Empire far in advance of any country in the world in respect to wireless telegraphy. I believe that this will be of importance from a naval and military point of view, and I anticipate that it will enable rates to be reduced for wireless dispatches sent from England, and from those parts of the empire, while it will not be unremunerative to the governments who are partners in the enterprise."

In dealing with the arguments adduced in favor of a new state-owned Atlantic cable, Mr. Samuels pointed out that there could be no disclosure of strategic secrets under the present system, because the Admiralty telegrams were sent in cipher.

Mr. Samuels adhered to the position he had taken up that a state-owned Atlantic cable could only be run at a loss. It could obtain no constant aid or certain volume of Canadian business because the land lines in Canada belong to groups of companies, which were in close alliance with the cable companies, and would not give facilities to telegrams that passed across the state-owned cable. Nor, he added, could we send across the Atlantic from this side, any large volume of business because the government has a long-standing agreement with the Anglo-American Company, which expired, he believed, about 1928.

The cost of an Atlantic cable would be about $2,500,000, and he was advised that the annual cost of maintenance, including a sinking fund, would be $250,000, and the probable revenue would be about $125,000 a year. There would be a loss, therefore, of 50 per cent. on this cable, and the government saw no reason for incurring what it regarded as a certain loss in order to achieve results, which could be achieved without any risk of loss at all.

An important step had been taken, he said, in obtaining government control of cable rates in connection with the renewal of landing agreements. He did not purpose to put this control into immediate operation in view of the fact that the companies had voluntarily made such large reductions in their rates quite recently, but after some time, in which the effect of those reductions could be observed, the question would come up for consideration whether the rates for code and urgent telegrams should or should not be required to be reduced under the powers now conferred upon the postmaster-general.

In view of the fact that wireless telegraphy was making great progress, he thought, the House would be ill-advised to press upon the government this large capital expenditure with its considerable contingent annual deficit, when reduction of cable rates had already been achieved to a large extent, or could, in the future, be achieved to a still larger degree by other methods which would not involve expense.

New Book.

TELEPHONY. By Samuel G. McMeen and Kempster B. Miller. 948 pages, 671 illustrations. Chicago: American School of Correspondence. Price $4.00.

This latest addition to the literature on the telephone has a decided advantage in being the product of two men whose knowledge of and experience and reputation in telephony are unquestioned. They are both among the most active and leading telephone men of the time, and what they say regarding the art may be accepted as authoritative and up to date.

The book is designed with the care that comes from knowledge and experience, and is a complete exposition of the art of telephony, both in theory and practice. Every drawing used was especially prepared for this work, and each one has the valuable merit of being clear and distinct.

The work has fifty-three chapters, Chapter forty being devoted to telephone train dispatching. A partial list of other subjects treated of in the various chapters includes: History and development, acoustics, lines, transmitters, receivers, primary cells, electromagnets and inductive coils, condensers, selective and non-selective party-line systems, protective means, switchboards, private branch exchanges, intercommunicating systems, traffic; phantom, simplex and composite circuits, lines, cables, poles, etc., underground construction, wiring, testing, etc. From this list an idea may be gained of the scope of the work, and railroad men will be especially interested in the book by reason of the special chapter on telephone train dispatching, which describes in a general way the various systems in use.

Copies can be procured of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, on receipt of price.

Course of Instruction in the Elements of Technical Telegraphy—XIII.

(Copyrighted.)

(Continued from page 214, April 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Fall of Potential.

The idea of potential essentially involves a relative condition of two points, the term being used to denote the difference between the potential, or electrical condition of a body or point, and the potential of the earth, which is assumed to be zero. The potential at any point in a wire therefore represents the excess, or the defect, of its potential above or below that of the earth.

If the positive pole of the battery be to line, the potential at any point along the line will be higher than that of the earth. If the negative pole be to line, the potential at any point will be lower than that of the earth.

In the fifty-mile race, used as an illustration of Force, Resistance and Current, if the track be level, and of uniform smoothness, it is evident that the cyclist's strength will fall gradually from its full height at the start, to zero, at the finish; and,

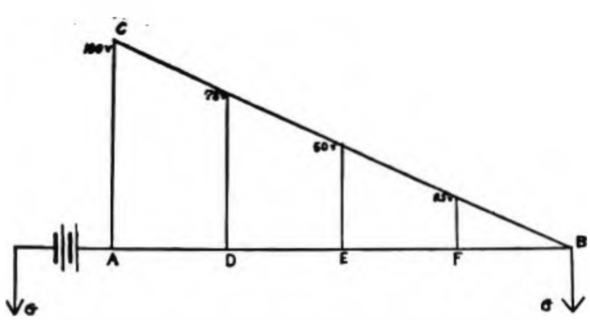


FIG. 1.—DIAGRAM ILLUSTRATING FALL OF POTENTIAL.

since his speed is uniform throughout the race, his loss of strength will be proportional to the distance he has covered. At 25 miles, or half way in the race, his strength has fallen to ½ its original value; at ¾, to ¼ its original value; and so on, until at the tape it has fallen to zero.

Similarly, in a wire of uniform resistance, the fall of potential at any point will indicate the distance between that point and the battery.

This is shown graphically in Fig. 1. Let AB represent a wire of uniform resistance, 50 miles long, and AC the potential at the point A: the slanting line CB will then represent the fall of potential along the line AB. At E the potential has fallen ½, as may be proved by measuring the height of EH as compared with AC. The point E is, therefore, the center of the wire, or 25 miles distant from the battery. At D the potential has fallen ¼; therefore AD is 12.5 miles in length.

Similarly the point F is ¾ of 50 = 37.5 miles from the battery, and the point B, where the potential has fallen to zero, is the end of the line.

If the wire be not of uniform resistance the potential at any point along the wire is proportional to the resistance overcome. If ¼ of the total resistance has been overcome, the original pressure has fallen ¼ at that point; if ½ the total resistance has been overcome, ½ the initial potential has fallen, and so on, until at the end of the line, where all the resistance has been overcome, the pressure is zero.

Example: To find the resistance overcome at a point in a circuit of 5000 ohms where the potential has fallen from 100 to 10 volts.

Solution: The potential being 10 volts there has been a fall of 100 — 10 = 90 volts up to that point. This is $\frac{90}{100} = \frac{9}{10}$ of the whole pressure, therefore $\frac{9}{10}$ of total resistance has been overcome;

$\frac{9}{10}$ of 5000 = 4500 ohms

Now if the total resistance of the circuit and the current strength be known, Ohm's law will give the initial potential, since IR = E, and since the potential falls through the circuit from its initial value to zero, E, in the equation, may be regarded as the fall of potential in the entire circuit.

The same equation IR = E holds good to find the fall of potential between two points, provided R, in the equation, represents the resistance between these two points.

It is better, however, to change the equation to IR = E, as R and E do not now represent the total pressure and total resistance. The application remains the same.

Example: To find the fall of potential in a section of wire having 200 ohms resistance, when a current of .02 ampere is flowing.

Solution: E = IR = 200 × .02 = 4 volts. Ans.

Example: To find the resistance of a section of wire through which the fall of potential is 4 volts, the current being .02 ampere.

$$\text{Solution: } \frac{E}{I} = R = \frac{4}{.02} = 200 \text{ ohms.}$$

Example: To find the current flowing when there is a drop of potential of 4 volts through a section of wire having 200 ohms resistance.

$$\text{Solution: } \frac{E}{R} = I = \frac{4}{200} = .02 \text{ amp.}$$

Example: A local circuit has a sounder of 4 ohms resistance and a battery consisting of 2 gravity cells. What is the fall of potential between the sounder terminals?

Solution: The internal resistance of 2 gravity cells = 4 ohms.

The external resistance = 4 ohms.

Total resistance = 8 ohms.

The current in the circuit $= \frac{E}{R} = \frac{2}{8} = .25$ amp.

The resistance between the sounder terminals is 4 ohms, therefore $E = 4 \times .25 = 1$ volt.

Solution 2: The resistance of the sounder is ½ the total circuit resistance, therefore ½ the initial potential must have fallen through it. ½ of 2 = 1 volt.

(*To be continued.*)

Habit.

BY J. W. MCMAHON, DISTRICT COMMERCIAL MANAGER, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

As we interpret the word, Habit is nothing more than the manner in which we do things: merely a custom, or, in other words, a practical routine, a method. Let a young man at the outset of his career resolve that he will, by all fair means, win a place in the world. Let him neither shrink nor shirk, but make up his mind to pay the full price. "Rest," said an eminent surgeon, "is not what I want, but strength." Moreover, to secure one's right to amusement and recreation one must pay an honest price, which is a good day's work. Life, it has been asserted, begins with renunciation and the "Angel of Martyrdom is brother to the Angel of Victory."

Success depends so largely upon the habits which are formed in early life, that nothing would seem to be more important than to have the strongest possible conviction of this fact impressed upon the mind at the very outset. The great tendency of all of us is to form habits and get into ruts. Fortunately, this tendency has its good side; if it, indeed, be true that

"Ill habits gather by unseen degrees,
As brooks make rivers, rivers run to seas."

Habit forms itself by repeated action. Habits are like the paths beaten hard by the multitude of footsteps which go to and fro. The proclivities which develop and harden into habits are likely to reveal themselves early, and, when properly encouraged, they often result in brilliant achievement. Napoleon's boyish passion for his mimic cannon foreshadowed the terrible execution of his artillery in later years.

We are unconsciously educated by our surroundings, by our associations, and by our habits of thought. The influence of our surroundings is a very potent one. All of us control, to a great extent, our own destiny. Undaunted energy and unflinching determination ever and everywhere make their impression on our lines and bring success.

Habit increases our facility for work. It is the secret of skill in all realms of human endeavor. A habit of classification is of immense value. Let one learn to have "pigeon-holes in the brain" and as facts come under our observation classify them by putting together by themselves those which are related. We easily remember that which interests us. A vivid conception of a subject, whatever it be, is that quality in a man which makes him clear-headed.

We need not fear to undertake the acquisition of any habit which seems desirable; for it can be formed, easier than one may at first suppose. The habit of improving every moment of time, for instance, is invaluable, and the inflexible rule of regularity soon becomes a controlling factor in our lives.

Let us apply a good habit to the telegraph. Rapid communication to-day is the keynote of modern science, and the telegraph is so essential to the world's activities, that it shares more or less in every achievement. What better habit can the telegraph fraternity form than to uplift and praise the economic value of the service and exemplify the habits that tend to secure the respect and admiration we are entitled to. We have every means to form such habits and the power to apply them industriously and thus gain the victory.

Telegraphers of Today.

An excellent opportunity is offered to telegraph people in general to become acquainted with over 600 prominent telegraph officials and others identified with the telegraph, the railroad, the submarine cable and press associations of the past generation, through their portraits and sketches of their careers as published in "Telegraphers of Today."

This work was issued in 1894 and includes biographical sketches of all the individuals connected with the interests mentioned at that period, many of whom have passed away from their earthly labors. The younger generation, however, will find much of interest in looking upon their portraits and reading of their achievements in life. Many of them are still alive and in harness in the telegraph and other fields of activity.

Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York, who recently received a copy, expresses his appreciation of the work as follows: "Copy of 'Telegraphers of Today' received. I casually saw a copy of the book when first published, but never had I an idea that it was so beautiful, interesting and historically accurate. It should be of great interest to telegraphers with any sentiment in their makeup. It is magnificent, unique, and I truly pity those of the fraternity who fail to secure a copy before the edition is exhausted."

This book, which is 11½ x 14 inches in size, was originally published at $5 per copy, but in order to close out the remaining copies we offer them at $1 per copy by express, charges collect.

Send orders to TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Mr. F. E. Howell, manager of the Western Union Telegraph Company at Utica, N. Y., writes: "Here is $2.00 to make me good for another year. Wish to thank you for continuing my subscription. If your readers keep up with the AGE, they are all top notchers."

Western Union Pension Plan.

President Theo. N. Vail, of the Western Union Telegraph Company, on March 28, announced the institution of a pension scheme for the benefit of the 30,000 employes of the company. The plan in detail, showing allowances, is as follows:

After twenty years of service and up to and including the twenty-fifth year of such service one per cent. of the average salary for the ten years immediately preceding retirement, multiplied by the total years of service.

After twenty-five years of service and up to and including the thirty-fifth year of such service one and one-half per cent. additional for each additional year.

After thirty-five years of service and up to and including the fortieth year of such service two per cent. additional for each additional year.

After forty years of service fifty per cent.

The minimum pension allowance to be $25.00 per month except when otherwise directed.

No pension under this plan to exceed $100.00 per month.

In making the announcement, President Vail said: "A pension committee has been compiling statistics and analyzing existing pension plans for many months, and while the plan which we are inaugurating does not go as far as we would like to have it, still it is a beginning, and we believe will materially assist in caring for those employes, qualified through length of service, who, because of incapacity or disability are compelled to discontinue active work.

"The solution of the problem," he continues, "has not been an easy one, in view of the large number of employes, their widely diversified occupations, and the large territory over which the system extends, together with the heavy expense to the company incident to the inauguration of the pension.

"However, it is my firm belief that all employes, identified by years of faithful service, are entitled to some financial protection against the necessity of retirement, and it is the hope of the company that this beginning will extend to a further protection of employes. Meanwhile, the inauguration of a pension plan marks an expression of appreciation on the part of the company of the loyal and efficient service rendered by its employes."

It may not be generally known, but the company before making this official announcement had already placed 250 of its employes on the pension list. In connection with the plan, the question has been asked, "What would be the effect on an employe's right to a pension if, after working continuously through any of the periods specified, he should resign, in good standing, and afterwards return to the service?"

In such a case, we are informed, his rights would not be forfeited, provided he returned to the service within one year after the date of his resignation.

We give some concrete examples of how pensions are calculated on the basis of the plan outlined.

Assume the case of an employe who has been in the service twenty years, and whose wages for the ten years preceding his retirement, have averaged $75.00 per month.

He is entitled to one per cent. of his monthly wage for each year of service. One per cent. of $75.00 is 75 cents, which, multiplied by his term of service (twenty years), gives $15.00 per month. As $25.00 is the minimum pension, this man will receive $25.00 per month instead of $15.00.

By the same method of calculation it is shown that a man receiving a salary averaging $125.00 per month for ten years, will receive a pension of $25.00 per month after twenty years' service, and one averaging $150.00 per month for the same length of time, will receive $30.00 per month.

Next, take the case of a man who is retired after a service of thirty years, and having received an average salary of $100.00 per month. He is entitled, according to the first clause, to one per cent. of the average salary for the ten years immediately preceding retirement, multiplied by the total years of service up to twenty-five, and, according to the second clause, to an additional one and one-half per cent. of the average salary for each additional year over twenty-five. For example: The average annual salary for the preceding ten years, $1,200.00. One per cent of $1,200.00 is $12.00, and this multiplied by 25 (years of service) gives $300.00 per year, or $25.00 per month. To this add, as provided for by the second clause, one and one-half per cent. of the annual salary ($1,200.00), which is $18.00 per year, and there being five years over twenty-five, the amount to be added to the $300.00 is $18 \times 5 = \$90.00$, making the total $390.00 per year, or $32.50 per month.

In the case of a man who has been in the service between thirty-five and forty years, the allowance, in addition to one per cent. of the average salary for ten years, is two per cent. for each year after the thirty-fifth. Thus the employe who has received an average of $1,200.00 a year for ten years, will receive $24.00 a year ($2.00 per month) for each year after the thirty-fifth, making the sum $444.00 per year, or $37.00 per month for thirty-six years. For thirty-seven years the amount will be $39.00 per month, and for the fortieth year he will receive $45.00 per month.

The man who has received a like salary for over forty years, will be entitled to fifty per cent. of his average salary, which will be $60.00 per month.

Belgian Telegraph and Telephone Service.—Various improvements have lately been introduced into the Belgian telegraph and telephone service, and the Belgian Administration intends to make proposals to Germany, France, Holland and Great Britain for the institution of cheaper international telephone rates.

Purified Politics.—In one of the Western states according to a newspaper, it is pointed out that during a recent political campaign no contributions were received from telegraph, telephone, railroad or brewing companies.

Induction, its Origin and Subjugation by Derived Law.

BY FRANK FISHER, NEW YORK.

Two articles on the subject of induction appeared in the issue of TELEGRAPH AND TELEPHONE AGE March 16. The article by Mr. W. H. Jones prefaced "Opportunities Always Waiting" appeals significantly to me as the patentee of a device for absorbing all inductive forces, such forces being recognized as "an inconstant quantity," and thus disturbing magnetic fields operated by constant values of electrical energy, the more delicate the magnetic field the greater the disturbing effect of the inductive forces. It is obvious that where a line or cable is operated by telephone, a Thomson recorder, or mirror, such delicate magnetic fields would be more powerfully agitated than the less sensitive fields operated by the Morse system.

On long cables where the Thomson recorder is operated, a shunt circuit is used and when the induced currents become powerful the coil is so far shunted to reduce the induction that very little of the line current passes through the coil. Such a condition frequently arises, and in numerous instances duplex working has to be abandoned, signals becoming unrecordable.

As Mr. Jones so truly writes, referring to the futility of past and present electricians to discover a "remedy for the harmful effects of induction," induction is, and has been, the bane of cable working, to my own personal knowledge for the past forty years.

However meritorious the numerous patents granted to such well-known electrical men as Athearn, Trowbridge, Kitsee, Blakeney, Gardanier, D'Humy and others, claiming to overcome, or govern inductive forces, none has absolutely accomplished it—the force still remained the master of the electrical expert. until May, 1911.

The basis of their investigations was wrong. It seemed to have become a fixed idea that nullification or compensation had to be set up to oppose these forces. Absorption never seemed to have occurred to them, and they overlooked the fundamental laws which are responsible for induced forces, namely evaporation and condensation, whose respective actions alternate atmospheric conditions which generate induced forces. The power, magnitude and universality of these forces have long been known to us through the Law of Potential.

Potential means something more or less vague to the student, but to the experienced electrician, a difference of potential means a war, between positive and negative electricity, arguing their respective rights or powers until agreed upon by the "derived law of absorption," which brings plus and minus into close embrace, and become one, quiescent. With all respect to other inventors and inventions I claim originality for the discovery of this derived law of electrical absorption, and its practical utility and, after a series of experiments, demonstrated its truth. I believe my study of these laws and long practical experience has taught me, that all inductive-magnetic field-disturbances are due to the difference of potential between the line and the earth. The potential of the lines in space varies. [Every wire chief knows that a clear sky means no inductive trouble, no loss.] At times it will vary, perhaps in clear, fine weather from 300 to 400 volts. Imagine that difference per foot with a strong wind during the prevalence of a fog or sleet storm; it is nearly beyond comprehension.

As the electrician of a cable ship a knowledge of difference of potential was exceedingly useful, especially when having to splice in from five to twenty knots from ship to buoyed end of cable. The piece had to be electrically perfect. The easiest, quickest and best way to determine this was by difference of potential, running 100 volts through the piece when in the tanks and noting the deflection. If the positive and negative deflections were the same, it meant perfect insulation and the piece was ready for splicing-in. Should the deflections differ, negative being greater than positive, it meant a fall of potential somewhere by the evolution of a gas. This method of testing occupies only a few moments, but they are precious moments at sea. It, however, proves the law "where the potential is the same there can be no induction."

In laying long sections of cable, a system for a continuous insulation test from ship to shore during submersion has been in use for years. I was in charge of the shore end arrangements of all the cables laid by the French Company from Cuba to Brazil. We used this system which proved very effective and was certainly very convenient, as I was in touch with the ship, through condenser, and dead beat mirror. The system is most simple. The shore end is joined to one plate of a condenser, thus being perfectly insulated. The other plate being joined to the coil of a dead beat mirror, and to earth. Each change of polarity which took place aboard every fifteen minutes was noted by me on the mirror, its magnetic field being altered by the impulse from the condenser by induction. Whenever the ship desired to speak to shore they simply connected in circuit the ordinary sending key. Appreciating the value of such a perfect arrangement, some years later, when induction proved so fatal to duplex cable working I conceived the idea by reversing the intensity field and condenser and creating a leak in any conductor by a tap connection. This brought the intensity field to the same potential (+) as the conductor without in any way altering the resistance of the line, because whatever voltage was used for operating the line had no outlet through this leak, as one end of the coil was insulated. The coil, therefore, would take the same potential as the line, up to the point of insulation and when joined to the condenser would remain so.

The action of the condenser convinced me that by connecting it to earth, the potential of which is (—), brought the line and earth to the same potential when induction ceases, thus placing the line coil in a neutral sphere.

Anticipating its value I forthwith took out letters patent in the United States, France, England, Canada and Newfoundland, and patents are now pending in Germany.

In the accompanying diagram I merely show where, and how the device is inserted. G is the magnetic field of whatever system may be

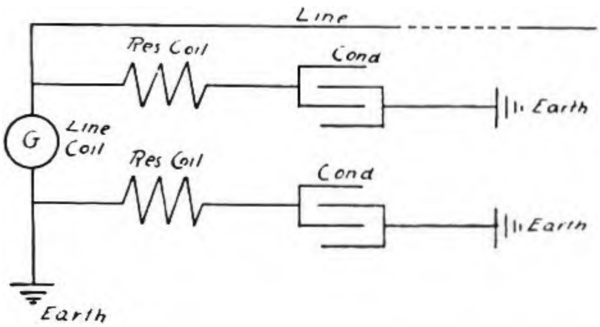


DIAGRAM SHOWING METHOD OF PROTECTING DELICATE INSTRUMENTS AGAINST INDUCTIVE EFFECTS.

worked, as the device is applicable to any and every system, siphon recorder mirror, telephone, Morse, etc., irrespective of their delicate magnetic fields. Its exceeding simplicity is its chief recommendation.

The most valuable feature of my device is its absolute constancy in duplex working. A submarine cable has two fixed quantities—resistance and capacity—they do not vary. The artificial line is based upon the ohm and farad. Why should they not become as fixed as the cable, and not subject to continual variation by atmospheric changes or local high voltage lines? I have every reason to know that my device brings the artificial line to exactly the same fixed condition as the cable or aerial and when once the apparatus is adjusted, after its initial charge, it remains fixed and constant until the cable severs. I see no reason why New York and London should not work from their respective centres direct, through a relay protected by this device.

I emphatically reiterate this opinion which is worthy mature consideration as being held by a man so closely associated with cable working for over forty years and thoroughly conversant with every phase of its ramifications, especially from the technical and dividend point of view.

Mr. Robert Morrell, general superintendent of the West Indies and Panama Telegraph Company, St. Thomas, D. W. I., writes: TELEGRAPH AND TELEPHONE AGE is so useful and necessary that I should be like a fish out of water without it. It certainly should be most useful to all telegraphers."

Report of the New York Telephone Company.

The report of the New York Telephone Company for the year ending December 31, 1911, shows the following results:

Total telephone revenue..........	$39,189,965.93
Total telephone expenses.........	29,013,188.40
Net telephone earnings...........	$10,176,777.53
Dividends and interest earnings...	$5,043,706.82
Miscellaneous earnings	2,535.90
Total net earnings...............	$15,223,020.25
Deduct interest charges..........	$2,395,826.03
Dividends	10,000,000.00
	$12,395,826.03
Balance to surplus account and reserve for contingencies...........	$2,827,194.22

The combined operations of the company and its associated companies cover the States of New York, Pennsylvania, New Jersey, Delaware, Maryland, the District of Columbia, and parts of Connecticut, Virginia, West Virginia and Ohio. The following statements show the combined operating results for the company and its associated companies during 1911 (not including local connecting companies) with inter-company items eliminated:

Telephone earnings	$59,019,410.71
Telephone expenses	43,946,709.71
Net telephone earnings...........	$15,072,701.00
Other income	1,443,594.54
Total net earnings...............	$16,516,295.54
Interest charges	2,585,766.16
Balance	$13,930,529.38
Dividends declared	10,010,493.50
Balance to surplus accounts and reserves for contingencies..........	$3,920,035.88

On December 31, 1911, there were 888,335 stations in the system directly operated by the company and its local connecting companies, an increase during the year of 100,771. Including the associated and connecting companies, there were in service in the whole system at the end of the year 1,524,024 stations, an increase during the year of 160,254 stations.

The report is signed by Mr. U. N. Bethell, president.

To Amend the Patent Law.—A bill has been introduced in the House of Representatives at Washington to amend features of the patent law upheld by the United States Supreme Court in its recent "patent monopoly" decision. The purpose of the measure is to prevent abuse of the patent law.

Testing on Railroad Telephone Circuits.

BY K. W. ENDRES, NEW YORK.

(Continued from page 226, April 1.)

PATCHING.

Before taking up in detail the methods of testing on train dispatching circuits, it is necessary to describe at some length the proper method of constructing such lines so that they can be made available for patching when desired. This is an important feature of a railroad telephone testing outfit. Means must always be provided for patching one circuit to another, for using a section of one circuit here, of another further on; briefly, the system must be flexible. A dispatcher should also be able to place trouble with some degree of accuracy so that he can send out a man to clear it. He should be able to make measurements of resistance, voltage drop or other simple tests upon the line, and how this can be done will be taken up later. As far as he is concerned personally, however, this is not considered so important as the patching feature, since the dispatcher's sole object is to keep his line working, and his first duty is to patch around a break or a ground, rather than to attempt to locate it closely on the line.

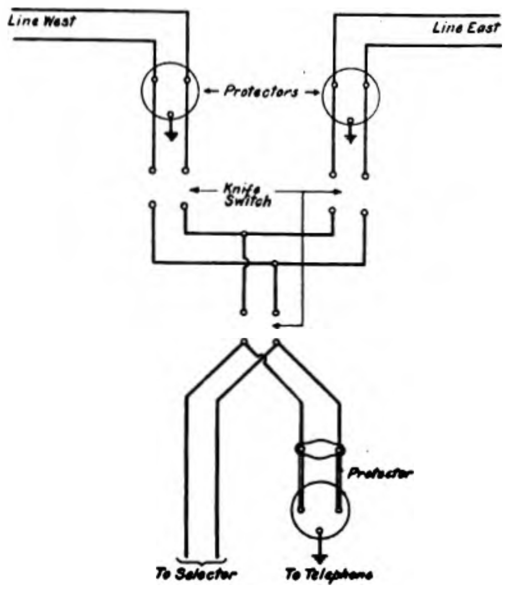


FIG. 1.—WESTERN ELECTRIC SYSTEM OF WIRING SINGLE TRAIN DISPATCHING CIRCUIT THROUGH WAY STATION.

Some train dispatching lines consist merely of the one circuit, and have no provision made for relief in cases of emergency. This is generally because there is only the one circuit available.

If, however, telegraph circuits parallel the telephone line, it is a wise plan to arrange at least two of these so that they can be used for patching purposes in times of trouble. While it would be impossible to obtain satisfactory transmission over the iron telegraph wire for any great distance, yet when used on short stretches here and there to bridge around breaks, they would operate very successfully and enable service to be maintained—the result always to be aimed for.

SINGLE CIRCUIT.

Where only one circuit, however, is installed, it is generally sufficient to wire this through knife switches at each way-station as shown in Fig. 1.

The two upper switches enable the line to be cut through or opened at each station. The lower switch connects the way-station apparatus, selector, telephone set, etc., to the line. The dispatcher can, with this arrangement, locate trouble to the nearest station. This, in general, is as close as can ordinarily be obtained in dispatching service and it has been found to be sufficient. Where a line is permanently equipped with a large amount of bridged apparatus, as in this case, accurate tests are almost impossible although instrument readings give fairly close results after a man becomes familiar with his circuit.

FIG. 2.—SWITCHING PANEL.

Experience has shown that testing devices on the line should enable the dispatcher or wire chief to find out readily what section must be patched, and then permit him to accomplish that patching by orders given to the proper way-station operators. After this has been done, and the line is in workable shape, he can send out his linemen to locate the trouble and restore the circuit to its normal condition.

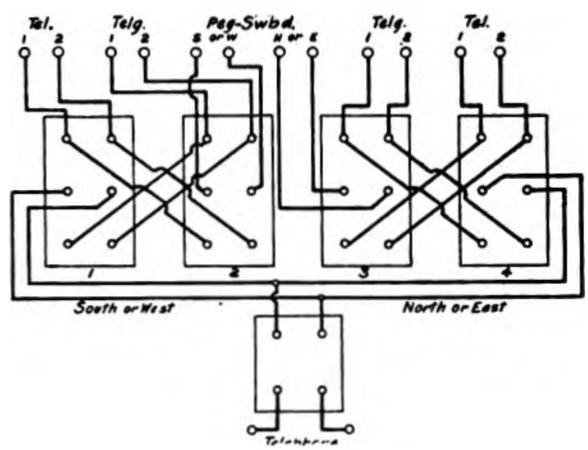


FIG. 3.—WIRING OF SWITCHING PANEL.

SWITCHING PANEL.

Fig. 2 shows a standard form of switching panel used on a number of railroads in this country where a telephone train dispatching circuit is equipped and two telegraph wires are transposed and made available for patching purposes, as outlined. The switches permit the telegraph lines which are normally cut directly through to the peg switchboard, to be used for making patches in the telephone circuit when necessary. The circuit arrangement is shown in Fig. 3 and the method of using this panel will be self-evident from this.

TEST BOARD.

Fig. 4 shows a standard form of test board which has been developed by the Western Electric Company to meet the needs of railroads for this type of apparatus on their dispatching circuits. It is a wooden box equipped with telephone jacks, cords, plugs and keys, and with it all

FIG. 4.—TEST BOARD.

the ordinary simple tests and patches incident to a line of this character can be made easily and simply. The box may be equipped with any amount of the apparatus desired, but the wiring for the complete equipment is installed initially and the addition of jacks or keys, therefore, at a later date, merely means installing these in the box and connecting them to wires already in place. The workmanship throughout is solid, substantial and neat, and the color scheme of wiring employed, together with the plain numbering of all jacks and connections, enable the circuits to be easily traced out.

DESCRIPTION OF TEST BOARD.

It will be seen from Fig. 4 and from the wiring diagram, (Fig. 5), that the test board has a capacity for sixteen jacks in parallel rows of eight each, and also a grounding jack in the centre at the bottom. Two keys are also provided in the lower part of the board. Designation strips are mounted alongside each row of jacks in order that the marking of the lines may be clearly before the operator and maintenance man. It is of particular importance on all telephone equipments where there are a large number of connections that everything should be clearly and accurately labelled for convenience in making tests and clearing trouble.

CIRCUITS.

Fig. 5 shows the circuit diagram of this test board. The outside wires are brought into protectors and from these, in turn, are carried to the screw terminal punchings numbered from one to sixteen in the diagram. These, likewise, are connected directly to the jacks. Each jack consists of three parts—tip conductor, sleeve conductor (so-called from the fact that they make contact with tip and sleeve of the plug), and an inside contact which is broken when a plug is inserted

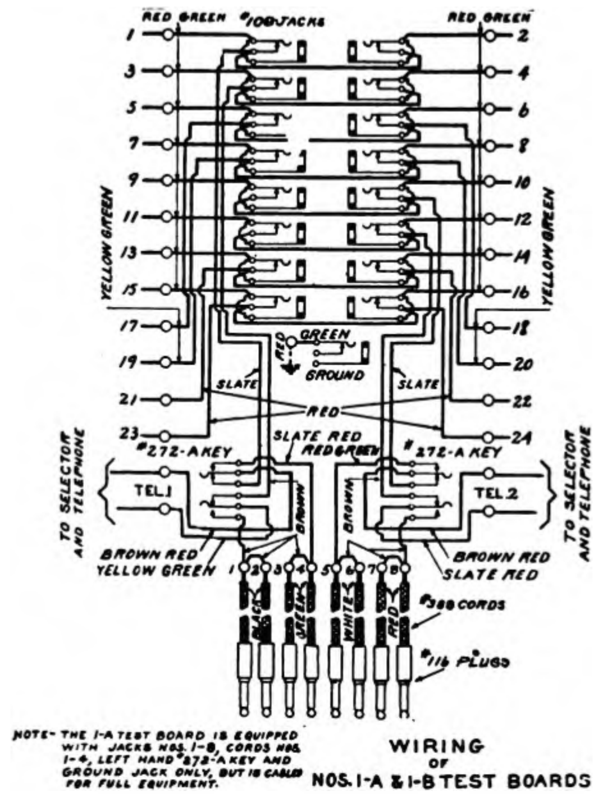


FIG. 5.—DIAGRAM OF TEST BOARD WIRING.

in the jack. These are shown diagramatically in a conventional way. In this test board, single conductor plugs are employed having their tips and sleeves in one solid piece of brass, hence the tips and sleeves of the jacks are also connected. It is necessary that the sleeves of the jack be equipped, whether used or not, in order to give the jack the requisite mechanical strength and to center the plug properly when it is inserted.

The lines come into the tip springs of the jacks (one wire per jack) on one side and are connected through their inside contacts to the corresponding springs of the jacks opposite, going out again on the line. The line or lines thus run straight through the office without break or interruption.

Selector and telephone apparatus is bridged across two of the circuits (usually the train and message wires), from jacks 1 and 3 and 10 and 12. This connection is taken, in each case, from the inside contact of the jack. From here the two wires run to the inside contacts of the key and from the movable springs of this key to the apparatus itself. The key, in its normal "off" position is connected to the inside contacts as shown. The outside contacts of the key are connected to the single conductor cords 1 and 4 as shown. The wiring of jacks 10 and 12 on the other side of the box corresponds with that for 1 and 3 in every particular.

TELEGRAPH CIRCUITS.

It will be noticed that connections from the inside contacts of jacks 5 and 7 and 6 and 8 are also brought out to lugs 17, 19, 18 and 20 respectively. These are for looping telegraph lines through this test board before running them to the telegraph peg switchboard, and also enable patches to be made with telegraph lines. When telegraph lines are connected into this board at these points, the straps between jacks 5 and 6 and 7 and 8 should be cut. Then the telegraph peg board takes their place, through telegraph connections being made there.

OPERATION.

Assuming trouble on the train wire, the dispatcher has successive stations in turn open the train wire circuits by inserting any two plugs (attached to cords of different colors) in jacks 2 and 4 at each station. When he reaches a point beyond which he cannot signal or talk, it is a good indication of a break in the line between that test point and the next. The dispatcher then arranges to patch with the message circuit between these points. He calls the last available point on the train wire and instructs the operator there to insert plugs 1, 2, 3 and 4 in jacks 1, 10, 3 and 12 respectively and to throw the train wire key to the "on" position. This has connected the lines coming in on jacks 1 and 3 to the lines going out on the lines 10 and 12 and has broken the connection between jacks 1 and 2 and 3 and 4. It has also broken connection between jacks 9 and 10 and 11 and 12. Throwing the key has bridged the train wire operator's selector and telephone set across the cords 1 and 4 and taken it off jacks 1 and 3 which are now open and not connected to this apparatus. The first part of the patch from the train wire to the message wire is complete, and the operator is connected across the patched circuit.

The dispatcher now calls the next point beyond the break over a telegraph wire, by commercial telephone, or in any other way available. His instructions here are very similar. This operator connects the message to the train wire by inserting plugs 5, 6, 7, and 8 in jacks 9, 2, 11 and 4 respectively, and throwing the message circuit key "on." This connects his apparatus across the patched circuit likewise. Plugs 1, 2, 3 and 4 and the train wire key could have been used in this office in the same way, if desired.

If the dispatcher or a test man is making instrument readings on the line, he may wish to open or ground either side of it, and he may desire to short-circuit the line, making a loop. As already noted, inserting any plug into a jack opens the line connected to the latter. A wire is grounded by inserting one plug in the jack to which that wire is connected and the plug attached to the other cord of similar color into the ground jack. A line is short-circuited by inserting the plug attached to cords of the same color into the two jacks of that line.

(To be Continued)

Employes Longest in the Telegraph Service.

Whenever a Western Union employe is retired on a pension, the local press proclaims him the oldest employe with the company. In this connection it will be of interest to give the names and addresses of a few of the employes longest in the business; as shown by the records of the company, together with the years of their entry into the service.

1854—J. W. Lewis, New York.

1855—H. C. Fardon, New York, and Ziba Nickerson, Chatham, Mass.

1856—P. H. Shaughness, New York.

1857—J. H. Purnell, Opelika, Ala., W. L. Ives, New York, and A. G. Hoyt, Halifax, N. S.

1858—B. S. Black, North Sydney, N. S., G. E. Baker, New York, R. Power, New York, Z. P. Hotchkiss, Chicago, Ill., and P. H. Fall, Houston, Tex.

1859—J. H. Russell, New York.

Valuable Electrical Books.

Ocean Cable Work.

In our issue for March 16 note was made of an address in Boston on March 1 on "Electrical Communication," by Dr. A. E. Kennelly, professor of Electrical Engineering at Harvard University, Cambridge, Mass.

Dr. Kennelly, who was formerly a telegrapher, has had a wide experience in submarine cable work and in his address he dwelt particularly upon this phase of electrical work, also on wireless transmission.

He briefly reviewed the early days of ocean cable service, which have led to a development capable of reaching from the earth to the moon, assuming that all existing cables were laid out in a straight line. Fifteen ships are now regularly engaged in maintenance work on the world's cable systems, and experience shows no sign of depreciation in cables laid in sea water. Mechanical injuries attributed to the movement of water currents of varying temperature across cables resting on rocky beds, the attrition from waves and damage done by animal life are the chief sources of wear and tear. The cost of a modern cable laid and ready for service is about $1,000 per mile, each of the later transatlantic lines representing an investment of about $3,000,000. The latter are heavily loaded with traffic and are likely to remain so for many years.

Dr. Kennelly said that thus far wireless telegraphy has brought the cable companies far more business than it has taken from them and that there is no immediate prospect of the cessation of cable laying, although wireless communication probably will monopolize the field in time.

The speaker touched upon the effects of weather conditions upon wireless transmission, emphasizing the adverse influence of solar rays upon distance of effective service. The sun appears to act like an evil eye so far as the wireless man is concerned, but it is certain that the world will learn far more about the conditions of the upper atmosphere than it would had such difficulties never arisen. The effect of intervening masses of land in cutting off signals was outlined, and the speaker stated that in entering the Bay of Genoa the Alps seem to interpose an insuperable barrier to the reception of signals from the north. Two hundred miles out at sea the messages may again be picked up, showing that in some manner the ether waves pass around the mountain ranges.

Dr. Kennelly said that in his opinion wireless communication holds the greatest possibilities for the future. Already the operator on an ocean liner possesses an electric arm capable of sweeping 120,000 square miles of sea, an invasion of space far exceeding anything accomplished in the past. In wireless telephony the prospect is bright, although the present range of communication is only about 200 miles. The present limit of cable telephony is about sixty miles, with prospects of a substantial increase by the Pupin method. A great advantage of wireless telephony is that if the receiver can detect anything at all he can hear the message clearly. Good work is being done along the lines of directing wireless waves and eliminating interference, and it is reasonable to expect progress in converting sound waves into electric waves of high power. Inter-individual wireless communication is also a possibility of the future.

A. A. Zion.

Mr. Alonzo A. Zion, superintendent of the Indianapolis Union Railway and Belt Railroad, Indianapolis, Ind., is an old-time and military telegrapher, and is chairman of the legislative committee of the Society of the United States Military Telegraph Corps. He was born in Lebanon, Ind., on July 23, 1846, and entered the telegraph service in 1859 as operator on the Lafayette and Indianapolis Railroad at Lebanon, which position he held until 1863. He was in the military

A. A. ZION,
of Indianapolis, Ind., Old-Timer and Military Telegrapher.

telegraph service from 1864 to 1865 and in 1866 he returned to Lebanon where he became agent and operator for the road on which he was first engaged, remaining there until 1873.

From 1874 to 1876 he was freight agent for the Cincinnati, Indianapolis, St. Louis and Chicago Railway at Indianapolis and in 1877 became chief train dispatcher for the Union Railroad Transfer and Stock Yard Company at the same point. In 1883 he was appointed master of transportation on the Indianapolis Belt Railroad and in 1894 was advanced to the position of superintendent of that line and of the Indianapolis Union Railway, which position he still holds.

Mr. Zion is an indefatigable worker in behalf of the military telegraph pension bills now before congress, and has exerted a great deal of influence upon the congressional committees having the bills in charge and there is now every indication of a successful issue, at this congress, of the agitation for government pensions for the telegraph operators who served in the civil war.

Selective Intercommunicating Telephone.

A selective telephone device for party lines has been recently patented by F. E. Granger, Aberdeen, S. D. It is particularly adapted to farmers' lines. It does away with the magneto signal bell and thereby eliminates the annoyance of the continual ringing of the telephone where many subscribers are on the line. It is entirely selective and secretive. A current from a battery is on the line all the time as in the telegraph system, the relay magnets at each station being connected in series on the line. The apparatus at each station is composed of a selector, transmitter and a dial showing the numbers of all the stations on the wire. Each station has an open circuit battery of sufficient power to operate the selector and this local circuit is closed and opened by the operation of the relay magnet on the line. When any one of the transmitters is operated it opens and closes the line circuit the same as does a telegraph key and all the selectors work simultaneously, with their dials. When the circuit is not in use all the telephones are disconnected from the line and their receiver-arms locked, so that removing the receiver does not connect the telephone to the line.

When a subscriber desires to call, he first puts his telephone on the line by placing the pin at the point in the wheel of the transmitter opposite his own number and swings the wheel around to the stopping point. The impulses will now advance all the selectors and dials on the line and stop at the caller's number. This will ring the caller's bell and unlock his receiver-arm. He then takes off his receiver and he is now connected with the line. Then he inserts the pin opposite the number of the party he wishes to call and swings the transmitter around to the stopping point again, and when the selectors have stopped a second time, the other party's bell is rung and his receiver-arm unlocked. This connects the two parties with the line, all others remaining cut off and cannot listen or cut in by the removal of their receivers. It is therefore a lockout system to that extent, although a third party is able to get on the line, but in order to do so he will have to throw the dials around to his own number first and the parties using the line will immediately see that he has come in and know who he is by his number.

This method is claimed to be superior to a central office lockout control because there is no central, and when disputes arise about the use of the line by two or more subscribers at the same time, it may be settled between themselves at that time. It is absolutely secretive because no one can cut in on the line without his number showing on all the dials that he has done so.

The selector is a simple mechanical device consisting of a ratchet wheel carrying a small cog wheel, which winds up just before the ratchet wheel arrives at its stopping point, and at that point is released slowly and does the work of ringing and unlocking. It releases slowly so that it may get by the operative point, when not stopped there, without doing the work. Each selector while in motion does nothing; it is only when it stops at a given number that it will ring and unlock the receiver-arm. There is no return to zero as in other automatic selecting signal devices; the dials always have a forward movement.

The talking circuit is on the same wire, but is bridged across the relay magnets through condensers. In the same way the line current runs through induction coils at both ends of the line so that the talking circuit is strictly confined within the limits of the length of the line; also the line current is, by means of condensers, prevented from going through the telephones. The system can therefore be operated with one wire and ground return.

Handling Messenger Boys.

BY E. A. RIPPEY, MANAGER WESTERN UNION TELEGRAPH COMPANY, SPRINGFIELD, MO.

This office has adopted a new method of handling messenger boys. Chair space is provided for them next to the delivery clerk, and when one boy goes out on delivery the others move up one chair, each one thus taking his turn as next out.

The messenger service has been placed on the piece basis and has proven satisfactory, delays having been reduced sixty to seventy per cent. If a messenger cannot earn on the piece plan the amount he was formerly paid on the salary basis he is dismissed and a more energetic boy put in his place.

Mario Mendez, Director-General Mexican Telegraphs.

Mr. Mario Mendez, director-general of federal telegraphs, City of Mexico, Mexico, was born in Montemorelos, Nuevo León, Mexico, March 19. 1868. He entered the telegraph service as a student in Matamoros, State of Tamaulipas, on March 25, 1885, and soon became a junior operator. From Matamoros he moved to San Luis Potosi where he became assistant chief, and in 1897 was appointed to the grade of superintendent of the first class and placed in charge of the Fourteenth Division. The Mexican war department afterward gave him a confidential commission to construct a strategic line from Chemax to Puerto Morelos, in the State of Yucatan. On the completion of this work he was congratulated by the war department for the excellent manner in which it was carried out.

He was then appointed chief of the construction department, and later became superintendent of the Second Division.

His appointment as general superintendent soon followed and he was later advanced to the position of chief of the Mexico office and finally, on January 4, this year, was elevated to the highest post in the service, that of director general of federal telegraphs.

Radio-Telegraphy.

Women Wireless Operators.—It is stated in a Seattle despatch that women wireless operators are to supplant men on steamers in the North Pacific trade, because men "are not always satisfactory."

Wireless Tower Destroyed.—The 656-foot steel tower of the wireless station at Nauen, Germany, was demolished by a heavy storm on March 30. The tower had been recently doubled in height and with a new plant it was expected that communication would be made with stations in America.

Wireless Telegraphy.—Recently an operator on board the steamer *Mantua*, off Melbourne, Australia, clearly read signals that were being sent to a warship from Jask, in the Persian Gulf. The distance traversed was 6,249 nautical miles, and the sending apparatus was of Marconi pattern; the receiver was the Marconi magnetic detector.

Locomotive Controlled by Wireless.—Tests are being made on the Canadian Pacific Railway at Toronto, Ont., with a locomotive operated and controlled by wireless. Mr. F. W. Prentice is the inventor of the system, and the tests are said to have proved to be satisfactory and effective. Mr. W. J. Camp is assistant manager of telegraphs of the Canadian Pacific Railway with headquarters at Montreal.

Wireless Between New York and London.—Mr. Godfrey C. Isaacs, managing director of the Marconi Wireless Telegraph Company, London, England, states that high-powered wireless stations to be erected in New York and London for the direct transmission of messages between these two cities will be open for the receipt and transmission of messages by January 1, 1913. In addition to the sending stations there will be central offices in London and New York where messages will be received and forwarded to the stations.

Wireless Experiments During Eclipse of Sun.—During the eclipse of the sun on April 23, experiments are to be made in Paris to note the effect of the related phenomena upon wireless waves. It is well-known that electromagnetic waves are propagated further in the absence of sunlight than when the sun shines, one theory to account for this action being that the ultra-violet rays of the sunlight have an absorptive effect. In making the proposed tests, messages will be sent shortly before, during, and after the eclipse, and the effect of the absence of the sun's full light upon the emitted waves will be noted.

Dr. De Forest Arrested.—Dr. Lee De Forest, the well-known inventor of a wireless telegraph system was arrested in Palo Alto, Cal., March 27 on an indictment found in the southern district of New York charging misuse of the mails. James Dunlop Smith, S. E. Darby, E. E. Burlingame and the Ellsworth Company are also indicted for the same offence and are co-defendants with De Forest. It is charged that the defendants attempted fraud by inducing certain persons to send to the Ellsworth Company and to the Fiscal Agency Company, of New York, money for stock in the Radio Telephone Company, a New York corporation; the Great Lakes Radio Telephone Company, the Atlantic Radio Company and the Pacific Radio Company, the three last Arizona corporations. The defendants are charged with having misrepresented conditions in telling the complainants that the corporations in question were paying dividends from the net profits of commercial operations.

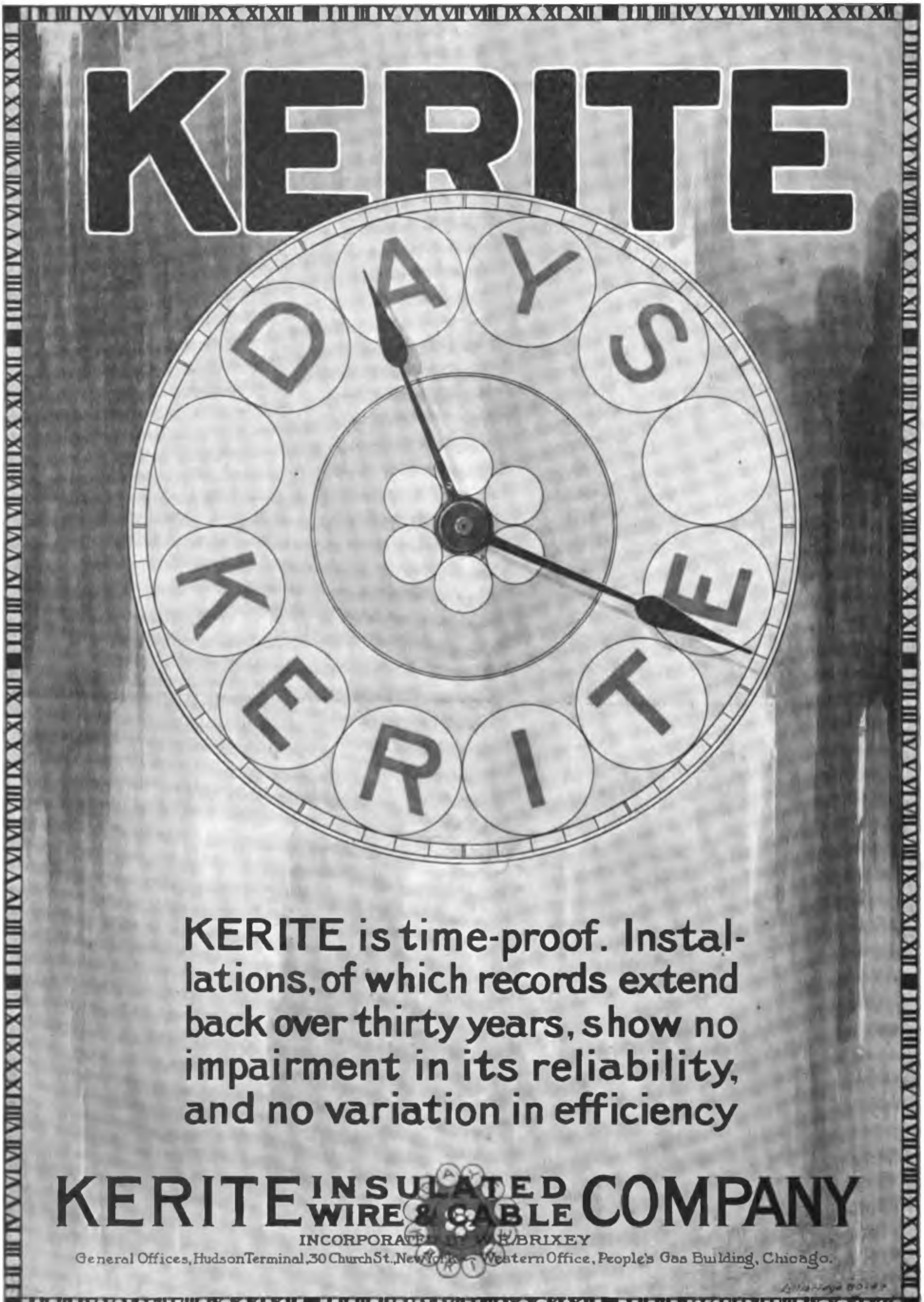
Experimental Wireless Station.—Mr. John Hays Hammond, Jr., of New York, is erecting a wireless experimental station on the sea front at Gloucester, Mass., which, it is stated, will be one of the most complete of its kind in existence. It is being established for the especial purpose of developing means of securing selectivity in wireless telegraphy and telephony.

The aerial is to be supported by two towers 340 feet high set 350 feet apart. The power installation will comprise eight complete wireless telegraphic systems, and also a system for telegraphing and telephoning over a searchlight beam. There will be two specially constructed high-frequency alternators giving 100,000 alternations per second, and developing an output of two kilowatts. These machines will be used for experimental development in wireless telephony. There will also be two five-kilowatt motor generator sets, having a frequency of 1,000 cycles per second. These will be employed for experimental research in wireless telegraphy. There will be a one-half kilowatt 250-volt direct current generating set for use with arc telephony. Besides this apparatus, there will be equipment for an induction-coil set. The station will also be used for the control of wireless dirigible torpedoes.

Consolidation of United Wireless and Marconi Companies Completed.

The trustees in bankruptcy of the United Wireless Telegraph Company and the United States district court at Portland, Me., have accepted the plan to consolidate the former company with the Marconi Wireless Telegraph Company. Under this new arrangement the stockholders of the Marconi Company and the stockholders of the United Wireless Telegraph Company will combine their interests by the formation of a new corporation, with an authorized capital of $10,000,000, or by increasing the present capital of the Marconi Wireless Telegraph Company of America from $1,511,200 to $10,000,000. The physical assets and patents of the United Company, excluding the claims against former president Christopher C. Wilson, who is now in prison, and George H. Parker, of Seattle, will be turned over to the new or enlarged company at a valuation of $700,000.

The physical assets and patents of the American Marconi Company will be turned over to the new or enlarged corporation at a valuation of $1,511,200. The Sir Oliver Lodge American patents will be turned over by the Marconi Wireless Telegraph Company, Limited, of London, at a valuation of $788,800. The agreement is that no shares of stock in the new or enlarged company, beyond the shares of $3,000,000 par value, will be issued except for cash, and not for less than par.


KERITE
DAYS
KERITE
KERITE is time-proof. Installations, of which records extend back over thirty years, show no impairment in its reliability, and no variation in efficiency
KERITE INSULATED WIRE & CABLE COMPANY
INCORPORATED BY W.R. BRIXEY
General Offices, Hudson Terminal, 30 Church St., New York. Western Office, People's Gas Building, Chicago.

The Railroad.

Mr. W. W. Ryder, general superintendent of telegraph, New York Central Lines, Chicago, Ill., was a New York visitor, April 11.

Mr. F. C. Batchelder, an old-time telegrapher, was elected president of the Baltimore & Ohio Chicago Terminal Railroad Company, Chicago, Ill., April 11.

An Operator Rewarded.—Mr. M. D. Wheaton, operator for the Pennsylvania Railroad at Wooster, Ohio, recently discovered a broken rail in time to prevent a possible wreck. For his alertness and promptness he was presented with a gold watch by the railroad company.

An Accident Avoided.

Much has been said concerning the many ways in which the telephone has helped the railroads after an accident has occurred, such as getting information to headquarters and the starting of wrecking and relief expeditions to the scene of the disaster. From the middle west comes a tale which demonstrates that the telephone played an important part in an accident "that did not happen." A track-walker on one of the trans-continental railroads in stepping back upon the right-of-way after a fast train had passed, noticed lying along the rails a broken flange that had ripped off one of the wheels of a car. The track-walker hastened to a siding switch, which was equipped with a Western Electric iron case telephone set, and told the dispatcher of his discovery. The dispatcher immediately telephoned ahead and had the train stopped, the damaged car removed from the train and thus a possible accident was prevented.

Pennsylvania Railroad's School of Telegraphy.

Since the establishment of the school of telegraphy in 1907 at Bedford, Pa., by the Pennsylvania Railroad Company, there have been enrolled 364 students, 214 of whom have been graduated and are now employed as telegraphers. In addition to the miniature railroad, engines and cars, a regular system of manual block signals, with cross-overs and sidings, has been installed at the school. Dispatching trains by telegraph and telephone is taught while the students are also given a full course in agents' work, such as filing of tariffs, keeping reports, filling out standard blanks and keeping the necessary records.

The school is in charge of Mr. J. C. Johnson, superintendent of telegraph of the Pennsylvania Railroad, Philadelphia, Pa., and Mr. Thomas Saddington is the resident manager of the school.

An account of this school was printed in our issue for February 16.

Increasing Use of the Telephone for Train Dispatching.

The New York Central and Hudson River Railroad Company recently placed an order with the Western Electric Company for forty-five telephone sets and miscellaneous supplies, to be used in extending its system; and later placed a further order for seventy similar telephone sets, fifty-four transmitter arms, thirty portable telephone sets with the same number of line poles, sixty test panels and a considerable quantity of miscellaneous supplies.

The Davenport & Muscatine Railway Company, operating between Davenport and Muscatine, Ia., a distance of about 25 miles, is installing a four-selector and telephone way-station equipment, four selector semaphores and four siding telephones. The Gulf, Florida & Alabama Railway of Pensacola, Fla., has adopted the telephone and given the Western Electric Company an order for equipment for 100 miles of line, consisting of twenty selectors, fifteen siding sets, twelve portable sets and the necessary line material.

The Lehigh Valley will install a special yard dispatching circuit consisting of eight complete selector stations, and has also ordered one hundred and forty portable telephone sets with line poles. A total of fifty-five wall telephone sets and miscellaneous material for train dispatching circuits is going to the Norfolk & Southern Railroad Company, while the Norfolk & Western has ordered ninety adjustaphones (transmitter arms) with the necessary generator sets and miscellaneous pole line hardware for two dispatching circuits.

The Chesapeake & Ohio recently installed forty-six additional desk type telephone sets with miscellaneous line material; and for use on the line between Columbus, Ga., and Birmingham, Ala., the Central of Georgia has ordered thirty portable sets and line poles. The Baltimore & Ohio will shortly install thirty-five additional way station outfits.

Convention of Railway Telegraph Superintendents.

The annual convention of the Association of Railway Telegraph Superintendents will, as previously announced, be held in New York, beginning June 4. The headquarters of the association will be at the Waldorf-Astoria, New York's celebrated hotel, and the meetings will probably be held in the main auditorium in the United Engineering Societies Building, No. 29 West Thirty-ninth street, which building is only a few blocks from the hotel, and where ample space will be provided for exhibits. It is interesting to note in this connection that the United Engineering Societies Building was erected largely through the generosity of Mr. Andrew Carnegie, and is the headquarters of most of the national engineering societies.

The programme for the meeting is a comprehensive one, and will include the reading and discussion of many valuable and interesting papers, which will occupy three days' time. There is much to see in New York and the entertainment committee, realizing that the visitors cannot see everything during their short stay, has used good judgment in mapping out a plan for the entertainment. The business of the convention is, of course, of the first consideration, but the combination of business and pleasure has been skilfully arranged.

The first business session will be held on Tuesday, June 4.

In the afternoon the ladies will be taken on a sightseeing tour in cars furnished by the Railway Telegraph & Telephone Appliance Association, and in the evening the New York Telephone Company will give a theatre party.

On Wednesday morning the ladies will go on a shopping tour and in the afternoon the men will visit the main operating department of the Western Union Telegraph Company and the Cortlandt street exchange of the New York Telephone Company. At 5 p. m. a trip will be made to Coney Island on a special steamboat provided by the Appliance Association.

On Thursday the ladies will visit the art galleries, and other places of interest, and in the evening there will be a roof garden party given by the Appliance Association.

On Friday the entire party will board a special train on the Erie Railroad at 9:30 a. m. and make a trip to the Edison works at West Orange, N. J. The visitors will be entertained at luncheon at the Country Club at West Orange, after which they will return to Jersey City where they will board the Western Union cable steamer *Robert C. Clowry* or some other available boat. They will then be conveyed to Travers Island and entertained at a clambake given by Mr. Belvidere Brooks, in behalf of the Western Union Telegraph Company.

The Entertainment Committee has given much time and attention to the work of arranging for the welfare of the superintendents and their families, and everything that is possible is being done to make the visit an enjoyable one. The committee consists of Messrs. L. S. Wells, L. B. Foley, E. P. Griffith, J. C. Johnson, E. E. Hudson, W. F. Crowell and R. A. Patterson.

Mr. P. W. Drew, superintendent of telegraph, Minneapolis, St. Paul & Sault Ste. Marie Railway, Chicago, Ill., is the Secretary of the Association, and he will be glad to give further information to those desiring the same.

Overhead Crossings.

At the recent meeting of the American Railway Engineering Association in Chicago part of the report of the committee on electricity was devoted to the specifications for overhead crossings of electric light and transmission lines. The sub-committee has been working in conjunction with a joint committee representing the National Electric Light Association, American Institute of Electrical Engineers, American Electric Railway Association, Association of Railway Telegraph Superintendents and representatives of large telegraph and telephone companies. The report of the joint committee and the report of the committee on electricity of the American Railway Engineering Association agree in the main, although there are points of divergence in a number of particulars. The specifications for overhead crossings as reported by the committee of which Mr. G. W. Kittredge is chairman were taken up paragraph by paragraph. In every instance except one, where there was a difference between this report and that of the joint committee, the paragraph of the joint committee was adopted, in deference to the wishes of the other associations mentioned. In one case, however, the steam-railroad men stood immovable, and this was in relation to paragraph 18, in which Mr. Kittredge said that the committee felt that it could not adopt the language of the joint committee's report. This paragraph relates to conductors, and as adopted by the American Railway Engineering Association reads as follows:

"18. Strain insulators shall be used in guys from wooden poles carrying any power wire of less than 6600 volts, provided the guys are not through-grounded to permanently damp earth. Strain insulators shall not be used in guying steel structures nor required on wooden poles carrying wires all of which are 6600 volts or more, provided the guys are through-grounded to permanently damp earth."

Obituary.

Elmer E. Shawn, aged fifty-one years, an operator for the Associated Press in Denver, Colo., died in that place March 26.

Olga Ruth McKenna, aged 22 years, daughter of Mr. F. J. McKenna, of the Postal Telegraph-Cable Company, Pittsburgh, Pa., died on March 20.

Frank P. Moore, an old time telegrapher formerly of Omaha, died at Sioux City, Iowa, of pneumonia March 17. His remains were buried in Fremont, Neb.

C. E. Case, manager for the Western Union Telegraph Company at Norwich, Conn., died in that city March 25. He was in the company's employ over fifty years, and served as a volunteer in the Army during the civil war.

I. W. Copeland, aged 65 years, manager for the Western Union Telegraph Company at Troy, N. Y., for forty years, died suddenly at his home, April 10. Mr. Copeland served as a soldier throughout the civil war, and he was one of the best-known telegraphers in the east. He attended the recent dinner to Mr. Theo. N. Vail.

Jesse Lantz, age 68 years, an old-time telegrapher and a member of the United States Military Telegraph Corps during the Civil war, died at White Plains, N. Y., March 20th. This is the thirteenth death among the members of the United States Military Telegraph Corps reported since the Atlantic City, N. J., reunion last September. Mr. Lantz, at the breaking out of the civil war, was employed by the Pennsylvania Railroad at Harrisburg and after hostilities had ceased he entered the service of Jay Cooke & Co., bankers at Philadelphia, Pa.

The "Western Union Special."

A FEW TIPS TO OPERATORS AS TO EFFICIENCY ON THE UNDERWOOD TYPEWRITER.

Now that the Western Union Telegraph Company has made its typewriter equipment uniform by the purchase of 10,000 machines of the Underwood Company, the necessity for a clear understanding of that typewriter on the part of the Western Union operators is apparent.

A short time ago most of the "mills" used by the many Western Union offices were the property of operators. The equipment consisted of machines of every character—single keyboards, double keyboards and double shift key machines —a bewildering array that left the operators unfamiliar with the operation of any one of them.

In the telegraph business the experiences of the operator proved the necessity for concentration on one machine, and now through the record breaking order recently given to the Underwood Company, the typewriter condition has been entirely changed. The "knights of the key" this year are welcoming information that will make them also "knights of the writing machine."

The Underwoods which are being shipped by thousands to the various Western Union offices are machines specially constructed for the telegraphic service, selected after an eight months' test in competition with all other makes. They are especially adapted to the work of telegraphic transcription with a keyboard made up to fit the needs of the operator.

In telegraphic work, and particularly the "press" branch of it, speed is a necessity. It may be considered fortunate for operators, therefore, that the Underwood machine was chosen by the Western Union because that machine holds every medal ever awarded for speed work in typewriting. In the Western Union "Special" the machines are not intended to employ the small letters of the alphabet. It is known as an "all cap" keyboard equipped with special characters. The shift key is only necessary to obtain the characters on the upper row and right hand side of the bank of keys. It is therefore "non-shifting" except for these special characters and fractions. So far as telegraph work goes this keyboard is supposed to be the ideal one for practical work, as the Western Union main offices and offices thus far equipped with these new machines will bear evidence.

AFTER MACHINE IS RECEIVED.

It should be remembered by the Western Union man who receives an Underwood typewriter that the machine is shipped to his office in a manner peculiar to it, so that it is next to impossible for it, under ordinary conditions, to be broken in transit. It is, however, an easy matter, through want of knowledge, to injure the machine in unpacking it, for which reason the machines are sent to the large branch offices of the Underwood Company and from there sent to the Western Union offices with instructions to hold until a repair man can set the machines up. It would not be out of place to state that in shipping these machines they are *suspended* in their packing cases with special protecting spring devices patented by the Underwood Company and tested out under extreme conditions. This makes it necessary that no Underwood typewriter should ever be taken out of its box except by unscrewing all the screws around the outer edge of the *bottom* of the box through which four bolts are placed and lifting the suspended machine out in this manner.

CARE OF THE MACHINE.

Possibly the best advice to be given the operator, as an introduction to the Underwood typewriter, is the necessity for proper care of it. There is nothing more important than this if the Western Union serivce is to be made more efficient, which is one reason for this record-breaking purchase of typewriters, the second being the desire of the telegraph company to relieve the operators from an expense to which they had for years been subjected in purchasing their own machines and keeping them in condition. In the first place no typewriter should be allowed to remain in an office, except when in use, unless it is covered with a rubber cover. In addition to this it should be treated to at least one daily cleaning. All working parts of it should be gone over with an oiled rag, but the machine should be carefully cleaned off after this with a clean piece of cheese-cloth. Oil from the oil-can should be used only on the running parts, after which these parts should be wiped off with a clean rag. Under no circumstances should the machine be flooded with oil, as the dust in any office will be caught by it and finally clog the action of the machine.

The type should be cleaned daily with a stiff brush which should always be used from right to left of the machine. In case the machine has been used with a heavily inked ribbon, it would be well to see that all type, particularly the a, e, o, u and m's are cleaned out with a pin before they are brushed. In cleaning the machine itself always brush the dust or dirt *back* of the type bar connections.

RIBBONS.

Each machine as it reaches the Western Union office is equipped with a purple copy *Underwood* ribbon made with special care for the machine and fitted with an exactness which does not apply to other ribbons made by other firms for the Underwood. Trouble, which the operator has in many cases with the ribbon, will be obviated entirely by the use of this ribbon rather than the ribbons of other makes in the open market. Careful instructions for changing the ribbons go with each machine, so that it is not necessary here to write anything in regard to this matter.

ESTABLISHING MARGINS.

The devices which enable the operator to establish margins with the Underwood are simple. They are located underneath the scale, one at either side and each has a pointer which, when pushed either to the right or left, indicates the limit of the writing line in either case. In order to establish a margin, all that it is necessary to do is to pinch either of these little devices and to push them along the rod on which they run.

In order to give the proper information as to margins, it is well to use as an example the regulation telegraph blanks used by the Western Union Telegraph Company. These blanks are uniform, eight inches in width but of different sizes as to length. The regulation blank for a "ten-word" message—the shortest blank used, has a writing surface about three and one-quarter inches deep. The Day Letter blank is about four and three-quarter inches as to writing surface, while the writing surface of the Night Letter is about four and one-half inches.

CENTERING THE BLANKS.

To accomplish the best results with the blanks, the right hand margin stop should be set at what would be the second space on the scale and the left hand margin stop at what would be the seventy-second space on the scale. Then the paper fingers, which are the little clips, one on each side on top of the platen, should be manipulated as follows: The right hand paper finger should be pushed to the left so that about one and one-eighth inches of the platen is exposed between the right frame of the machine and the small rubber roller on the paper finger. The left hand paper finger should be pushed over to the extreme end of the platem.

As all of these Western Union blanks are inserted in the machine exactly in the center between these paper fingers, the outer edges of each blank will divide the paper fingers in the open space under the little rubber rollers exactly in the center. This will leave a margin on each side of the blank of one-half inch, which will make the telegram take on a correct typewriter appearance.

THE CABLE MESSAGE FORM.

There is very little difference between the size of the Night Letter form and the Cable Message form except that in the latter there is less writing surface. It is possible, by a little crowding, to get very nearly five inches of writing surface on the Night Letter form but only three and three-quarter inches on the form devoted to cable messages.

THE TYPE-BAR GUIDE.

The Underwood is so constructed as to make the operation of it extremely simple. It is equipped with the only type-bar guide that secures absolute, perfect alignment. The operation of the machine is easy because there is one rule that the machine always follows, viz.; that the typewriter, when a key is depressed, will print exactly in the center of this type-bar guide, which guide is located in the exact center of the machine and is the part behind which the ribbon is located. As the carriage is moved from right to left, the machine will print exactly in the center of the notch on the type-bar guide. By trying this out the operator will see how easy it is to throw the carriage to the right or left and insert a letter which has been omitted by mistake. This type-bar guide also forms a regulation guide for all printing. Wherever the center of the guide stands, there the machine will print.

POINTS ON TABULATING.

Each Western Union "Special" is equipped, like all Underwood machines, with a tabulator key located at the right hand upper corner. This key enables the operator to cause the carriage to move automatically from right to left and stop it at will, thereby obviating the use of the space bar. The tabulator stops are located on the back of the machine, each stop having a pointer arranged over a back scale which conjoins with the scale on the front. To cause the machine to move automatically, the tabulator stops in the back should be thrown out and moved on the running bar to any point desired. Four tabulator stops are furnished with each machine and these allow the carriage to make four tabulator stops from right to left.

In the use of the Western Union blanks, when it is necessary to make a paragraph, it will be found advantageous to move the first tabulator stop one-half an inch to the right of the first indicated tabulator stop which is 10. It will then be found that the carriage will automatically find its proper paragraph point at 5 on the front scale whenever the tabulator key is touched. This makes it unnecessary for the operator to space the space-bar, or operate the carriage release in order to find the paragraph point.

AS TO THE TOUCH METHOD.

This same tabulator can be used for the signature at the bottom of the telegram by placing the second tabulator stop from the right at 40 on the back scale. This would enable the operator, when the telegram was completed, to come to the proper place for the signature by making two depressions of the tabulator key; one that would bring the carriage to the first tabulator stop at 5, and another depression of the key to allow the carriage to move to the second tabulator stop at 40—the proper signature position. This would, as in the paragraph stop, obviate any use of the carriage release key, or the space-bar, and it is a valuable suggestion for the rapid transcription of telegrams.

Naturally, the telegraph operator, of the old school at least, has never been instructed in the modern touch method now generally taught in the schools; therefore he could not be expected to make the same speed on a machine as those who are now graduating from the telegraphic departments of the various commercial colleges. The points given here may, however, assist him to some extent in acquiring enough speed to do his work more satisfactorily.

THE UNDERWOOD KEYBOARD.

The keyboard of the Underwood is so arranged that the operator holding his hands in a natural position before it will rarely be called upon to use his right hand on the left hand side of the keyboard, or vice versa. If he is ambitious to learn the touch system of operating an Underwood, he will find a book on this method of operation among the various things that make up the equipment accompanying each typewriter.

The time has come when telegraphy is closely allied with the typewriter and when a part of the instruction in telegraphy must be devoted to learning the operation of the writing machine.

Telegraphers oftentimes accomplish great bursts of speed in operating the typewriter, even though they may not have received instruction in the commercial schools. Certainly the typewriter has made a great change in the method of "receiving," making the "stuff" as it comes over the wire, instead of the old Morse hit or miss abbreviations, a legible result which goes red hot from the machine to the thankful printer. The typewriter has changed not only the method of telegraphic "receiving," but the ordinary methods which, up to within a few years ago, prevailed in newspaper offices. Woe betide the telegrapher or newspaper man today who doesn't own, or at least operate, a typewriting machine.

A FINAL SUGGESTION.

One suggestion that can be used by all operators to advantage and one which very few typewriter operators understand, is the instantaneous leading in to the machine of a telegraph blank or any other paper with the same motion used to draw out the written sheet of paper.

With this method it is possible, particularly in the "short word" message, to draw a new blank into the machine to the proper printing point for the date or any other line as soon as the blank already typewritten is drawn out. To accomplish this the new blank should be inserted into the machine between the platen and the paper upon which the operator is writing *before* the old blank is taken out. As soon as the signature is made on the first blank, the rapid drawing out of it will insert the other to the correct position for writing. With some practice the operator will be able to throw the new blank to any point on the paper where he desires to begin without any use whatever of the platen knobs.

The suggestions as offered above are only a few for the primary assistance of the new telegraph-typewriter operator. Experience is the best teacher. No one is more clever at inaugurating helpful methods than the operator himself. Therefore to obtain further instructions for the technical operation of the typewriter, the operator is referred to the literature which accompanies each machine.

Municipal Elections.

The Gamewell Fire Alarm Telegraph Company has secured the contract to supply the city of St. Louis with a large number of additional fire alarm telegraph boxes.

New York Fire Alarm System.—Mr. Joseph Johnson, fire commissioner of New York, recommends that a new fire alarm system be installed and that isolated sites for fire alarm telegraph stations be provided.

Municipal Electricians.—The executive committee of the International Association of Municipal Electricians met at Peoria, Ill., April 15, to arrange a date for the annual convention of that association, which is to be held in Peoria during the summer. The committee also arranged for papers to be read at the meeting. Mr. C. R. George, city electrician, Houston, Tex., is the secretary of the association.

Proceedings of Municipal Electricians' Convention.—The proceedings of the sixteenth annual convention of the International Association of Municipal Electricians, held at Atlantic City, N. J., September 12-15, 1911, have been published in book form, and copies have been sent to the members. The volume contains nearly 200 pages and is neat in appearance and mechanical execution. The frontispiece consists of a portrait of Mr. John W. Kelly, Jr., of Camden, N. J., president of the association, and portraits of other officials are scattered throughout the pages.

Concrete Telephone Poles.

The American Telephone & Telegraph Company has erected a number of experimental concrete telephone poles between Bloomington and Wilmington, Ill. These poles are thirty feet long, six inches square at the top and twelve inches square at the ground level, weighing about 2,000 pounds each. They are made in the form of a hollow square with walls two inches thick which are reinforced with steel rods. Cross arms are bolted on through holes left in the concrete when the pole is cast, and steps are made of through bolts provided with a shoulder, holes for these also being left during the molding of the pole.

Western Union Philadelphia News.

The first dinner of the Dot-and-Dash Club will be held on the evening of May 11. It will be called a "Reminiscent" dinner, and no doubt some of the old-timers will have something to say that will be very interesting. The club is growing and meeting with much success.

Clayton, Del., is connected by a loop from the main line. A few days ago the loop failed to work and a lineman found tangled up in the wires a beautiful silver crane which had broken its neck in its efforts to free itself from the wires. The bird was shipped to Mr. R. C. Murray, plant chief, this city, and was placed on exhibition in the main office.

Telegraph and Telephone in East Africa.—The Governor of the East Africa Protectorate reports that on March 31 of last year there were 2,261 miles of telegraph wire and 1,016 miles of pole line in the protectorate. There were 304 miles of telephone lines carried on 60 miles of pole line and 300 telephones were in use at that time.

The Secret of Success.—Col. Theodore Roosevelt was recently asked, "What is the secret of success?" His reply was: "There is no secret about it. It's the simplest thing in the world. Just do what you have to do and do it right away and as well as you possibly can. What good is a motto? Just rush out and attack the breastworks."

Western Electric Company's Report.—In making comparison between the business done by the Western Electric Company during the fiscal years of 1910 and 1911, as shown by its annual report, account has to be taken of the fact that the fiscal year 1910 had thirteen months. Making twelve-thirteenths of this year's business for purposes of comparison, the report for 1911 shows gross sales of $66,211,975 against $63,115,512 for 1910. The increase in manufacturing costs and expenses more than offset this increase in gross receipts, however, leaving net earnings of $4,135,201 for 1911 compared wth $5,002,308 for 1910. The 1911 balance available for dividends of nearly 22% is more than twice the regular 8% dividend rate plus the usual yearly extra 2%. The surplus on hand after deducting interest charges, dividends and amount paid to reserve, is $980,292 for 1911 as against $1,554,732 for 1910.

Western Electric News.—The Western Electric Company has begun the publication of a monthly journal called *The Western Electric News*. The headquarters are in New York and the Board of Editors consists of P. L. Thomson (Editor-in-Chief), E. A. Hawkins, C. H. Johnson, R. Raymond, W. F. Hendry, F. H. Leggett and G. C. Pratt. The first number has an attractive front cover in colors.

Telegraph Service of a Large Newspaper.—During the week ending March 30, 530,000 words were received by telegraph by the *New York Times*. Of these about 350,000 words were Associated Press matter. The exact total of "special dispatches," as shown by the bills of the telegraph companies, was 181,484 words, including 25,859 words foreign news. The foreign service included 24,910 words transmitted by wireless telegraphy.

The Vibroplex.

The new model direct point Martin vibroplex is an entirely new departure in sending machines and it is claimed has solved the sending machine problem. Dots and dashes are made on the same contact point, thereby insuring perfect signals.

This up-to-the-minute transmitter has an advantage of at least 50 per cent. over the old style Martin vibroplex which has been so popular for the past ten years. One of the chief reasons why these transmitters have proven so satisfactory is that Mr. Martin is an expert telegrapher and has at heart the welfare of the fraternity. It has been his constant endeavor and desire to give to the telegrapher that which is best. When he originated this art of transmission the discovery was received with scant approval. He was forced to give away hundreds of instruments in order to introduce them. He had to teach the operators how to manipulate them. Then, when their merit became known, competition sprung up. Some of these competitors were not telegraphers; they were utterly lacking in experience and their make-shift apparatus naturally had a temporary damaging effect on the good machines, but "the survival of the fittest" doctrine applies as well to transmitting machines as to anything else, and the Martin transmitter has emerged from the battle unscathed, and victorious. Mr. J. E. Albright, 253 Broadway, New York, is the sole selling agent for this machine.

The Calculagraph.

The necessity for a device to record elapsed time from the beginning to the end of an event or operation led to the development of the Calculagraph. By the use of this instrument there is no possibility of clerical errors and there is no chance for falsifying the record by tampering with the machine.

Several different models of the Calculagraph are made, arranged for recording time in different denominations. One model records elapsed time in minutes and fractions of a minute, and is used in

THE CALCULAGRAPH.

every telephone exchange in the United States and Canada where a considerable amount of toll business is handled. This type of Calculagraph, it is stated, is also the standard apparatus for timing toll messages in every country in the world where telephones are used, and the manufacturers are now executing an order from the French government for one hundred of these machines for use in its telephone exchanges.

One type of Calculagraph records elapsed time in hours and minutes, and another model in hours and tenths of an hour. These are very extensively used in manufacturing plants and in other industries where large numbers of persons are employed.

Western Union Affairs in Richmond, Va.

H. H. Cramer, who succeeded the late E. N. Dennis as night chief operator, has been promoted to be day chief operator, succeeding F. R. Veale, transferred to the cable service with headquarters at Atlanta, Ga. Mr. Thos. Farley, repeater man in this office for several years, has been promoted to succeed Mr. Cramer and S. V. Moody of the operating department has been appointed to succeed Mr. Farley. The offices of superintendent, J. S. Calvert; commercial superintendent, F. O. Nourse, and district plant superintendent, J. B. Faulkner have been moved into the company's new headquarters in the Travelers Insurance building, recently constructed. The operating plant and commercial departments will be removed later.

Western Union New Main Office at Houston, Texas.

The Western Union Telegraph Company is completing a new main office at Houston, Tex., which will rank among the finest telegraph stations in the country. The operating department, which will occupy the second floor, will be equipped with apparatus of the latest design, and will have seventy-eight operators' positions, and a large repeater-outfit. Five sections of the new type switchboard will be installed and the dynamo plant will be of modern design.

Ample and commodious quarters are provided for the employes and every effort has been made to insure their comfort. The business or commercial office on the ground floor will be simply, but handsomely furnished and no effort has been spared to make it convenient and comfortable both for the public and the employes.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL.

The annual ball of the Electrical Aid Society of Philadelphia, set for April 17, promises to surpass all former affairs both financially and socially.

Mrs. Taney has resigned, to go to Boston.

Mr. R. Gould, of New York, was a recent visitor on company business.

NEW YORK WESTERN UNION.

Sympathy is tendered to Mr. Joseph Piccolo, chief of the newspaper division, on the death of his father on March 31.

Mr. James L. Young, manager of the Gold Street office has been elected captain of Company "I", forty-seventh Regiment, N. G. N. Y. Captain Young is the youngest officer in the Guard and one of its best shots.

Mr. M. Walton Jones, formerly of superintendent E. M. Mulford's office, and for the past two years in the employ of the Guayaquil and Quito Railway, South America, has been promoted to the position of train master for that company.

J. Walton Smith, aged fifty-four years, a well-known New York telegrapher, for many years identified with this department and with the *World* Telegraph Bureau, New York, died at Atlanta, Ga., April 3. Mr. Smith recently went South for the benefit of his health.

Jas. T. Shain, aged 70 years, familiarly known as "Dock" Shain, died in New York on April 3. Mr. Shain was an old-time telegrapher and was well known in Philadelphia and other sections of the country. He had worked in this office for the past thirty-five years.

Courtland M. Cunningham, aged 59 years, a well-known New York telegrapher, died in Brooklyn on April 4. Previous to his coming to New York in 1878 he was employed at Omaha, Neb.

A new time stamp has been introduced in this department to record the arrival and departure of each employe. It seems to give satisfaction. Each member of the staff carries a card which he inserts in the clock on arriving and departing from the office.

Telegraph and Telephone Age

No. 8. NEW YORK, MAY 1, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Ideas As a Business Asset.

There is probably nothing in this world any more valuable than ideas, notwithstanding the fact that there is no living person who has not had a goodly share of them during his life time. No one is too poor to have some, yet comparatively few derive much, if any, benefit from them because they either belittle the importance of the lines of thought in which their mind turns or they are incapable of carrying into execution the suggestions of that little small voice which is endeavoring to urge each of us onward to success.

Did it ever occur to the reader that ideas, or rather the faculty of evolving, accumulating, and promoting them, might be made a profession or line of business? If not, it should be known at once that no one has ever achieved any great degree of success in this world without pursuing this line of thought and action.

The head of one of our greatest industries as a boy worked several years in a small country store for five dollars per week. Business was so dull that in order to kill time he used to dress the shop window with different kinds of goods to represent animals or machinery, and thereby unwittingly attracted the attention of the editor of the local newspaper who, when news was scarce, often referred to these unique displays. This free advertisement was read by a merchant in an adjacent town who wrote to the boy and offered him $10 per week. The boy accepted. The new employer then told the boy that he was not hired simply to sell goods over the counter to regular customers—anyone could do that, and he could get all the boys he wanted for $5—but that he was employed for the sole purpose of evolving ideas that would bring strangers into the store.

This was a strange proposition to him but he immediately put on his thinking cap and let his mind work overtime. The result was a large business soon came to his employer's store, and the store gained a state-wide reputation.

Naturally the "promoter's" services were in wide demand and each offer he received was succeeded by a better one until finally he found himself general manager of one of the biggest concerns in this country, and all the capital he had to start on was what we all have—ideas.

Probably the reader will say, "but I'm not a merchant. I'm a telegraph or telephone operator and not in a position to attract the public's attention." If so, that is where you make a mistake. What you need to do is to attract your employer's attention. Every now and then you have seen an improvement made in some apparatus that you have been using daily, and possibly may have thought of the same thing yourself, but you let it pass and a wiser man reaped the reward. Not only that, but when he suggests another improvement of some kind it will be found that the prestige he gained by his first effort will assure its consideration at least, and at the same time he advances a little nearer the center of the stage.

The point of this illustration is, get started. Do something, even if you fail. Do not stop if your first move is a failure; very few succeed at first.

Now, there are many things that might be improved in the telegraph service, both mechanically and electrically. If you are of a mechanical turn of mind devote your attention to bettering or cheapening the construction of the apparatus before you; if electrically inclined, to improving their operation by means of some new method. There are many things needed. For example: A really satisfactory means of eliminating inductive effects due to the proximity of wires; a self-adjusting or compensating single line Morse relay; a means of duplexing a wire without using an artificial line for the purpose of balancing it; a simplified "double loop repeater" that will immediately disclose on open circuit on the receiving side of the extra loop.

A fortune awaits the one who solves any one of the first three problems mentioned; they are not impossible of solution. The day has arrived when we can safely say, "there is nothing impossible, it is merely a matter of time and the right man." Try to be that man!

Recent Telegraph and Telephone Patents.

ISSUED APRIL 2.

1,021,920. Telephone Receiver. To W. W. Dean, Elyria, Ohio.

1,021,942. Printer for Multiplex Printing-Telegraph Systems. To D. Murray, London, Eng.

1,022,175. Telephone. To R. A. Boniventure, New York.

1,022,253. Telephone Transmitter. To M. Moloney, Christchurch, New Zealand.

1,022,350. Telephone. To C. C. Blackman, Bridgeport, Conn.

ISSUED APRIL 9.

1,022,519. Telephone Repeater. To N. G. Warth, Columbus, Ohio.

1,022,522. Telephone-Exchange System. To H. G. Webster, Chicago, Ill.

1,022,540. Wireless Signaling. To R. A. Fessenden, Pittsburgh, Pa.

1,022,713. Telephone System. To F. C. Unger, St. Louis, Mo.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange April 24:

American Telephone and Telegraph Co.	146½
Mackay Companies	84
Mackay Companies, preferred	69¼
Western Union Telegraph Co.	84⅝

Personal.

Miss Myrtle Stumm, daughter of Mr. F. A. Stumm, a well-known old-time telegrapher, but now retired, was married April 9, to Mr. F. D. Graham, at Arcola, N. J.

Mr. W. Noble, who has been appointed assistant engineer-in-chief of the British postoffice, London, England, was employed as an operator in the English telegraph service at Aberdeen, Scotland, until the age of 33 years. He has been in the engineering branch of the service at London for the past eighteen years.

French Wireless Operators Shot by Arrangement.—Four French wireless operators at Fez, Morocco, were killed recently, it was thought, by the Moors, who are in rebellion against the French. Later dispatches, however, state that rather than fall into the hands of the Moors, by whom they were to be inevitably captured, they, by lot selected one of their number to shoot the other three and then kill himself, which arrangement, it is stated, was carried out.

In Memory of Wireless Operator Phillips of the "Titanic."—The telegraphers of Madrid, Spain, have decided to place the portrait of J. A. Phillips, the wireless operator, who lost his life in the "Titanic" disaster, in a place of honor in the principal operating room. They wll also ask the International Bureau at Berne, Switzerland, to take some steps toward perpetuating the memory of the brave operator.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, New York, has gone on a trip through the South and West and will be absent until about the middle of May.

Mr. G. H. Usher, general superintendent, and Mr. G. W. Ribble, district superintendent, Atlanta, Ga., visited Jacksonville, Fla., recently, on an inspection tour.

Mr. F. E. Norton, superintendent of traffic, New York, is on a trip through the west on company business.

Mr. Guy E. Paine, Chicago, Ill., superintendent of the second district, has resigned to engage in other business. He has associated himself, as a partner, with well-established insurance brokers in the South.

Mr. D. H. Gage, Jr., of the electrical engineer's office, has gone to Chicago on company business. Mr. A. J. Eaves of the same department has returned from Washington where he went on business connected with the engineering service.

A conference of managers of the second district of the Eastern Division was held in New York, April 25 and 26. Those present were Mr. E. Kimmey, superintendent, New York, and the following managers: F. Orchard, New London, Conn.; F. H. Dernell, Burlington, Vt.; T. F. Burke, Poughkeepsie, N. Y.; S. H. Flint, Bridgeport, Conn.; M. L. Barns, Troy, N. Y.; C. F. Horstman, Schenectady, N. Y.; B. F. Ziegler, Wilkes-Barre, Pa.; J. C. McGeehan, Hazelton, Pa.; A. C. Ackerman, Jersey City, N. J.; J. G. Sutliff, Elizabeth, N. J.; H. A. Guyon, Yonkers, N. Y.; C. W. Oram, New Brunswick, N. J.; W. B. Hynds, Norwich, Conn.; J. C. Churchill, Meriden, Conn. They all attended the Mapnetic Club dinner April 24.

Much sympathy is being expressed for Mr. George M. Eitemiller, of the Detroit office of this company, in the loss of his son, Floyd, in the "Titanic" disaster, April 14. Mr. Charles C. Adams, second vice-president, New York, personally tendered Mr. Eitemiller his heartfelt condolences and all the other officials at headquarters expressed themselves feelingly in regard to Mr. Eitemiller's bereavement. Everyone in the service, from the highest officials down, condole with that gentleman and feel that his great bereavement to a large extent is theirs.

The Mackay Telegraph & Cable Company will shortly lay an additional cable across the bay at Galveston, Tex. It will be a 20-conductor armored submarine cable, 12,000 feet in length.

Atlanta Banquet Postponed.—The third annual banquet of the Postal Telegraph Club of Atlanta, Ga., which was to have been held April 20 has been postponed until after the Grand Opera week, which covered the same date. Mr. L. A. Minor is secretary of the club.

Newport Messengers Ride to Boston on Bicycles.—Lester Martin and Peter Reid, two Newport, R. I., messengers of the Postal Telegraph-Cable Company, recently rode to Boston and back on their bicycles. They spent a day in Boston sightseeing as guests of the Boston messengers.

Telegraph Lines Submerged in Mississippi River Flood. — During the recent disastrous floods in the South, much damage was done to telegraph lines. Photographs received by Mr. W. I. Capen, general superintendent of plant, Postal Telegraph-Cable Company, New York, show how the company's lines suffered in the vicinity of Memphis, Tenn. Poles twenty-five high were entirely covered by water. One of the photographs shows linemen in a boat at work on the line with the water up to the cross-arms.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee, has returned from a trip to South America. He visited cities on the eastern and western coasts and the Panama canal.

Mr. C. H. Murphy, general superintendent of time service, New York, has returned from a business trip to the Mountain and Pacific Divisions, having visited all of the large cities on the coast.

April 19 was the 51st anniversary of the capture of Mr. W. J. Dealy, general superintendent of the commercial news department of the Western Union Telegraph Company, New York, at the breaking out of the Civil War. Mr. Dealy was no doubt the first prisoner taken by the Confederates.

Mr. D. C. Dawson, district traffic superintendent, St. John, N. B., who has been spending several months on the Pacific Coast stopped off at New York recently on his return to St. John and called on friends.

Mr. P. D. Callum, division solicitor, New York, has been appointed commercial agent and attached to the staff of Mr. E. M. Mulford, division commercial superintendent, New York. Mr. Callum succeeds Mr. A. C. Kaufman who has been appointed division cable manager.

Mr. Frank V. Moffit, district commercial manager, Chicago, Ill., has been appointed manager at Toledo, Ohio, to succeed F. J. Krumling, deceased. Mr. Moffitt has been succeeded by Mr. L. J. Mink, formerly general solicitor, Chicago.

Mr. Jos. E. Fenn, division equipment inspector, Atlanta, Ga., in addition to his other duties, has been placed in charge, by supervisor of equipment L. B. Thompson, of the division storage battery systems, motor-generators, generators, etc. Mr. Fenn is one of the old-timers, an electrical engineer of ability and has had a wide general experience.

Mr. H. M. Armistead, manager of the Salisbury, N. C., office, has been transferred to Raleigh, N. C., as manager. Mr. Chas. M. Martin, of the Winston-Salem, N. C., office, has been appointed manager of the Salisbury office, to succeed Mr. Armistead.

Mr. F. D. Byrne, of the cable service at Duxbury, Mass., has been transferred to the cable department at Philadelphia, Pa.

Col. George L. Lang, former superintendent of telegraph of the Queen & Crescent Railway system, Chattanooga, Tenn., has been appointed special agent for the Western Union Telegraph Company, with headquarters in Chattanooga. Since leaving the Queen & Crescent system, Col. Lang has been engaged in other lines of business, and it will be gratifying to his many friends to know that he has returned to the telegraph service. He has had a wide and long experience in railway and commercial telegraphy and is well equipped to fill his new duties.

A meeting of Maine and New Hampshire managers was held at Portland, Me., April 26, and presided over by Mr. C. F. Ames, district commercial superintendent, Boston, Mass.

The following changes are announced by district superintendent J. R. Terhune, Nashville, Tenn.: Mr. Ozro Stanley of Memphis, Tenn., has been appointed local commercial agent. Mr. L. C. Smith has been appointed manager at Johnson City, Tenn., vice Mr. F. E. Frazier transferred to Ashland, Ky., as manager. Mr. C. W. Chenault, former manager at Ashland, has been appointed district manager, with headquarters at Nashville.

Mr. J. W. Collins, general traffic chief, Washington, D. C., has been promoted to be assistant to district plant superintendent R. J. Meigs at Philadelphia, Pa. Mr. Harry McKeldin has been appointed to succeed Mr. Collins at Washington, D. C.

Western Union and Marconi Traffic Arrangement.

The Western Union Telegraph Company has entered into a traffic arrangement with the Marconi Wireless Telegraph Company whereby the Western Union offices receive and deliver Marconigrams to and from Europe. The agreement provides for the extension of the Marconi system from the Pacific coast of the United States to Hawaii, China, Japan and the Philippines, thus giving the Western Union Company a wireless trans-Pacific service.

The English and American Marconi companies have agreed to construct a number of long distance wireless stations including the ones at London and New York, as previously announced in these columns.

At a special meeting of the Marconi Wireless Telegraph Company of America held in New York, April 18, the capital stock of the company was increased from $1,662,500 to $10,000,000.

Expropriation Proceedings in Louisiana. — The Western Union Telegraph Company has filed an expropriation proceeding at New Orleans, La., against the Louisville & Nashville Railroad Company for the right to maintain its telegraph poles and wires on the railroad company's bridge over Lake Ponchartrain at the Little Rigolets and Rigolets.

Heavy Telegraph Business on Account of the "Titanic" Disaster.

The greatest amount of telegraph business ever sent by the Western Union Telegraph Company from New York was handled April 18, in consequence of the "Titanic" disaster. Both the Western Union and the Postal Telegraph-Cable Companies had extra forces on duty for the occasion. The amount of press matter handled far exceeded the highest previous record.

The transatlantic cable service was also very heavy.

O. L. Turner, Superintendent, Dallas, Tex.

Mr. Owen L. Turner, district superintendent, Western Union Telegraph Company, with headquarters at Dallas, Tex., was born at Wabash, Ind., February 17, 1866, and entered the telegraph service in Auburn, Ind., July 4, 1882, as messenger.

With the exception of a year or two, in 1883 and 1884, during which time he was employed as operator on joint railroad work, Mr. Turner has been in the continuous service of the Western Union Company. Among the many positions held by him up to the present time, are, night chief operator at Ogden, Utah; assistant chief operator at St. Louis, Mo.; chief clerk to the superintendent at St. Louis, Mo., and, latterly, chief clerk to general superintendent L. McKisick, Dallas, Tex.

O. L. TURNER,
Superintendent, Dallas, Tex.

Western Union Pensions.—The brief and exact wording of the official announcement of the pension plan of the Western Union Telegraph Company was fully elaborated in our issue for April 16. The interpretation of the order as there given was authorized by the company, and explains how a pension in a given case can be determined. Every one interested should have a copy of this paper containing the article. Copies can be obtained at the office of TELEGRAPH AND TELEPHONE AGE, at 10 cents each.

The Cable.

The Commercial Cable Company's repair steamer "Mackay-Bennett" was chartered by the White Star Line and sent from Halifax April 17 to the scene of the "Titanic" disaster to search for bodies. A large number were found.

The cable steamer "Minia" of the Anglo-American Telegraph Company was placed at the disposal of the White Star Line and is now at the scene of the "Titanic" disaster searching for bodies from the ill-fated steamer.

British Pacific Cable. — The total number of words sent over the British-Pacific cable system, exclusive of inter-colonial traffic between Australia, New Zealand, and the Fijis, amounted to about 208,000 words in January, and about 211,000 in February, this year.

Japanese-Korean Cable.—The Communication Department in Tokyo, Japan, has decided to lay a new submarine cable between Shimonoseki and Fusan and also to erect a through wire between Nagasaki and Tokyo. There are already two submarine cables between Fusan and Shimonoseki. Besides these, Chosen and Japan are connected by a line between Wonsan and Matsuye, in Izumo Province, and another between Seoul and Osaka.

Central and South America Cable Rates Reduced.—The Central and South American Telegraph Company announces that on and after May 1 the rate "via Colon" and "via Galveston" to and from Colombia, Ecuador, Bolivia, Peru, Chile, Argentine, Uruguay and Paraguay will be reduced 20 cents per word. The reduction to and from those countries also applies to Europe, but not to China, Hong Kong, Chosen (Corea), Formosa, Japan, Philippines, Pacific Islands and Australasia.

A New Morse Telegraph System.

In our issue for April 16 we printed a description by Mr. J. W. Larish of a new system of Morse telegraphy invented by Mr. Patrick B. Delany, secrecy being one of the characteristic features of the system.

The illustration (Fig. 2) showing the form of the Morse characters as they are transmitted over the wire, was slightly defective due to imperfect etching of the plate by the engraver and gives a wrong record of what actually takes place. The dash and dot of the "n" in the word "shipping" and the two dashes and dot of the "g" should have been shown on the second line (the transformed characters) as well as on the first line. In the transformation Mr. Larish states that single dots always appear as such when in combination with dashes, exactly as in straight Morse. Therefore by adding a dot at the end of the last dash and one at the end of the third dash from the end of the lower line of characters a correct understanding will be obtained as to how the word "shipping" actually sounds to an interloper on the wire.

Obituary.

F. C. Simpson, aged 42 years, purchasing agent for the Missouri & Kansas Telephone Company, died in Kansas City, Mo., April 6.

Edwin Middleton, aged 84 years, who built the second telegraph line in the United States, died at Point Pleasant, N. J., April 19.

Thomas Jefferson Coolidge, Jr., of Boston, Mass., member of the board of directors of the American Telephone & Telegraph Company, died at his home in Manchester, Mass., April 14.

Maurice Brick, aged 60 years, a well-known old-time telegrapher, died in Washington, D. C., April 23. Mr. Brick was born in Watkins, N. Y., and was division chief at 195 Broadway, New York, for many years previous to 1883. He has been a resident of Washington, D. C., for the past twenty years.

George F. Eitemiller, son of Mr. George M. Eitemiller, the well-known old-time telegrapher, now with the Postal Telegraph-Cable Company, at Detroit, Mich., was a passenger on the ill-fated "Titanic," and was lost with the other passengers when the steamer sank. He was returning from a three-months' trip in Europe, as the representative of a Cincinnati automobile company.

Milan W. Russell, aged 55 years, a well-known telegrapher, died at Calgary, Alt., Canada, April 2. He was a native of Michigan and had occupied many positions in the railroad and commercial telegraph service throughout the West. In 1891, he became editor of Telegraph Age. Mr. Russell was prominent in Telegraphers' Brotherhood affairs, and a few years ago was on the editorial staff of the "War Cry," the official journal of the Salvation Army.

Albert L. Suesman, aged 68 years, a well-known old-time telegrapher, died in Oak Bluffs, Mass., April 13. He served in the Civil War as a member of the Twelfth Rhode Island Regiment. When he was mustered out of the military service he learned telegraphy and for several years was an operator in the Western Union Office at Providence, R. I., resigning as such to become manager at that point of the American Rapid Telegraph Company and later, of its successor organization, the Bankers and Merchants Telegraph Company. In 1885 he entered the service of the United Press as general Western manager with headquarters at Chicago. "Naturally alert, enterprising and possessed of the keenest intelligence." says Mr. Walter P. Phillips, his former associate, "he accomplished miracles in extending our service, pushing it westward until he placed it up and down the Pacific Coast, from Vancouver to Los Angeles and obtained for us firm alliances with newspapers of the greatest importance, such as the *San Francisco Examiner* and *Portland Oregonian*." After the absorption of the United Press by the Associated Press, in 1897, Mr. Suesman was with the Columbia Phonograph Company, in New York and Chicago, and later with the Bell Telephone Company in Kansas.

Mutilators of Telegraphy and Telephony.

In our issue for April 1, we printed on page 217, an article under the caption "Mutilators of Telegraphy and Telephony," written by Mr. F. M. Ewing, of Williamsport, Pa. The article has attracted considerable attention among our readers, and is being favorably commented on. Mr. I. D. Maize, of the Western Union Telegraph Company, Philadelphia, Pa., says he heartily endorses what Mr. Ewing says regarding "butchers of Morse," and offers some suggestions.

"If the sending operators," he says, "would only stop to consider for one moment the misery they are entailing on the receivers with their imperfect sending, they might be brought to realize the fact that a little better service would make it easier for the receiver. Many of them, however, will give the weight on their transmitting device another turn and do worse than before.

"A good receiver," he continues, "will never find fault with good sending, as it is a joy and a pleasure to receive when one is sure of every letter and word. This state of mind, however, cannot exist when the sending is by means of a transmitter. There is a vast difference in the sense of a message when one gets 'hold' for 'sold' or 'Shencer' for 'Spencer.' There are often single letters in a message and it is extremely difficult to tell whether the sender tried to make a 'p,' '6,' 'B' or '8.' "

"The receiving operator should be the judge of the sending and the sending operator should take heed if the receiving operator calls his attention to his deficiencies, if any exist."

Western Union Standard Window Signs.

The Western Union Telegraph Company is issuing, through its Engineering Department, specifications providing for uniform window lettering in all offices of the company where the Bell telephone system maintains public pay station service. The upper panels, reading "Western Union" will have a white translucent field on which will appear opaque blue letters. Below this will appear the joint office trade mark, which will be furnished in decalcomanias. The lower panels naming the different classes of service will consist of white translucent letters on an opaque blue field.

Twenty-four Hour Clocks in France.—A new system of measuring time will be inaugurated in the French railway, postal and telegraph services on June 1. The hours will be numbered from one to twenty-four from midnight to midnight. This new system will abolish the use of "a. m." and "p. m."

The Dick Patent Case.—The Supreme Court of the United States has declined to rehear the Dick patent case.

Mr. F. O. Nourse, district commercial superintendent, Western Union Telegraph Company, Richmond, Va., writes: "It gives me great pleasure to renew my subscription, first on personal grounds, and second because of the value of the paper."

Radio-Telegraphy.

Government Ownership of Wireless Systems.—Representative Berger, of Wisconsin, has introduced a bill in the House of Representatives at Washington, providing for the nationalization of the radio-telegraph systems.

New Marconi Directors.—John R. Sheffield, John L. Griggs and Kenneth K. McLaren have been elected directors of the Marconi Wireless Telegraph Company of America.

Mr. Marconi on the Witness Stand.—Signor Guglielmo Marconi was on April 25 a witness before the Senate committee investigating the "Titanic" disaster. He denied that the news of the sinking of the steamer was withheld by operators Bride and Cottam.

A Lesson Showing the Need of Wireless.—As a result of the burning of the steamer "Ontario" on Montauk Point, Long Island, recently, the New England Navigation Company is erecting a wireless station at Westerly, R. I.

Wireless Around the World Direct.—Signor Guglielmo Marconi states that he believes it will be possible in the near future to send a wireless message from New York completely around the world and be received by an instrument located in the same office with the transmitter, without any intervening relaying

Driven from His Wireless Post by Flames.—Herbert Ingalls, the wireless operator on the steamer "Ontario," which was beached on Montauk Point, L. I., recently, after being discovered on fire, stuck to his post until the flames destroyed part of the wireless equipment. He sent out the distress call before the flames crippled the apparatus.

Wireless Compass.—Signor Guglielmo Marconi has invented a so-called "wireless compass." Details of this apparatus have not yet been made public, but its general purpose is to enable navigators to determine the position of their ships in fog or stormy weather, by noting the direction from which wireless signals from shore stations and other ships are received.

Investigating Effect of Vegetation Upon Wireless.—Wireless tests are being conducted by the United States Navy Department, at Washington, D. C., Annapolis, Md., Philadelphia, Pa., and Norfolk, Va., to determine what effect vegetation has upon radio waves. The tests will consist of sending series of letters for a short period, followed by reports of the weather conditions. This will be done at irregular intervals each week under all kinds of weather conditions.

Simple Wireless Receiving Circuit.

Mr. Albert E. Peyton, of Fort Gibson, Alaska, has sent us a sketch of a simple wireless receiving circuit, a description of which, he thinks, may be of interest to wireless amateurs and experimenters. He uses a stove pipe for the aerial, and he has used, as well, for the purpose bed springs, a bracket lamp and a rifle in its rack in the same room. Mr. Peyton's office is about 600 yards from the wireless station at the Fort Gibson government post and he can, he states, hear the signals very plainly.

He uses an 80-ohm telephone receiver in series with the detector. The detector consists of a piece of silicon and a short length of fine steel wire which makes contact with the silicon, the lead connecting with the stove pipe.

The wireless plant at the Fort Gibson post is a 10-kw. quenched spark system of the Telefunken Company.

The Wireless Situation in the United States.—It was recently stated by a New York newspaper that the wireless patent situation in the United States is now "settled," but Mr. John L. Hogan Jr., points out that such is not the case. The Marconi Company, he says, is a party to some five patent suits at the present time, and is defendant in suits brought by the National Electric Signaling Company for infringement of three United States patents. Complete proofs have not been taken in any of these, and no patent of Marconi's has been broadly sustained by any United States court.

In addition to those above mentioned, he continues, numerous suits for infringements of Fessenden's basis patents have been brought against the Telefunken, Radio, North American, Wireless Specialty, and other companies. All of these are in process of litigation, and the outcome cannot be known for some time to come.

Effect of Atmosphere on Wireless Signals.

Mr. A. Esau describes in *Physikalische Zeitschrift*, his investigations on the effect of the condition of the atmosphere upon the damping of wireless telegraph signals. When the antenna wires are covered with hoar-frost or ice the damping is increased up to 200 per cent. In rain it increases up to 100 per cent., and when snow is falling up to 50 per cent. Fog causes very little change. The electrical conditions of the atmosphere causes changes up to about 20 per cent. Atmospheric disturbances increase with the increasing transparency of the air, with decreasing moisture, with increasing wind velocity, and with the formation of thunder clouds. They diminish with increasing cloudiness, mist and fog. They are more frequent at midday and at midnight. The maxima disturbances occur in June and August, with a secondary maximum in December. The winter months are quietest.

Wireless Telegraph Stations of the World.—The United States Navy Department has prepared a pamphlet giving a list of Wireless Telegraph Stations of the World. Copies can be obtained at the office of TELEGRAPH AND TELEPHONE AGE, New York, at 35 cents per copy.

Signal Corps Review.—The first company Signal Corps, National Guard, New York, will hold a music ride and review by Major-General J. F. O'Ryan at the armory at Seventh Avenue and Fifty-ninth street, New York, at 8 p. m., May 4.

The Telephone.

The headquarters of Mr. H. J. Pettengill, president Southwestern Telephone and Telegraph Company, have been transferred from Dallas, Tex., to St. Louis, Mo.

Telephone Regulation in the Southwest.—Mr. H. J. Pettengill, president of the Southwestern Telegraph & Telephone Company and of the other companies comprising the Southwestern group, advocates the establishment of corporation commissions in the various Southwestern states for the regulation of the telephone.

Mountain States Telephone & Telegraph Company.—The directors of the Mountain States Telephone & Telegraph Company have authorized the expenditure of approximately $2,250,000 for extensions and improvements during 1912. Of this sum, $500,000 will be spent on the new exchange in Salt Lake City, and about the same amount in extending and improving the service in the rapidly developing fruit districts in southern Idaho. The balance of the appropriation will be used in bettering the service throughout the territory covered by this company.

Cumberland Telegraph and Telephone Company.—The gross earnings of the Cumberland Telegraph and Telephone Company for the year ending December 31, 1911, were $7,372,661. Operating expenses amounted to $4,443,222, which, with charges and taxes of $637,208, left a surplus of $2,291,231. Out of this amount, dividends of $1,574,412 were paid giving a net surplus of $717,-819. This is a slight decrease compared with the surplus of $832,856 in 1910 although in this year the gross business was less than in 1911. The total surplus is now $5,519,843.

Telephone Facts in the Census.—The recent United States Census reveals some interesting facts regarding the telephone service in the United States, among which the following may be enumerated: Eight million miles of wire added to American telephone systems in five years. Iowa, Nebraska, Washington, Nevada and California lead the States in number of telephones to population. Texas sends more messages per capita than New Jersey and Utah leads Pennsylvania. Cleveland has the greatest number of telephones to every thousand inhabitants; New Orleans the least. In Chicago the company has 60,000 requests daily for the time. The busiest hour for the telephone exchange is between 10 and 11 a. m.; busiest day in the year, the day before Christmas. Five office buildings in New York have telephones enough for a city of 100,000 people.

An Electro-Magnetic After-Dinner Speaker.—Members of the Yale Club, residing in Chicago, recently held a dinner at the Hotel Blackstone and listened to a speech by telephone from president Hadley at New Haven, Conn. Two direct wires were connected through from president Hadley's home in New Haven to the Hotel Blackstone in Chicago, with a telephone repeater at the latter point, in order that no word of the speaker's remarks might be lost. The diners, seated in groups of eight at small tables, listened through Western Electric watch-case receivers to a most interesting five-minute speech. Having finished speaking, president Hadley took up a receiver on the second or listening circuit and for over half-an-hour listened to the songs and cheers of the gathering. To president Hadley, therefore, belongs the unique distinction of having made the longest long-distance speech on record.

Changes in Southwestern Telephone Management.—Mr. H. J. Pettengill, president of the Southwestern Telephone and Telegraph Company, Dallas, Tex., has announced the following changes in the company's executive staff: C. A. Gates general superintendent of the plant department, has been appointed general manager. E. D. Nims becomes vice-president of the Bell Telephone Company of Missouri and the Pioneer Telephone and Telegraph Company of Oklahoma. Edgar S. Bloom becomes second vice-president of the Southwestern Telephone and Telegraph Company, with headquarters in St. Louis. J. P. Crowley becomes secretary of the Southwestern Company at Dallas. J. E. Farnsworth continues as first vice-president of the company, but is relieved of general management burdens in order to devote necessary time to the higher responsibilities of his position. Col. G. W. Foster has been appointed as his assistant.

Mr. Vail on Automatic Telephone Systems.

Mr. Theo. N. Vail, president of the American Telephone & Telegraph Company, being asked recently as to how extensively the automatic telephone would be used in the future, said that in his opinion the automatic and manual systems will both be used in the future, each to serve in its peculiar field. "We are not," he said, "building up our reserve with the idea that we may be compelled to abandon the manual system for the automatic. We could and would have adopted the automatic system long ago had we thought it practical for our needs.

"If the automatic operating cost were less than that of the manual system," he continued, "we would have installed it before this. As for other claims made for the automatic service, we are unable to see that they are well founded. There must be intelligence somewhere on the line in case anything goes wrong. Our system is automatic from the time you give your number to the operator, and we believe that in the great majority of cases the operator is an essential part of the system as serving to correct at once any trouble a subscriber may have. Finally, the automatic system does not make the work less for the subscriber, but on the contrary shifts the operator's duties to the subscriber. Undoubtedly, the automatic service will find a field of its own, but in my opinion it will never supplant the manual system any more than the wireless telegraph will supplant the wire telegraph for land service. It is not adapted to the needs."

Telephone Subscribers Agents for Western Union.

It was reported from Philadelphia recently, that the Western Union Telegraph Company was adopting an arrangement whereby certain telephone subscribers are made agents for the company, receiving 10 per cent. commission on all telegrams sent over the telephone wires, and that agents of the Department of Justice, are investigating the legality of the scheme under the anti-rebate law.

Mr. F. H. Bethell, vice-president of the New York Telephone Company explained that for some time it had been the custom to make the people in charge of many of the drug store, hotel and other telephone pay stations, agents of the company, with a commission interest in the receipts. The same idea, he explained, was now being tried to a limited extent with the telegraph company, the drug store people receiving the telegram, accepting payment, and, after telephoning it to the Western Union office, collecting their commission.

Chinese Telephone Students in the United States.

During the early part of 1911, the authorities of the Government Technical College at Shanghai, China, or Nan Yang University, as it is now known, feeling the growth of a national telephone system to be assured, took up with the Western Electric Company's representative in China the question of sending a number of the members of the graduating class in electrical engineering to the United States for training in that company's shops.

The necessary arrangements were quickly made and after graduation in July, 1911, three men, the first ever sent out by the University for such training, came to Chicago to the Hawthorne plant of the Western Electric Company, where they will engage in the practical study of telephony, in the company's student course. Following this, they will spend some time with one of the large operating telephone companies. Upon completion of their studies, they will return to their native land, where it is expected that they will be of material assistance in promoting and developing the telephone system of China.

Bell Memorial at Brantford, Ont.

The Bell Memorial, which is to be erected at Brantford, Ontario, the birthplace of the telephone, will be completed some time during the summer of 1913. The Bell Telephone Memorial Association at Brantford, under whose auspices the memorial is being prepared, plans also to purchase Tutela Heights, the family homestead at which Dr. Alexander Graham Bell experimented with his invention during his vacations.

The memorial proper is to be a statuary design of granite showing allegorical figures representing humanity sending and receiving messages. Between these figures which are so placed as to give the impression of great space between the speaker and listener, a flight of broad low steps leads to a large sculptured panel designed to show man discovering his power to transmit sound through space, and three floating figures representing the messengers, Knowledge, Joy and Sorrow. To the left of the large panel will be a portrait in relief of Professor Bell, modeled from life. On the back of the design are four pilasters between which runs a telephone line, and binding the whole is the line of the earth's curvature, expressing the world-wide use of the telephone.

Telephone Franchise in Ottawa.—The city of Ottawa, Canada, has given to the Bell Telephone Company a 5-year exclusive franchise, the company to pay $12,000 annually (against $5,000 formerly) and supply the city with 20 telephones free. The service rates are to remain the same —$45 for business telephones and $25 for residence telephones.

Canadian Telegraph Lines.

The following figures relating to the operation and equipment of the various Canadian telegraph companies in the year 1910-11 are published in the *Railway and Marine World*:

The Dominion government owns 8,406 miles of telegraph line and cables, 8,150 miles being land lines. There are 603 offices, and 249,915 messages were sent in the year. The expenditure was $432,-970.04, and the revenue $169,585.15, a deficit of $263,384.89.

The Canadian Pacific Railway Telegraphs operated 12,257 miles of telegraph line, with 76,175 miles of wire, sending 3,431,493 messages. It has 1,372 offices.

The Great North Western Telegraph Company operated 11,234 miles of pole lines, with 50,092 miles of wire, sending 2,907,495 messages, and has 1,183 offices.

The Western Union Telegraph Company had 2,639 miles of pole lines with 11,024 miles of wire, sending 551,764 messages, with 217 offices.

The North American Telegraph Company operated 605 miles of line, with 783 miles of wire, and sent 38,015 messages, with 83 offices.

The Grand Trunk Pacific Railway operated 1,699 miles of pole lines, with 5,081 miles of wire, sending 71,154 messages with 73 offices.

The Algoma Central Railway had 130 miles of line, 174 miles of wire, and sent 3,639 messages with four offices.

The Temiskaming & Northern Ontario Railway had 265 miles of pole line and 1,865 miles of wire, sending 131,106 messages with 22 offices.

The total mileage of pole line owned by all the companies in Canada was 28,729, and the line mileage operated by telegraph, telephone and cable companies was 145,997. Messages taken and delivered over all these lines, not including press messages, 7,134,665, and total number of offices 2,934.

New York Electrical Show. — The New York Electrical Exposition and Automobile show of 1912 will be held at the New Grand Central Palace, New York, October 9 to October 19.

Testing on Railroad Telephone Circuits.

BY K. W. ENDRES, NEW YORK.

(*Continued from page 252, April 16.*)

INSTALLATION TESTS.

After the line and drop wires have been installed on a telephone train dispatching circuit, it is desirable to make sure that these are in good shape and perfectly clear before going ahead installing the apparatus at the stations. This can best be done by wiring a telephone set across each end of the line and talking. If the line is in trouble, due to grounds, crosses, or bad leaks, this will be revealed either through conversation being impossible, noise on the line, or both. If the line is quiet and conversation clear and loud, it is probably in first-class condition. It would also pay, if there is time, to bridge a telephone receiver across the line somewhere near its middle point and listen there for a day or so, reporting all noise heard.

If switching panels or test boards are installed, the line can be opened at successive points and by listening on either side of the break, it can be found in which direction the noise exists. Thus it can be closely located. If testing equipment is not installed, it is then necessary to send out a man to hunt the trouble. This will generally appear either in the transpositions, which may be crossed, or in the guy wires which may have become slack and so ground the line when they sway. Crossed transposition wires should be cleared and the guys tightened in such cases. Trouble should also be looked for at bridges. If it appears at such points, it may be advisable to run circular loom cable under the bridge. Twisted pair is not especially satisfactory for such service, owing to the fact that the insulation is quickly destroyed by the locomotive gases. Open circuits, of course, should not appear on a newly constructed line.

Readings should be made on the line with a voltmeter and milliammeter. The resistance of the circuit can be calculated from wire tables giving the size of wire and its resistance per mile. Now, take a battery of dry cells and measure its voltage (using about twenty cells in series); then make a loop of the line by short-circuiting its distant end and apply the battery through the milliammeter. If the actual current flow does not agree closely with the calculated current, it is an indication of trouble. The current reading which should be obtained on the milliammeter may be figured as follows:

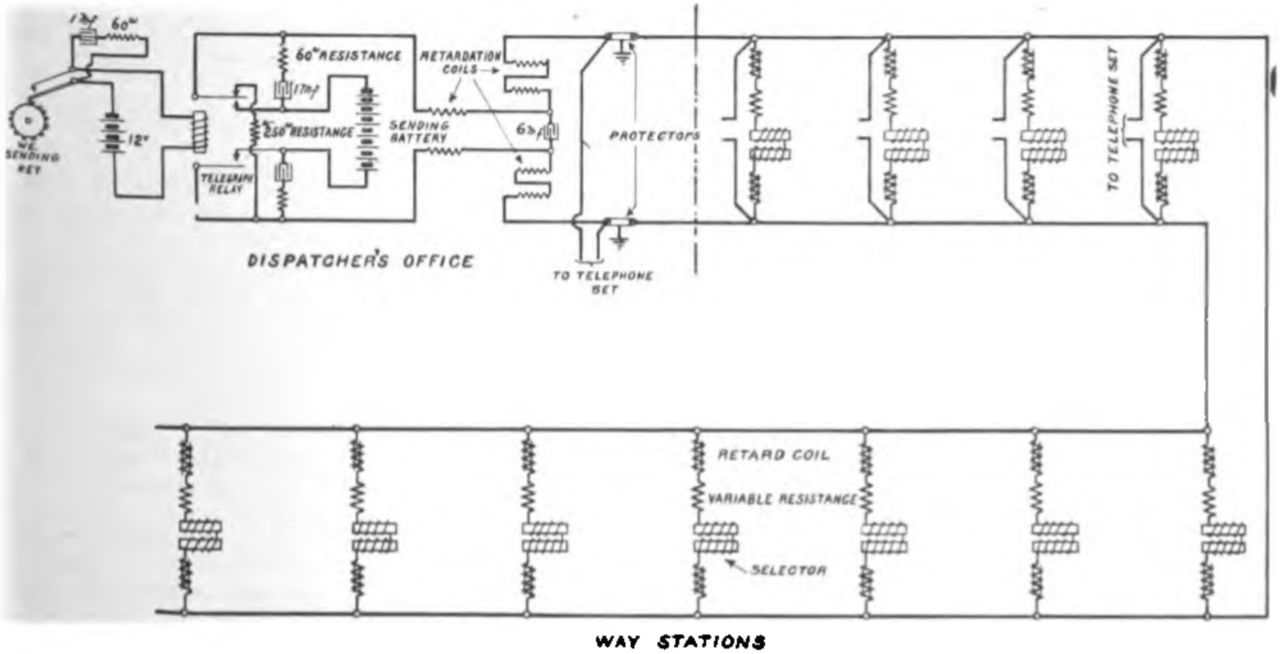

FIG. 6.—WESTERN ELECTRIC TRAIN DISPATCHING CIRCUIT.

$$\text{Current} = \frac{\text{battery voltage}}{\text{loop line resistance}}$$

A much higher value than this would indicate a short circuit or cross on the line, the amount of excessive current depending on the distance away of the short or the resistance of the cross. A much lower value would indicate high resistance joints or poor connections somewhere; this would also show in the poor transmission of speech obtained. A zero reading would indicate an open circuit. Grounds on either side of the line can also be detected by a milliammeter. Have the line in its normal condition (before installing way-station apparatus) then ground one side of the battery and apply the other side to one line wire through the milliammeter. There should be no reading unless there is a ground on the line. A slight deflection of the needle would indicate faulty insulation. Do the same thing to the other wire of the circuit.

TRAIN DISPATCHING CIRCUITS.

After the dispatcher's and way-station equipments have been installed on a train dispatching circuit, we have a condition which is entirely different from the ordinary telephone circuit; in other words, there are a number of permanent high resistance and high impedance bridges across the circuit. These are the selectors, and the resistance of these varies from 3,800 to 16,000 ohms according to the type used. A schematic illustration of the telephone train dispatching circuit is shown in Fig. 6.

It is obvious from this that the ordinary methods of testing telephone circuits are not applicable to one of the train dispatching type. This is for the reason that practically all of the testing methods employed on the standard commercial circuits are dependent on having the wires free and not equipped with bridged resistances. Accurate measurements on the line are, therefore, to a great extent impossible, but instrument readings, with a little practice, will give very close results and enable a man familiar with his circuit to locate trouble to the nearest way-station. This is as close as is desired, and is as close as now obtained in testing on telegraph wires.

LINE TROUBLES.

It has been found by experience that 90 per cent of the troubles occurring on telephone train dispatching lines are not in the apparatus nor instruments, but are on the line itself and for this reason trouble should be looked for here first of all. The following is a list of some of the possible troubles on the line which may cause signaling failures at the way-stations:

1. The line may become short-circuited, due to crossing of the wires or by lightning fusing the protectors together.
2. The line may become open, in which case the trouble can be easily located by calling the various stations until the neighborhood of the break is reached.
3. A loose joint in the line causes a loud grating noise in the dispatcher's receiver while he is calling. A very loose swinging joint may affect the operation of the selectors.
4. A swinging cross on the line causes a loud grating noise in the receiver when the dispatcher is calling, and may also cause a selector to fail to operate, or the wrong one to respond.

METHOD OF LOCATING TROUBLE.

One very satisfactory way of locating opens and short circuits on the telephone line is by the use of a milliammeter. This instrument should be connected in series with one side of the circuit. A convenient way of doing this is to place the milliammeter between the contacts of the telegraph sending relay and the line, as shown in Fig. 7.

Readings should then be taken with the line in good working condition on a normal day, first with all the stations connected across the circuit. The current flowing in this case should approach closely the normal current taken by each selector multiplied by the number of stations. Large variations from this should be looked into, as they are an indication of trouble on the line. A zero reading would be obtained only in case of a break in the line between the dispatcher and the first way-station. A ground on either side would also show up in testing either wire, only there would be a much heavier current flow when testing the side which is actually grounded. This is, of course, obvious, due to the resistance of the bridges through which the current would have to flow to ground on the opposite side of the line.

This normal reading having been obtained, starting at the most distant end of the line from the dispatcher, each successive station in turn

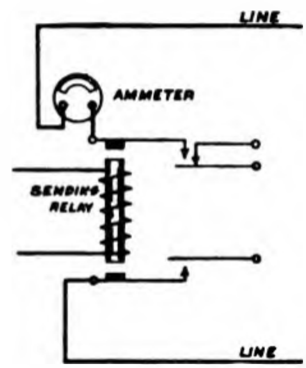

FIG. 7.—LOCATION OF AMMETER FOR TESTING.

should be disconnected from the circuit and a reading made under these conditions. At the same time, the line should be short-circuited at each successive station in turn, and a reading likewise made under this condition. The result will be two tables giving a current reading for each station when the line is open just beyond that station and when the line is short-circuited at that station. These tables should be kept in an available place, preferably at the dispatcher's desk.

In case of trouble on the train dispatching circuit, which is not obvious in the dispatcher's office, the first move would be, therefore, to make a current reading on the line. The value of the current obtained from this reading should be compared with the values listed on the table mentioned, and would, therefore, give a quick indication as to where the probable location of the trouble is, as well as its nature.

SHORT CIRCUITS.

A short circuit may occur at any point on the line. When it happens at some point near the dispatcher's office, it is impossible for him to ring any of the bells on the line. When the short circuit is a long distance from the dispatcher's office, he may be able to ring the stations near his office, but he will be unable to ring any stations in the neighborhood of the cross.

A short circuit on the line near the dispatcher's office causes the contacts of the sending relay to spark more than they do when the short circuit is near the far end of the line.

TESTS IN DISPATCHER'S OFFICE BATTERIES.

In the operation of the selectors, two sets of batteries are used at the dispatcher's office; namely, a local battery which operates the sending relay and is controlled by the contacts on the sending key, and the other, the main line battery which operates the selectors at the way-stations and is controlled by the contacts of the sending or transmitter relay. These two batteries and their relations to the circuit are shown on the circuit diagram in Fig. 8.

LOCAL BATTERY FOR OPERATING SENDING RELAY.

This battery, as Fig. 8 shows, is controlled by the contact on the sending keys, which are mounted in the cabinet on the dispatcher's desk, and it operates the sending or transmitter relay. The best results are secured if the current (in the winding of the sending relay) supplied by this battery does not fall below 0.25 amperes. The resistance of the sending relay is approximately thirty-one ohms, and if the battery gives a voltage of eight to nine volts (measured when the relay is drawing current) 0.25 ampere will be secured. This battery is usually made up of two sets of eight dry cells connected in series multiple as shown in Fig. 9. The method of testing this battery is also shown in this figure.

The voltmeter should be read when the contact on the sending key is held closed and the batteries are sending current through the relay.

MAIN LINE BATTERY.

The function of the main line battery is to supply current to the line to operate the selectors.

The voltage of the main line battery may be too low to send sufficient current over the line to operate the selectors. When the batteries have been in use for a long time, the voltage not only drops, but the internal resistance of the battery increases thus cutting down the current sent out over the line to operate the selectors. A voltmeter placed directly across the terminals of the battery when the sending relay armature is held up so that a steady current can flow out on the line, will tell whether the voltage is low. In measuring the voltage in this way, as well as on the local battery previously described, it is very essential that the battery be supplying current to the line (or the sending relay) at the time the voltage is read. When a dry battery is not supplying current to the line, the voltmeter reading may be much higher than when current is flowing on the line, on account of the internal resistance of the battery.

In the absence of a voltmeter, the dry cells can be tested individually with a good battery gauge.

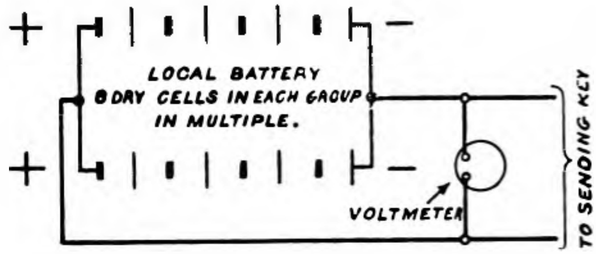

FIG. 9.—WIRING OF SENDING RELAY BATTERY. DISPATCHERS OFFICE.

When a battery gauge is used to test the cells individually, it is not necessary to have current flowing out on the line.

The voltage of the main line battery is determined for each particular installation. It should not be allowed to drop more than 12½ per cent. below its normal value, as originally calculated, for the particular circuit in question.

CIRCUIT DATA.

When a telephone train dispatching installation is cut into service, the maintenance man who is to care for this circuit should be furnished with the following information which should be kept on file at the dispatcher's office.

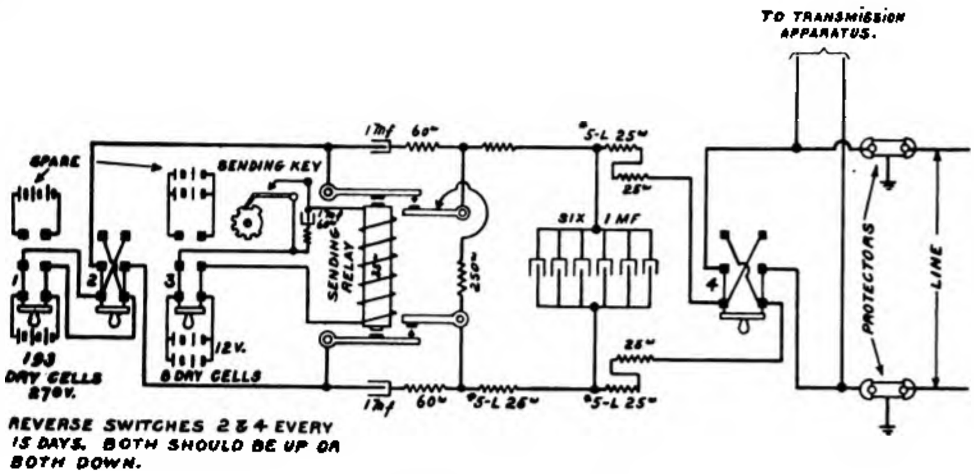

FIG. 8.—CIRCUIT DIAGRAM.

MAIN LINE BATTERY.

This battery is located at ....

It consists of ...... dry cells connected in series.

Battery voltage ....

This battery is controlled by the contacts of the sending relay shown in the circuit diagram (See Fig. 8).

With the voltage at ......, the current in each selector is ...... milliamperes.

Patches may be put in the dispatcher's line, provided they do not reduce the current per selector to below ...... mills, which is the least current upon which the selectors will operate.

As the cells drop off in voltage with use, more can be added from time to time to retain the voltage at its normal figure.

The voltage of the battery should be measured when the current is flowing out on the line.

A dry battery on open circuit or when it is only supplying current to the voltmeter across its terminals will often indicate high voltage, but the voltage will fall to a very low value (if the internal resistance of the battery is high) when the circuit is closed and it is supplying current to the line.

In reading the voltage, place the voltmeter leads directly across the battery leads and not across the line.

SENDING KEYS.

The function of the sending keys is to control by their contacts the transmitter or sending relay which, in turn, controls the battery current for operating the selectors. The operation of these too close to the pole pieces, it is evident that the current will stay on the line too long and the selector or armature cannot fall back so as to make the next step. Also if the armature of the sending relay is too far from the pole pieces, current will not stay on the line long enough.

To determine whether the sending relay is keeping the current on the line about 50 per cent. of the time during the stepping up of the selector, it is only necessary to put an ammeter on the line as shown in Fig. 10, and turn one of the higher numbered keys. The reading of the ammeter while the sending key spring is passing over the stepping teeth should be 50 per cent. of the steady reading obtained with the sending key spring held permanently closed. In case the ammeter should not read approximately 50 per cent. of the steady value, the local battery should be checked and the sending key should be checked so as to make sure that the fault is not in the local battery nor the key before adjusting the relay.

If the ammeter reading is found to be 40 per cent. of the steady value, this means that the pole

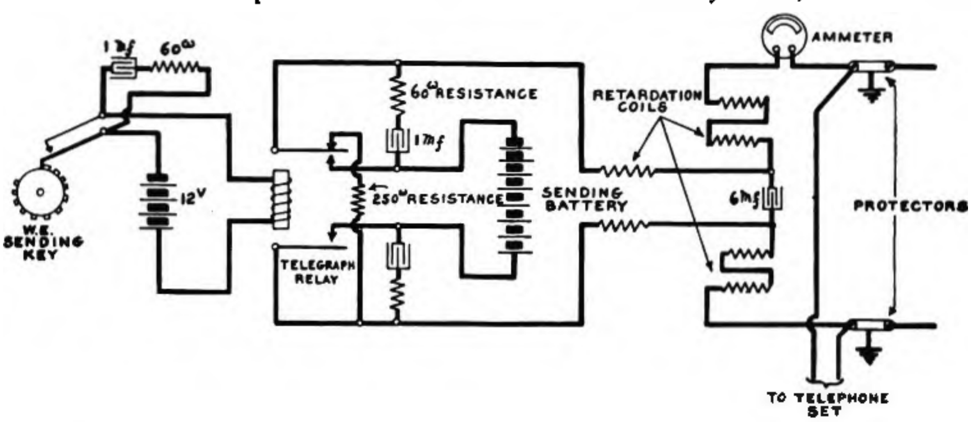

FIG. 10.—TERMINAL TESTING ARRANGEMENTS ON WESTERN ELECTRIC DISPATCHING CIRCUIT.

keys in the dispatching circuit is shown in Fig. 8. Trouble in these keys will ordinarily occur in the adjustment of the springs which are operated by the toothed impulse wheel, and it is a simple matter to remove a key and adjust these at any time. If the keys become noisy, a little graphite applied to the gear wheels will ordinarily care for this satisfactorily.

SENDING RELAY.

The sending or transmitter relay controls the current operating the selectors, and it is clearly shown in Fig. 8. This sketch also shows the method of arranging the reverse switches 2 and 4 at the dispatcher's office so as to protect the relay contacts from undue wear. By reversing the switches 2 and 4, the direction of the current in the relay contacts is changed and they will wear a much longer period without cleaning.

This relay is adjusted in somewhat the same manner as a telegraph relay. The best all round results are secured when the contacts of this relay are so adjusted that the current is kept on the line about 50 per cent. of the time and off about 50 per cent. of the time when the sending key is causing the selector to step up. If the armature of the sending relay is pieces of the relay should be set slightly closer to the armature so that the contacts will be closed a little longer. If the relay is set to read about 50 per cent. as described, when the local battery controlling the relay is new, it will run a little below 45 per cent. when the local battery is nearly run down. It is not necessary, however, to readjust the relay on account of this. From time to time an ammeter should be connected as has been described, and an inspection made in order to insure the best results on the circuit.

If the sending relay sparks excessively while sending, too much current is being sent out, which indicates that the line is crossed. The dispatcher will be unable to call or talk to stations beyond the cross, neither will he be able to call or talk to the first two or three stations on his side of the cross.

NOISE.

If the noise is excessive while sending, and the sending relay sparks badly, the condenser in the dispatcher's telephone circuit (inside the desk set box) or the condensers which are bridged around the local contacts of the sending relay, may be broken down.

(To be continued.)

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May 1, 1912.

Wireless in the Titanic Disaster.

Again wireless telegraphy has demonstrated its great value to shipping interests, and had it not been for the wireless it is quite conceivable that the 700 or more passengers rescued from the ill-fated "Titanic" might also have been lost, in addition to the hundreds of unfortunates who went down with the steamer to watery graves.

The story of the wireless in connection with this, the greatest of sea disasters is an intensely interesting one. The accounts of the work of the operators on the "Titanic" and on the steamer "Carpathia," which rescued the seven hundred passengers from life boats, give evidence of their coolness and bravery under circumstances which test men's souls. While all was excitement on the ill-fated steamer, the two operators stuck to their posts to the last and did all that was within their power to do. When nothing more could be done, Captain Smith, of the "Titanic," told them they had done their duty, and were at liberty to save themselves. They then extended a helping hand in saving passengers, and were among the last to leave the ship as she went down.

Several most valuable lessons may be drawn from the experiences attending this awful disaster, and the fact that stands out most prominently is that it should be imperative that all passenger steamers carry two wireless operators at least, the object being, of course, to have some one listening-in every moment of the time. It was by the merest chance that the operator on the "Carpathia" learned of the "Titanic's" distress. He had been absent from his instrument for a few minutes, and, on returning, was preparing to retire for the night when, by chance, he put on his telephone headpiece. It was then that he heard the "Titanic's" distress call. Had he retired without listening-in as he did, it is probable that the results would have been much worse than they were, because the "Carpathia" would have been ignorant of the disaster and would not have gone to the rescue.

Some months ago, when the steamer "Prinz Joachim" was wrecked in the West Indies, there was much loss of time in going to the rescue, because the wireless on some of the stations in the vicinity was unguarded. Mr. W. J. Bryan, who was a passenger on the wrecked steamer, then suggested the importance of having a wireless operator on duty at all times, and the force of this suggestion is emphasized by the experience on the "Carpathia." Another instance showing the great necessity of such a provision is furnished in the case of the steamer "Parisian" which was at the time in the neighborhood of the "Titanic." The "Parisian's" operator had been in communication with the "Titanic" before he retired on Sunday night, after being on duty for eighteen hours. Nothing was known of the disaster on the "Parisian" until the operator resumed duty on Monday morning, when it was too late to be of any assistance.

Mr. Harold Bride, the surviving operator of the "Titanic," who was rescued by the "Carpathia" and afterwards assisted the worn-out operator on the latter steamer, severely arraigns the wireless operator on the United States scout cruiser "Chester," and charges general incompetence. Similar charges have been made against navy wireless operators before, and if there is any truth in them, the navy authorities should see to it at once that none but first-class operators be employed on the ships of the navy. The charge as far as the "Chester" is concerned, however, has been denied by the officers on that cruiser, and an investigation will probably be made.

Apart from all the discordant circumstances attending the awful event, the bravery and sound judgment of the wireless operators concerned stand out in bold relief, and they are deserving of the greatest honors that the world can bestow upon them. They are heroes in the broadest sense of the term, and the world loves a hero.

What is the Matter with the Men.

It was recently announced that women wireless operators were being employed on Pacific-coast steamers in preference to men, the alleged reason being that "men were not always satisfactory." What is the matter with the men?

Up to within the past fifteen or twenty years, men in civilized countries, have done the world's work, but women have in late years entered into competition with them in practically all lines of business with the result that men have, in many instances, been crowded out. The time may soon come when men will be compelled to do the work formerly performed by women, such as feeding babies, if there are any babies; family cooking and washing. If they do not do this work, who is to do it, while the wives, sisters and other female relatives are at work earning bread and butter for the family?

Some day we may see women at the head of large industrial concerns, bossing the present male bossers. The day of man as the main support of the family seems to be approaching the end. In the telegraph field, women are crushing the youthful male blossoms to earth, and we may some day see a woman at the head of the great telegraph and telephone corporations. In the telephone industry, they monopolize certain departments of the work, and when they reach the point where they think they know as much as men do, the males will have to surrender to their might.

It will be the men's turn then to fight for their rights, and instead of suffragettes, we will have suffering "gents."

Government Ownership of Telegraphs and Telephones in England.

The financial statement of the postmaster-general of Great Britain for 1910-11, was presented to Parliament recently, and, for the information of advocates of government ownership of the telegraphs and telephones in this country, we reproduce the following abstract of the statement as found in the London *Electrical Review*. The net revenue of the telegraph service was £5,121,342 and the expenditure £6,085,166, showing a deficiency of £963,824—the largest deficit ever recorded. The amount received in royalties, mainly from the National Telephone Company, was £342,542, and the amount paid to cable companies, foreign countries, etc., was £781,487 (deducted from the gross revenue). Of the expenditure, salaries and other working costs, amounted to £4,721,158, and items of the nature of capital outlay to £1,036,321. The total expenditure, apart from the latter, was £5,048,845, or £72,497 less than the total receipts. The figures are exclusive of the capital expenditure on the purchase of the telegraphs, etc., which amounted to £10,129,687; the interest paid on this account was £271,691, which brings up the total deficiency on the telegraphs for the year ended March 31, 1911, to £1,235,515.

The capital expended on telephone purposes to March 31, 1911, was £11,130,327. The total capital expended on both telegraphs and telephones, including sums spent on extensions, etc., is given as £29,293,289.

The total deficiency in the telegraph account from the commencement is £19,821,381; excluding items of the nature of capital from the expenditure, the deficiency is reduced to £7,942,226, but in this no charge is made for interest on capital expenditure not provided by the issue of stock or the creation of annuities.

The total expenditure on trunk telephone lines was £5,337,725, and on exchanges £3,913,204 in London, £1,691,619 in the provinces. The telephone revenue was £1,595,787, and expenditure £1,146,629, leaving a balance of £449,158, which, added to the royalties mentioned, fell short by £262,187 of the amount necessary (£1,053,887) for the repayment of principal, interest, eti., on outstanding loans.

International Association of Municipal Electricians.

The seventeenth convention of the International Association of Municipal Electricians will be held in the Hotel Jefferson, at Peoria, Ill., August 26 to 30.

The International Association of Municipal Electricians is composed of municipal electricians from all parts of the United States and Canada, as well as from Cuba and South America. Its objects are the acquisition of experimental, statistical and scientific knowledge relating to the constitution, equipment and operation of fire and police telegraphs, light, heat and power systems, and the diffusion of this knowledge among the members of the association with a view of improving the service and reducing the cost thereof, and the establishment and maintenance of a spirit of fraternity among its members.

The annual conventions have proved to be the source of much benefit to the municipalities represented by the members of the association and to the country at large through the information given out in the form of papers and discussions. These papers relate to matters of great importance to municipal electricians and their work, and are of the most practical kind, because they are prepared by practical men.

The officers of the association are: John W. Kelly, Jr., chief of electrical bureau, Camden, N. J.; vice-presidents, John Craig, superintendent fire alarm, Toronto, Ont.; W. L. Riehl, superintendent of electricity, Indianapolis, Ind.; secretary, Clarence R. George, city electrician, Houston, Tex.; treasurer, Clark E. Diehl, superintendent fire and police telegraph, Harrisburg, Pa. Chairman Executive Committee, W. E. Wolgamott, city electrician, Peoria, Ill.

Electrical Instruments and Testing.

Every one connected with the telegraph and telephone service should know how to test lines and also be familiar with the instruments used in such work. It does not require much study to learn the mechanical operations of this important branch of the service, but of course a knowledge of electrical and mechanical principles involved in the design and construction of the instruments, and of the principles involved in measurements is the source of deep and never-ending pleasure to the ambitious student.

An excellent book on this subject, intended for the practical man, is "Electrical Instruments and Testing," by Norman H. Schneider, with new chapters on testing wires and cables and locating faults, written by Jesse Hargrave, division superintendent of the Postal Telegraph-Cable Company, Atlanta, Ga.

The price of this book is $1.00 and copies can be had of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York. Any other book on telegraph, telephone or general electrical subjects can be obtained at the same place.

Course of Instruction in the Elements of Technical Telegraphy—XIV.

(*Copyrighted.*)

(*Continued from page 246, April 16.*)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Derived Circuits.

Resistance, we have seen, is the obstacle which a circuit offers to the passage of the current.

Conductivity is the opposite; it is the facility with which the circuit transmits or conducts the current.

If a circuit have 2 ohms resistance, its conductivity is represented by ½; if the resistance be increased to 4 ohms the conductivity will only be ½ as much as before, or ¼.

As the resistance of a circuit increases, therefore, the conductivity decreases, and *vice versa*, as the conductivity increases, the resistance decreases.

Fig. 2 shows a derived circuit of two branches, A and B.

It is evident that, on account of the increase in conductor area, two conductors such as A and B (Fig. 2), connected in parallel, conduct the current more readily than would one alone; that is, their joint or combined conductivity is greater than the conductivity of either A or B alone. It follows that the combined or joint resistance of A and B must be less than the resistance of either single branch.

If the separate resistances of the two branches are equal, their joint resistance is equal to one-half of one of the separate resistances. Thus, in Fig. 2, the resistance between X and Y is the joint resistance of A and B, and equals 25 ohms, since A and B have 50 ohms resistance each.

When the separate resistances are unequal, the joint resistance is equal to the product of the separate resistances divided by the sum of the separate resistances.

Example: Branch A = 25 ohms, branch B = 50 ohms, find their joint resistance.

Solution: $\dfrac{25 \times 50}{25 + 50} = 16\frac{2}{3}$ ohms.

When there are more than two branches, the joint resistance may be found as follows:

Reduce the respective resistances of the branches to fractions having 1 for a numerator, and divide 1 by the sum of the fractions.

Example: Three branches of 5, 10 and 20 ohms, find their joint resistance.

Solution: Reducing to fractions with numerator 1,

$$\tfrac{1}{5},\ \tfrac{1}{10},\ \tfrac{1}{20}.$$

Finding the sum of the fractions,

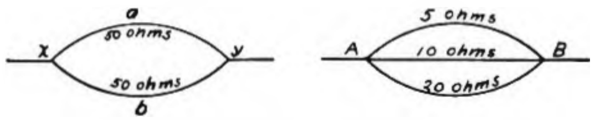
$$\tfrac{1}{5} + \tfrac{1}{10} + \tfrac{1}{20} = \tfrac{7}{20}.$$

Dividing 1 by $\tfrac{7}{20}$,

$$1 \times \tfrac{20}{7} = \tfrac{20}{7} = 2\tfrac{6}{7} \text{ ohms.}$$

This method for determining the joint resistance is obtained as follows:

A resistance of 2 ohms represents a conductivity of ½; a resistance of 4 ohms a conductivity of ¼; and so on; therefore to find the conductivity corresponding to any given resistance, divide 1 by the resistance. Similarly, a conductivity of ½ represents a resistance of 2 ohms, so to find the resistance corresponding to any given conductivity, invert the conductivity.



FIGS. 2 AND 3.—TWO AND THREE-BRANCH CIRCUITS.

In the example the resistances being 5, 10 and 20 ohms, the corresponding conductivities are $\tfrac{1}{5}$, $\tfrac{1}{10}$, $\tfrac{1}{20}$.

The joint conductivity is the conductivities of all the branches added together.

Thus, $\tfrac{1}{5} + \tfrac{1}{10} + \tfrac{1}{20} = \tfrac{7}{20}$ = joint conductivity.

The joint resistance is the opposite of joint conductivity, or $\tfrac{7}{20}$ inverted, hence $\tfrac{20}{7} = 2\tfrac{6}{7}$ ohms = joint resistance.

Where the branches have equal resistances as in Fig. 2, the current divides equally between them. If a current of 2 amperes is flowing in the main circuit, 1 ampere will flow through each branch.

When the branch resistances are unequal, the current in any branch may be determined by the formula $\dfrac{E}{R} = I$, where E is the difference of potential between where the branches divide and where they unite, and R is the resistance of the branch in question.

Example: A derived circuit (Fig 3) has three branches of 5, 10 and 20 ohms resistance, find the current in each branch when there is a fall of potential of 5 volts between A and B.

Solution: Taking the 5 ohm branch first, $\dfrac{E}{R} = I$.

or $\dfrac{5}{5} = 1$ ampere = current in 5 ohm branch.

In the 10 ohm branch, by the same equation, $\tfrac{5}{10} = .5$ amp.

Similarly, in the 20 ohm branch the current is .25 ampere.

The total current, or the current flowing in the main circuit, is the sum of the currents in the branches; or 1 + .5 + .25 = 1.75 amperes.

It will be seen from the foregoing that the current divides inversely as the respective resistances of the branches. In the first branch the resistance is 5 ohms and the current 1 ampere. In the second branch the resistance is double that of the first, the current is consequently only one-half, or .5 ampere. In the third branch the resistance is double that of the second, and the current therefore one-half its former value, or .25 ampere.

Since Ohm's law, $\frac{E}{R} = I$, gives the current in any branch of a derived circuit, the resistance of any branch and the fall of potential between the dividing and uniting points can also be found provided two of the quantities be known, for $\frac{E}{I} = R$, and $IR = E$.

(To be Continued)

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. The review of Maver and Davis' book, "The Quadruplex," was completed in our issue for February 16, and the next book to be taken up and treated in like manner is "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What is a glass slab resistance and how is it made?

Can plumbago or pencil lead be relied upon to give invariable resistance?

In testing is it desirable to allow the entire current to flow through the galvanometer coil?

What is the purpose of a shunt?

What are the ratios of the shunts to the galvanometer?

Are the shunts fixed or adjustable?

When the ratio of the shunt to the galvanometer is one-ninth, how much current flows through the galvanometer; and how much flows through it when the shunts are one-ninety-ninth and one hundred and ninety-ninth?

What is meant by the multiplying power of a shunt?

If one-tenth of the current flows through the galvanometer and nine-tenths through the shunt, what is the total value of the current in the circuit as indicated by the galvanometer reading?

How is the true value of the current in the circuit ascertained from the galvanometer reading?

How can the necessary resistance of a shunt to be used with a certain galvanometer be found? State the rule.

If a galvanometer has a resistance of 2,000 ohms and it is desired to pass one-fifth of the current through it, what is the resistance of the shunt?

What is the formula used to obtain this information?

How is the multiplying power of a shunt ascertained?

Calculate the multiplying power of a shunt of 1,000 ohms used in connection with a galvanometer of 10,000 ohms.

Mr. Marconi's Lecture Before the New York Electrical Society.

Mr. Guiglielmo Marconi delivered an interesting lecture before the New York Electrical Society, April 17, on "Recent Developments in Wireless Telegraphy." He outlined the early work leading to the discovery of the principles upon which the production and detection of wireless messages depend, giving full credit to Maxwell, Ampère, Faraday and Hertz. The advantageous features of tuning the interrelated circuits so as to possess the same inherent natural vibratory period, and employing loose electromagnetic coupling between the mutually related circuits in order to avoid the production of detrimental superposed vibrations was not discussed. He expressed the opinion that no other single development in wireless telegraphy equalled the demonstration in 1901 that the curvature of the earth does not of itself tend to limit the distance of transmission of ether waves used in wireless communication, although it places a definite limit to the transmission of ether waves visible to the eye.

Mr. Marconi mentioned the fact that the ultra-violet rays in sunlight act on wireless waves just as does fog on light waves, the effect being greater the shorter the wave-length. On this account messages can be sent more easily at night than during the daytime and in cloudy weather than in clear sunlight. It has been noted that the damping effect of sunlight is even greater when either the sending or the receiving station is in darkness than when both are in sunlight, this result being due to the refraction of the waves at the surface separating darkness from sunlight. The fact that messages can be sent more freely over sea than over land is attributable to the greater and more uniform electrical conductivity of the surface of the ocean compared with the land surface.

In closing his lecture, Mr. Marconi stated that nature has provided in wireless-telegraph phenomena both advantages and disadvantages, the advantages always outweighing the disadvantages in connection with the most urgent communications. Under the conditions existing when communications are most desirable and difficult to obtain in any other way, namely, night-time, foggy weather, over troublesome seas, wireless telegraphy is at its very best in every respect.

On Prof. M. I. Pupin's motion, Mr. Marconi was elected an honorary member of the society, and in seconding the motion, Mr. Frank J. Sprague credited Mr. Marconi with saving the lives of from 700 to 800 persons rescued from the ill-fated "Titanic" by means of wireless telegraphy. Mr. Marconi was visibly affected by this compliment.

Wireless Telegraphy in the Titanic Disaster.

The entire civilized world was shocked beyond expression by the news of the awful calamity which befell the new steamer "Titanic" bound for New York, from Southampton, England.

The "Titanic," which was the largest and most magnificently fitted-up steamer afloat, and was on her first trip to New York, collided with an iceberg off the Banks of Newfoundland on Sunday night, April 14, and soon afterward sank in water over two miles in depth carrying to their death over 1,600 passengers and crew. Many of the lost passengers were prominent citizens of New York and other places in the United States. The tragic event has no parallel in history and has cast a gloom over the entire civilized world.

The story of the part played by the wireless telegraph in the disaster as told in the *New York Times* of April 19 by Mr. Harold Bride, the surviving wireless operator of the "Titanic" is one of thrilling interest.

Considerable criticism was indulged in by the newspapers because the wireless operator on the steamer "Carpathia" carrying the "Titanic" survivors refused to answer calls and questions from the scout cruiser "Chester" which had been sent out by the United States Government to render what assistance it could. Mr. Bride after being rescued and taken on board of the "Carpathia," assisted the "Carpathia" wireless operator in his work, and explained the "Chester" matter in a way that does not reflect any credit upon the naval wireless operator on that vessel.

"The wireless operators on the 'Chester,' he said, 'got all they asked for. And they were wretched operators. They knew American Morse but not Continental Morse sufficiently to be worth while. They taxed our endurance to the limit. I had to cut them out at last, they were so insufferably slow, and go ahead with our messages of grief to relatives. We sent 119 personal messages April 19 and 50 April 18."

Mr. Bride then continues:

"When I was dragged aboard the 'Carpathia' I went to the hospital at first. I stayed there for ten hours. Then somebody brought word that the 'Carpathia's' wireless operator was 'getting queer' from the work.

"They asked me if I could go up and help. I could not walk. Both my feet were broken or something, I don't know what. I went up on crutches with somebody helping me.

"I took the key and I never left the wireless cabin after that. Our meals were brought to us. We kept the wireless working all the time. The navy operators were a great nuisance. I advise them all to learn the Continental Morse and learn to speed up in it if they ever expect to be worth their salt. The 'Chester's' man thought he knew it, but he was as slow as Christmas coming.

"We worked all the time. Nothing went wrong. Sometimes the 'Carpathia' man sent and sometimes I sent. There was a bed in the wireless cabin. I could sit on it and rest my feet while sending sometimes."

Mr. Bride told of his duties on board the "Titanic." He and J. G. Phillips were the wireless operators, one being on duty while the other was off.

"There were three rooms in the wireless cabin," he said. "One was a sleeping room, and one a dynamo room, and one an operating room. I took off my clothes and went to sleep in bed Sunday night. Then I was conscious of waking up and hearing Phillips sending to Cape Race. I read what he was sending. It was traffic matter."

Mr. Bride was urging Phillips to go to bed when the captain put his head in the cabin and said: "We've struck an iceberg." Ten minutes afterwards the captain ordered the wireless call for assistance, and Phillips began to send "C. Q. D." The call was heard by the steamer "Carpathia," whose captain immediately headed his steamer for the "Titanic."

"Every few minutes," Mr. Bride continues, "Phillips would send me to the captain with little messages. They were merely telling how the 'Carpathia' was coming our way and gave her speed. Phillips told me the wireless was growing weaker.

"I went out on deck and looked around. The water was pretty close up to the boat deck. There was a great scramble aft, and how poor Phillips worked through it I don't know. He was a brave man. I learned to love him that night and I suddenly felt for him a great reverence to see him standing there sticking to his work while everybody else was raging about. I will never live to forget the work of Phillips for the last awful fifteen minutes.

"We picked up the 'Olympic' and told her we were sinking by the head and were about all down. As Phillips was sending the message I strapped his life belt to his back. I had already put on his overcoat."

Mr. Bride tells how he helped to get a life boat into the water and then walked back to Phillips and told him the last raft had gone.

"Then, came the captain's voice:" Mr. Bride goes on, "'Men, you have done your duty. You can do no more. Abandon your cabin. Now it's every man for himself. You look out for yourselves. I release you. That's the way of it at this kind of a time. Every man for himself.' I looked out; the boat deck was awash. Phillips clung on sending and sending. He clung on for about ten minutes or maybe fifteen minutes after the captain had released him. The water was then coming into our cabin."

Phillips soon ran aft and that was the last Mr. Bride saw of him alive.

Mr. Bride describes how he was washed off the steamer as she sank and how he afterward found himself on a life raft. Some one sat on his legs but he did not have the heart to ask the man to move.

"I didn't care what happened," he continued. "I just lay and gasped when I could. At last the 'Carpathia' was alongside and the people were being taken up a rope ladder. Our boat drew near and one by one the men were taken off of it. One man was dead, I passed him and went up the ladder, although my feet pained terribly. The dead man was Phillips. He had died on the raft from exposure and cold.

"I was then hustled down below to the hospital. That was early in the day I guess. I lay in the hospital until near night and they told me the 'Carpathia's' wireless man was getting 'queer' and would I help.

"After that I never was out of the wireless room, I just worked wireless. The splutter never died down."

Mr. Bride again referred to the incompetence of the operator on the scout "Chester." "If he had been a decent operator," Mr. Bride says, "I could have worked with him longer, but he got terribly on my nerves with his insufferable incompetence."

The "Titanic's" band was on the after deck playing "Autumn" as the ship disappeared beneath the waves. "That," says Mr. Bride in concluding his narrative, "and the way Phillips kept sending after the captain told him his life was his own, and to look out for himself, are two things that stand out in my mind over all the rest."

Mr. H. T. Cottam, the Marconi operator on the rescuing steamer "Carpathia," told an interesting story of the part he took in the wireless correspondence between the "Titanic" and other steamers concerned in the tragedy. "I got the 'Titanic's' C. Q. D.' call at 11:20 o'clock Sunday night," he said. "It was, 'come at once, we've struck a berg. It's a C. Q. D. call, old man.' "

The captain of the "Carpathia" was informed of the "Titanic's" plight and he turned his steamer at once in the direction of the "Titanic," which was then 58 miles distant.

"It was only a streak of luck," Mr. Cottam said, "that I got the message at all. I had been up until 2:30 the previous night, and the night before that until 3:00 o'clock, and I had planned to get to bed early that night."

Mr. Cottam then told how he had finished his work and made up his daily list of communications and reported them to the officer on watch. On his return he put on his telephones to exchange time with the steamer "Parisian," when he heard the "Titanic's" distress call.

The last message he received from the "Titanic" was: "Come quick. Our engine room is flooded up to the boilers."

"From 11:55 until we reached the spot where the 'Titanic' foundered," Mr. Cottam continued, "I was listening for a spark from his emergency set, but when I didn't hear anything, I was sure that he had gone down."

J. G. Phillips, the senior wireless operator on the "Titanic," who lost his life, was an Englishman, 24 years of age. He had been in the employ of the Marconi Company as an operator for about five years, and went to the new vessel from the steamship "Oceanic." Mr. Phillips's wireless service had taken him into many parts of the world. He was formerly the Marconi man on Mr. James Gordon Bennett's yacht. Entering the transatlantic service, he was assigned to the "Oceanic." Before going on the Bennett yacht, Mr. Phillips had served on a Peninsular and Oriental steamship running to the Orient. Referring to Phillips' work on the "Titanic" during the exciting moments following the fatal collision with the iceberg, the New York *Times* says, "The wireless operator seemed absolutely cool and clear-headed, his sending throughout being steady and perfectly formed, and the judgment used by him was of the best." Phillips was a native of Godalming, England, and learned telegraphy in Godalming post office. In march, 1906, he joined the Marconi School, at Liverpool, and became one of the most expert wireless operators.

Mr. Harold Bride, the second wireless operator on the ill-fated steamer, is 22 years of age, and was born at Nunhead, England. He joined the Marconi service in July, 1911, working first on the steamer "Haverford," and afterwards going to the "Lusitania," of the Cunard Line. He joined the "Titanic" at Belfast, Ireland, when she left her builders' hands, to sail from Southampton on her first trip to New York, which trip she never finished. On arriving at New York on the "Carpathia," he was carried ashore by two men on account of the injuries to his legs and feet during his trying experiences on the life raft.

Mr. Bride was a witness before the United States Senate Committee appointed to investigate the circumstances in connection with the disaster. His testimony, however, was substantially a repetition of his original story of the loss of the steamer.

Harold Thomas Cottam, the wireless operator on the "Carpathia," was born in Nottinghamshire, England, 21 years ago. At the age of 17, he learned telegraphy in Clapham, London, and received a diploma in eleven months. He has worked on several steamers and this eventful trip on the "Carpathia" was his first on that boat.

Mr. Andrew Carnegie contributed $5,000 toward the fund for the relief of needy survivors of the "Titanic" catastrophe.

Col. John Jacob Astor who was lost in the "Titanic" disaster was a member of the board of directors of the Western Union Telegraph Company.

C. M. Hays, another victim, was president of the Grand Trunk Railway, Montreal, Can., and was well-known to many members of the Old-Time Telegraphers' Association. Mr. Hays was always liberal in providing transportation over his system for the old-timers before the law prohibiting free railroad transportation went into effect.

Mr. A. C. Cronkhite, district commercial superintendent of the Western Union Telegraph Company, Indianapolis, Ind., writes: "I am indeed glad to know that you renewed my subscription in advance of advice from me. It would be a great disappointment to miss an issue of your valuable paper, which publication I can heartily recommend to those who are engaged in the telegraph and telephone business."

Telephone Pioneers of America.

W. T. GENTRY.

Mr. William Thomas Gentry, president of the Southern Bell Telephone and Telegraph Company and the Cumberland Telephone and Telegraph Company, with headquarters at Atlanta, Ga., is one of the leading telephone men of the day and is the head of one of the most important groups of subsidiary telephone companies of the American Telephone and Telegraph Company.

Mr. Gentry is a native of the Dominion State, having been born in Gordonsville, Va., April 14, 1854. At the age of sixteen, he entered the telegraph service as operator for the Southern and Atlantic Telegraph Company at Charlottesville, Va. He was afterwards employed at Lynchburg, Richmond and Gordonsville, becoming, in 1873, circuit manager of all the lines of the Southern and Atlantic Telegraph Company in the state of

W. T. GENTRY.
President Southern Bell Telephone and Telegraph Company, Atlanta, Ga. (1879)

Virginia. When this company was purchased by the Western Union Telegraph Company in 1876 Mr. Gentry was transferred to Lynchburg, Va., as operator for the latter company. Later he went to Wilmington, N. C., where he remained for four years, part of the time occupying the position of chief operator.

In 1879 he was transferred to the telephone department of the Western Union Telegraph Company and constructed and operated an exchange for that company in Wilmington. In 1880 he became manager of the Western Union office in Alexandria, Va., and soon after constructed a telephone exchange in that city for the Southern Bell Telephone and Telegraph Company, of which he was appointed manager. He occupied both of these positions until February, 1884, when he was appointed manager of the telephone exchange in Atlanta, Ga. In 1890 he was appointed assistant superintendent of the Georgia division of the same company in addition to his duties as manager of the Atlanta exchange. During 1893 and 1894 he had charge of practically all of the new construction work of the Southern Bell Company in the states of Georgia, Alabama, South Carolina and Florida. When the construction department of the company was organized in 1895, Mr. Gentry became general superintendent of construction and in 1899 he was appointed division superintendent with headquarters in Atlanta.

On the resignation of Mr. Chas. H. Wilson, general manager of the Southern Bell Company, in 1901, Mr. Gentry was elected to the position and in 1903 he was chosen vice-president of the company in addition to his duties as general manager.

The growth of the business was so rapid that in 1906 it became necessary to separate these two offices and Mr. Gentry relinquished the position of general manager, continuing as vice-president, however. In 1909 he was elected president of the Southern Bell Telephone and Telegraph Company which position he still holds. Under his guidance and management the business of the company has grown to very large proportions.

On February 1, 1912, Mr. Gentry was elected president of the Cumberland Telephone and Telegraph Company, Mr. J. E. Caldwell, former president, becoming chairman of the board.

Mr. Gentry was elected vice-president of the Telephone Pioneers of America at its organization meeting in Boston, November 3, 1911, and in the absence of President Theo. N. Vail, he presided over the proceedings of the meeting.

How a Messenger Left Notice.

Parkersburg, W. Va., has a force of messenger boys who cannot be surpassed. One of them perpetrated a new one on his manager a few days ago. The boy's name is Earl ("Farmer") Hunter and he is 16 years of age. Not long ago "Farmer" was given a message to be delivered about four miles in the country.

"Did you find your man?" asked the manager upon the boy's return.

"No, sir," he replied, "but I left notice."

"Where did you leave the notice?" the boy was asked.

"Right where this picture was taken," replied "Farmer," handing over a photograph of himself to verify his statement.

"But I don't see any house in this picture," replied the manager, as he glanced admiringly at the photograph.

"Sure not," said "Farmer". "The man's dead. See his tombstone there?"

The photograph shows a bright-looking messenger in uniform standing beside his bicycle near the grave of the deceased addressee of the message.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(91) Q. Will you please explain the meaning of the terms "cycle" and "single phase" and "three phase," which are used in connection with alternating current work. F. E. J.

A.—In order to understand the answer to the question it will be necessary to point out the difference between a direct and an alternating current. A direct current is one whose pressure (or voltage) does not vary while contact with the source of the current is maintained—that is the current is steady and unvarying in its intensity. An alternating current is one whose pressure (or voltage) is constantly changing. For example, let us take an alternator capable of generating a current with a maximum pressure of 60 volts, with only one coil on the armature. In the revolution of the armature in the magnetic field it passes a point where no current is generated. As the armature advances from this point it begins to generate current, and as it progresses the current becomes stronger until the armature coil reaches a point one-quarter of a revolution from the starting, or zero, point, when it generates its maximum current—60 volts. Then as the armature turns another quarter of a revolution the generated current decreases in pressure until the coil reaches a point directly opposite the starting point, when the current will again have dropped to zero. Let us assume that this wave of current, from zero to 60 volts and back to zero, was positive. Now starting on the second half of the revolution the armature continues to revolve in the magnetic field, from the second zero point to a point directly opposite that where it generated 60 volts positive, and will again generate 60 volts but negative this time, and the current will decrease from this point, as before, until it reaches the original starting point. It will thus be seen that in one revolution a current is generated in the armature coil that starts from zero, grows until it reaches a potential of 60 volts positive, decreases until the positive potential falls to zero, grows again until it reaches 60 volts negative, and then decreases until the negative potential falls to zero—at the starting point. All of this explanation summed up is that one revolution of an armature coil is called a cycle, and the number of cycles of an alternator depends upon the number of armature coils and the number of field magnet poles.

The simple alternator we have described is essentially a single-phase machine, that is, it generates one alternating current per revolution. If we wind the armature with three coils and space them 120 degrees apart, that is, each to be one-third the distance around the armature, three alternating currents will be generated and we will get three like currents in one revolution of the armature. Such currents are known as "three phase" currents.

(92) Q. Can you give me some information regarding the new submarine telephone cable recently laid between England and France, such as size and weight of conductor and other constructional data? D. C. O.

A. The cable is of the continuously-loaded type. The copper conductor which weighs 300 pounds per nautical mile, consists of a central copper wire surrounded by five copper tapes and the inductance loading is obtained by surrounding the conductor with a close helically-wound layer of 0.12-in. steel wire, the whole being covered in the usual way with guttapercha to a diameter of .412 in. The attenuation constants as measured after submersion and at a frequency of 1,000 alternations per second were found to be .00996 and .00987 per loop kilometre for the two circuits respectively.

(93) Q. "Suppose we have 26 volts and 60 milliamperes of current with two 150-ohm relays on one circuit and 80 volts and 60 milliamperes of current on another with two 150-ohm relays, what would be the relative capacities of each? In one case we have 1.56 watts and in the other we have 4.80 watts which is, I believe, the working capacity of the respective currents. We are also taught that the pull on the relay is the current multiplied by the convolutions of wire around the magnets. This seems to me to be somewhat confusing." C. W. H.

A. The figures given are correct, but the use of the terms is wrong. The power of a current is measured in watts, and the term "watts" relates to electric power and not to capacity, which is something entirely different. The "pull" on the armature is proportional to the current multiplied by the turns of wire on the magnets, that is, the ampere-turns, other things being equal. For example, if one ampere flowing through one convolution around a magnet core gives a pull on the armature of 1, the same current through three coils on the same core will give a pull of 3.

Pole Treating. — The San Joaquin Light & Power Company, San Joaquin, Cal., has found that untreated western yellow pine poles showed completely rotted stubs after twenty-seven months' service on its line. Of those given a brush treatment with creosote twenty-seven per cent. showed signs of decay and of those brush-treated with carbolinium twenty-nine per cent. showed signs of decay; of those treated with crude oil forty-five per cent. showed slight signs of decay. About twenty-eight per cent. of those treated with zinc chloride showed attack by decay. About fifty per cent. of the entire number of poles tested were treated with creosote by the open tank method and these were found to be perfectly sound, showing no signs of decay whatever.

Early Days of the Telegraph.

Following is a copy of an interesting letter from the late John Thomas, of Cleveland, Ohio, an old-time telegrapher, to Mr. George C. Maynard, of Washington, D. C., ex-president of the Old Time Telegraphers' Association, on the occasion of the reunion in 1891. Mr. Thomas will be remembered by many telegraphers for his lovable character, and for the encouragement he gave them during their early struggles. He was for many years superintendent of the Cleveland & Pittsburg Railroad at Wellsville, Ohio, and later, when that road passed into the control of the Pennsylvania Railroad he removed to Cleveland, where he died some years ago. The letter follows:

"My attention was first called to the telegraph by the acquaintance of my father's family, in the old town of Poughkeepsie, N. Y., with that splendid man and genius, Prof. S. F. B. Morse, the inventor of the telegraph, whose country seat was near Poughkeepsie, and whose wife was related to our family.

"Although a mere lad, I greatly admired, Prof. Morse and was deeply interested in his great invention. In 1852, when I was fourteen years of age, Mr. A. G. Davis, of Baltimore, (recently deceased), was the manager of the Poughkeepsie office. He was a warm friend of mine and allowed me to come into the office as messenger, and gave me the opportunity to learn the art of telegraphy.

"In those days all operators read by paper, and I shall never forget my surprise, when on a certain occasion Mr. Davis had left me in charge of the office for a day or two (while possibly he was out repairing lines, as was then the custom) with the provision that Mr. Porter, the House operator, (also a Morse expert,) would come over and take the press report for me each evening. Mr. Porter actually took the whole report one evening by sound, and that from a relay only. It seemed to me at that time an astounding performance. Later, when most of us had acquired the same facility, we could comprehend it better.

"In the closing days of 1852, I accepted a position as operator on the New York & Erie Railway line at $25 per month. I went to Elmira, N. Y., and waited there several days for the return of Mr. L. G. Tillotson, superintendent of telegraph, who was to assign me to duty at some point on the Western Division of the road. On Christmas eve I was at the Elmira Railroad telegraph office, when the two young gentlemen, then in charge, requested me to take their places for a while as they wished to enjoy the holiday season. I agreed to do my best and they went out. About 10 p. m. they returned in a joyful frame of mind. One of them I remember (a very handsome young man) was decorated wit a string of sausages around his neck. They seemed to think that I was doing well enough, so they again went away and I saw them no more that night.

"I was finally assigned to Great Valley station on the Cattaraugus Indian Reservation and went there at once. By consent of Mr. Charles Minot, then general superintendent of the New York & Erie Railway, all the operators on the entire line arranged for a dinner at Elmira, on New Year's day, 1853. All arrived during the preceding night. On New Year's day the operators marched, preceded by a band of music, to Brainard's Hall where a meeting was held. The chief point discoursed upon was the urgent importance of operators declining to teach any more students, as the business was thought to be overcrowded, and a resolution to that effect was adopted, although I imagine was never observed by many of the operators. The dear boys had little anticipation then of the mighty development which has since taken place. At about five o'clock we had dinner. It was a fine affair. It was at this dinner that William Donnell, a witty Irishman, passenger conductor on the Western Division, was called upon to respond to a toast, which he did in a manner that 'brought down' the house. He said: 'Boys, at the last day when the great chief operator of all shall call, may yez all be found ready at your keys with the answer, 'O. K.' The effect was electrical.

"It was at this time that I first met Mr. Minot, general superintendent of the Erie road, the man who is entitled to the credit of introducing the use of the telegraph in the movement of railway trains. He was a man of brilliant genius and ability. I remained on the New York & Erie line for more than three years, during the latter part of which I was division operator at a salary of $500 per annum, and then went with D. Wilmot Smith and M. D. Woodford to the Michigan Central Railway where the movement of trains by telegraph was introduced. I was one of the train dispatchers at Kalamazoo, Mich. While there, in 1858, the first Atlantic cable was completed, the first through message being sent August 18, 1858. All the operators and dispatchers were enthusiastic. We bought candles and illuminated the station in the evening. Then we engaged a large stage coach and the entire party was driven all over the town, in most cheerful spirits.

"A few years later came the war and I went South, first in the military telegraph service, and afterward as train dispatcher on United States military railroads, with headquarters at Alexandria, Va. I was at the war department as one of the operators on the night that the election returns were received from Ohio showing that Brough was elected governor over Vallandigham.

"The war secretary, Edwin M. Stanton, was greatly interested. At about midnight he invited a number of gentlemen, including such of the telegraphers as could leave their instruments, myself among the number, to partake of a supper in one of the rooms of his department. Besides the secretary himself, General Halleck, Major Thos. T. Eckert and a few other prominent men were present. I observed that no wine was served. Stanton was a mighty man and bore his great responsibilities grandly.

"During the closing period of the war I came to Ohio with Colonel J. H. Devereux as superintendent of telegraph and later became superintendent of the Cleveland & Pittsburgh Railroad, now leased by the Pennsylvania Company.

"In 1868 I wrote to Prof. Morse, then in Europe, seeking some information as to telegraphic matters in England and received in reply from him a beautifully written and interesting letter. Prof. Morse was at that time about seventy-seven years of age. What mental and physical vigor Morse possessed even in that advanced age! This leads me to recall the fact that Samuel Finley Breese Morse was born at Charlestown, Mass., in 1791, so that this, from the standpoint of birth, is the Morse Centennial Year. Will not this add a special charm to your meeting? And will not every old-timer recall, at this time, with affectionate veneration, the name of the great founder of his craft?"

The Washington-Boston Underground Telephone Cable.

Some interesting facts are given out regarding the underground telephone cable between Boston and Washington being laid by the American Telephone and Telegraph Company which will be ready for through service toward the end of the year.

The New York-Philadelphia section is already in use and is stated to be the longest known circuit

FIG. 1.—TRENCHING MACHINE AT WORK.

of its kind, and the duct work between New York and Boston and between Philadelphia and Washington is completed, and ready for the cables. These are now being laid.

The total length of line between Washington and Philadelphia is 135 miles. This necessitated the manufacture of cable weighing in all approximately 3,000 tons, requiring 1,500 reels with about 500 feet of cable per reel. The entire cable was manufactured at the Hawthorne plant of the Western Electric Company and made necessary the installation of a considerable amount of new equipment, which with the work of accumulating the raw material, consumed nearly a year before the actual work of cable manufacture could be begun. There will be in the neighborhood of 10,000 loading coils in use on the new section, and in their manufacture about 155,000 miles of iron wire are used for the cores and 7,000 miles of insulated copper for the windings.

The line in the main consisted of four ducts, made of creosoted southern yellow pine, it having been found from experience that ducts made in this way are very durable. The construction work also

FIG. 2.—TRENCH READY TO RECEIVE DUCTS.

made necessary the use of a great amount of concrete and a plant with freight facilities was established at Baltimore.

The New York-Boston section of the underground cable has not yet advanced to the same degree of completion as Philadelphia-Washington section, but its features will be practically the same and will give a continuous stretch of underground work 435 miles in length. The cable and loading coils for the entire work will be manufactured by the Western Electric Company.

The line is carried partly in trenches along the highways, and over bridges. In digging the trenches two methods were employed, by trenching machines and by trenching plows drawn by horses or mules. Fig. 1 shows a trenching machine at work, and Fig. 2, a completed trench ready to receive the ducts.

Mr. J. J. Lynch, superintendent of construction of the Postal Telegraph-Cable Company, San Francisco, Cal., writes: "I am very much interested in the articles that appear in TELEGRAPH AND TELEPHONE AGE, and assure you that I do not miss an opportunity to recommend the paper to any of our people who are not taking it, and who, I think, ought to be subscribers."

Mr. E. D. Keyes, manager of the Western Union Telegraph Company, at Hamilton, Ohio, in renewing his subscription writes: "Let TELEGRAPH AND TELEPHONE AGE come along regularly, as usual, as we cannot get along without it."

CONSERVATION TALKS—V.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLA.

Exchange Efficiency-Grading for Vacations.

It has been customary for most companies to allow employes vacations on the basis of length of service only. There was no incentive in this practice for anyone to try to increase his efficiency and to see that others did likewise. The scheme herewith explained is, so far as the writer knows, new, and has the advantage over the old methods in that a friendly rivalry exists between exchanges, in addition to the extra vacation allowed, for meritorious service.

All employes who have been in the service of this company continuously for one year or more are entitled to a regular annual vacation of one week, with full pay.

Employes in the service for six months or more, but less than one year, are entitled to a regular vacation of one-half day for each month continuously in the service, with full pay.

For vacation allowance purposes, the year shall end May 30, and the time of service shall be counted back from that date.

The vacation due an employe shall be taken all at one time. A week of vacation shall be counted as seven consecutive days, including Sunday.

Vacations are to be taken between May 30 and September 1, unless by special arrangement with the employe's immediate superior, and vacation time shall not be cumulative—that is, an employe not taking his or her vacation this year will not be entitled to this year's time in addition to next year's vacation.

Vacations must be arranged for with the employe's immediate superior at least twenty days before the date of the commencement of the vacation, and the time selected must meet with the approval of the superior.

Employes not taking vacations will be paid a vacation bonus for all the regular and special vacation time due them, at the rate of one-half their regular salary for the time due, such payments to be made September 1. The company, however, much prefers that the employe take the needed rest. The bonus plan is to cover exceptions.

Special vacation privileges beginning.......... 19... will be graded monthly as to the efficiency of the work of all departments, and each exchange will be given a grade percentage each month, which shall be made up from a summary and study of the work of each department, and the percentage so given will apply to the exchange as a whole and to all employes in all departments.

Special vacation privileges will be allowed all employes at exchanges making good ratings for the year ending June 1, 1912, as shown in the following paragraphs.

(1) At exchanges making an efficiency grade of 95 per cent. or more, all employes will be allowed one week extra vacation. in addition to the regular vacation due, with full pay.

(2) At exchanges making an efficiency grade of 90 per cent. to 95 per cent. five days extra vacation will be allowed each employe, with full pay.

(3) At exchanges making 85 per cent. to 90 per cent., three days extra vacation will be allowed all employes, with full pay.

(4) At exchanges making 80 per cent. to 85 per cent., two days extra vacation will be allowed all employes, with full pay.

(5) At exchanges making 75 per cent. to 80 per cent. one extra day of vacation will be allowed all employes, with full pay.

In fixing the efficiency rating of each exchange, the following items will be considered:

COMMERCIAL DEPARTMENT:

Percentage of collections.
Percentage of development (net increase in subscribers).
Amount of rebates.
Public relations—the company's standing with the public locally.
Co-operation and harmony with other departments.
General efficiency.

TRAFFIC DEPARTMENT:

Percentage of overtime.
Percentage of lost calls.
Complaints.
General service and efficiency; attention to operating rules; discipline.
Co-operation and harmony with other departments.

PLANT DEPARTMENT:

Promptness of installation, removals and changes.
Promptness in repairs, toll and local.
Condition of plant and equipment; cleanliness and order in operating rooms and offices.
Co-operation and harmony with other departments.
Attention to rules; general efficiency.

ACCOUNTING DEPARTMENT:

Promptness and accuracy in making reports, neatness in reports; attention to rules.
General efficiency.

The exchange vacation allowance will be based upon the average percentage of efficiency for the number of months considered. For illustration, if an exchange should have 80 per cent. one month and 90 per cent. the next month, the average percentage for the two months would be 85 per cent. The percentage for the entire period will be figured the same way.

Regular annual vacations being provided herein, the time of absence from duty for other reasons will be deducted from the employe's salary, pro-rata, excepting that one working day's absence shall not be deducted if the absent employe provides at his or her own expense or without cost to the company, for some other employe or employes to attend to his or her duties while absent, without detriment to the work. In all cases, however, such an arrangement must be satisfactory to the immediate superior or superiors of the employes concerned before it is made effective.

Other absence shall be deducted pro-rata, and the company will settle direct with the person filling the absent employe's place.

Any exceptions to the above rules must be referred to the head of the department in which the employe works.

Duplex and Quadruplex in Railway Work.*

JOHN A. KICK.

I once heard of a railway abandoning its quadruplex system of telegraphy because it was claimed that too much trouble was experienced in maintaining the equipment and wires in full quadruplex condition.

Taking a single wire capacity as a basis, a good quadruplex circuit is equal to four wires, and where the equipment is given attention the polar side at least is better than two single wires and will give more satisfaction.

The common side of a quadruplex is what you make and maintain it; that is, if the line wire is within the limits of good quadruplexing distance, then the question is one of upkeep, and the returns in added service surely justify first-class maintenance and attendance. If the line wire is so long as to make "fair weather" service only, then the old familiar phrase "you cannot get something for nothing" applies just as it does when you attempt to maintain multiplex equipment by having inferior quality of maintenance and attendance. A quadruplex properly installed and working on a wire well within the limits does not require a great amount of attention, but what attention it does need and receive must be from a skilled attendant.

There is usually enough business between the general headquarters and each division headquarters to require the full service of one or more single wire equivalents and since the usual string of way offices cut in on these circuits are unable to secure service, they had best be cut out altogether and the wire quadruplexed or duplexed, thus multiplying the capacity by two or four.

In general it is more satisfactory to relay business for local points on any division at the main telegraph office on that division than to attempt a general direct service between all stations. For many reasons the method first mentioned is more satisfactory.

First: The through wires are decreased in resistance by the cutting out of office equipment at way offices which are rarely ever able to get the circuit long enough to raise an office.

Second: The lag introduced by a circuit overloaded with relays is cut to a minimum.

Third: The circuit is made a duplex or quadruplex possibility, increasing the capacity two or four-fold.

Fourth: If desired, the through circuit may be quadruplexed from division point to division point with the polar side cut through using the common side for business between the division points or cutting it through as required.

Fifth: There are many possibilities of half set repeatering of side line and branch circuits through over these quadruplexed circuits, and while the intial installation will appear to call for added relay service there will eventually work out possibilities of offsetting this increase by using the added facilities for carrying direct the business formerly relayed from these circuits.

Sixth: If remaining single but strictly through with no way offices, the maximum speed of operation is secured as a single wire. If duplexed and two-way service secured, a higher speed is made possible by reason of the "clearing out" feature of the operation of a pole changer as against a continued direct current applied, which is the case under single wire operation. As the higher speed is possible both ways, it is clear that one wire duplexed will carry more business than two like single wires. If the distance is within the limit of a good quadruplex, then the capacity is increased four-fold, as the latest type of quadruplex equipment is of such efficiency as to allow the very highest speed of operation.

The question of determining requiremnts properly to handle the business is one that is not easily decided, and an attempted study of the proposition will result in a lot of detail work becoming apparent and bringing to notice the fact that there is a very important traffic feature to a well organized railway telegraph system.

Telephone Engineer.

New Time Service Catalogue.

The time service department of the Western Union Telegraph Company, New York, has issued a new time service catalogue, which may be obtained in quantities desired, upon requisition on the supply department in the usual manner.

The catalogue gives illustrations of the various designs of clocks furnished on a rental basis and the rates applied to each clock under yearly contract.

Directions for regulating master clocks equipped with both wooden and mercurial pendulum are fully described with valuable information, which, if carefully observed, will very materially aid in the proper regulation of the master clocks and the rendition of service that will be satisfactory and commendable to time-service subscribers.

The catalogue shows the new signs recently adopted for display purposes on clocks, reading:

U. S. Observatory Time
Hourly by
Western Union,

instead of the abbreviation W. U. Tel. Co. as on the old signs. The new signs are much more attractive with the improved lettering and bring out the words "Western Union" much more prominently. These new signs will be ready for distribution in the near future.

Attention is called to the telegraph company's day and night letter service, cable messages and fast messenger service, and on the front and back covers the new Western Union circular sign is conspicuously displayed.

The General Railway Equipment Company.

The announcement made by the offer by the bankers for subscription to the stock of the General Railway Equipment Company marks the accomplishment of a union of the selector telephone train dispatching interests which has been under consideration for some months past. The new corporation has a capital of $15,000,000 and a board of directors of weight and influence in both the financial and the railway worlds. The board of directors comprises Messrs. Newman Erb, long identified with the Hawley roads; Jules S. Bache, of J. S. Bache & Company, bankers; the Hon. John W. Griggs, ex-attorney-general of the United States and counsel to the Marconi Company; James Gayley, chairman of the United States Steel Corporation; W. G. Besler, vice-president and general manager of the Central Railroad of New Jersey; Charles N. Sigison, treasurer of the United States Electric Company, and George M. Seeley, of the National Telephone Selector Company. The new company succeeds to the business of the United States Electric Company, the National Telephone Selector Company, the Sandwich Electric Company, the Sandwich Pole Changer Company, the Charter Electric Company, the Electric Switch and Signal Company, and the International Telegraphic Call Company.

As is indicated by the names of the constituent companies the General Railway Equipment Company comes into ownership and control of the Gill, the Sandwich, the National and the Wray-Cummings selectors, the aggregate of which in service is said to far outnumber those of all other makes combined. Beside these the new company will own and control a large number of patents, many of them basic and fundamental, covering the essential features of telephone dispatching, message and signal service as used on American railroads to-day. The company will have the services of the engineers who have developed to its present efficient stage the art of dispatching both in its selector and telephone equipment branches and will begin business with a large number of orders on its books. Beside the economies consequent on a centralized control, the new company will have at command a force of technical representatives both at its local offices and on the road, familiar with the requirements of the roads and with a wide acquaintance among railroad officials. Its ample capital is a guarantee of its financial strength and of its ability to take care promptly of contracts of any magnitude. Its standard output will cover practically the entire line of railway electrical equipment.

Wireless in Russia.—The Russian Government proposes to establish four wireless stations on the shores of the Kara and White Seas, at a cost of 100,000 roubles, to facilitate commercial intercourse between Siberia and Europe by way of the Arctic Sea.

Telephone Pioneers of America.

The proceedings of the first annual convention of the Telephone Pioneers of America, which was held at Boston, Mass., November 3 and 4, 1911, have been published in book form and copies are now being distributed to the members. Every detail of this interesting meeting is recorded and the results of the work reflect great credit upon secretary Henry W. Pope. He has displayed much artistic and editorial talent in the make-up of the book, and the members will feel highly pleased with his achievement.

The cover is in telephone blue, the lettering and designs being neatly embossed in gold, a representation of Bell's first telephone being shown on the back cover.

The book has several excellent illustrations including portraits of those gentlemen most prominently identified with the organization. Full page portraits of Dr. Alexander Graham Bell and Mr. Theo. N. Vail are beautifully printed in Sepia on artist paper of a light brown tint, and lists of the members, arranged alphabetically and geographically, are given at the back of the book.

Philadelphia Postal News.

Among the recent visitors at this office were D. H. Gage, Jr., and G. D. Wilkinson, of New York, H. L. Krum, of the Morkrum printer, New York, and M. Ruberg of the American Telephone and Telegraph Company, Philadelphia.

J. M. Elder is in Baltimore on business.

Police Telephones.—The Berlin police are all provided with pocket telephones, and connection boxes are fixed in every street, so that communication cau be immediately effected with headquarters. The pocket apparatus fits into a nickel case two and one-half inches in diameter by three-quarters of an inch thick, and weighs only seven ounces.

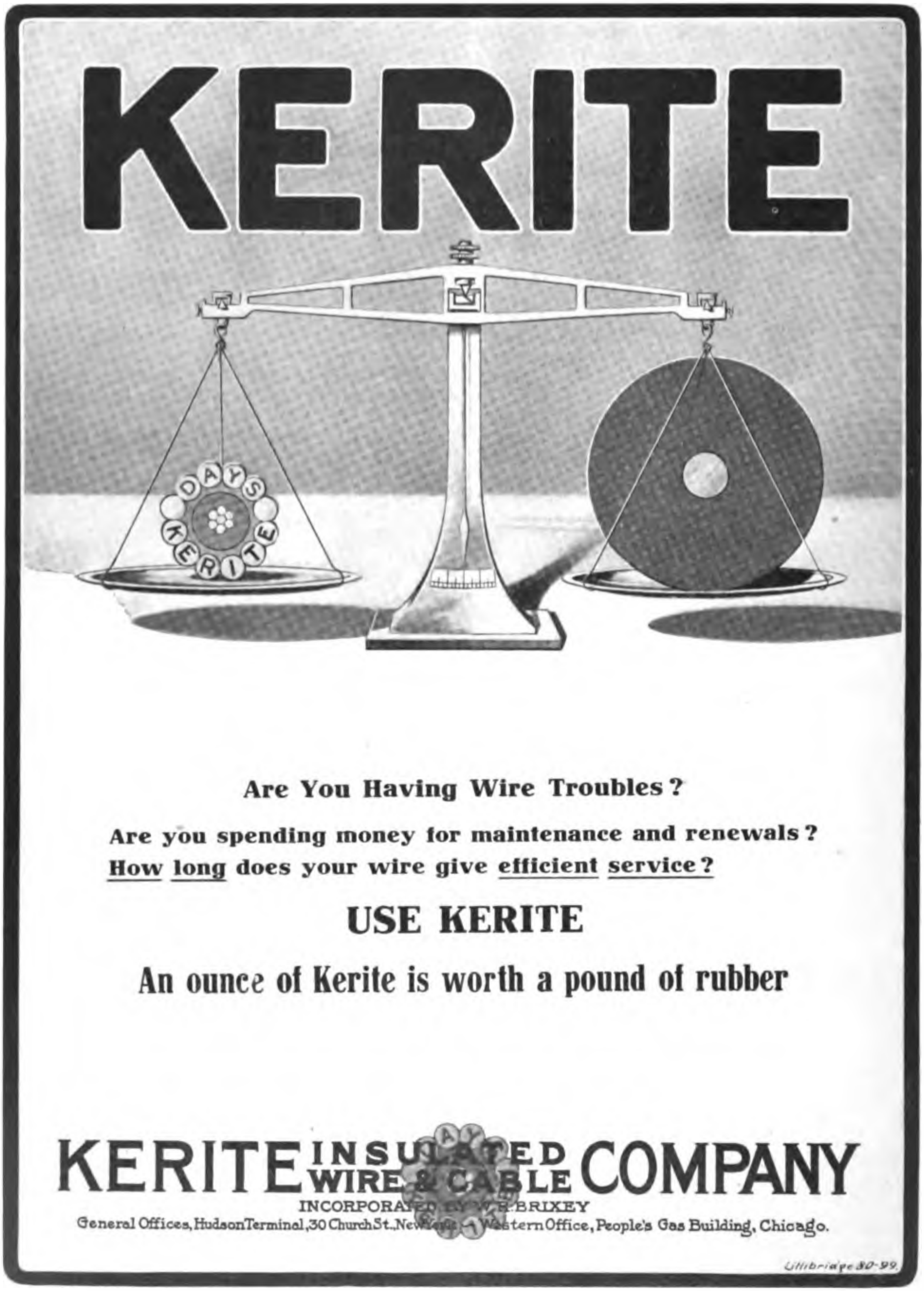
Death of Mr. Boone.

L. N. Boone, aged 54 years, for thirty-five years an operator for the Western Union Telegraph Company at St. Louis, Mo., died in that city April 18. He was at one time chief operator in the St. Louis office, and was retired on a pension some months ago.

New Fire Alarm System for Sacramento.—The city of Sacramento, Cal., will install the Gamewell fire alarm telegraph system.

Valuable Electrical Book.

Vest Pocket Electrical Dictionary. A practical hand book of reference containing definitions of electrical terms and phrases in use in every branch of electrical science. It is especially valuable to telegraphers and telephonists, and will be found a great aid in understanding electrical apparatus and applications of electricity in general. Price 50 cents per copy. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.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Arrangements for Convention of Railway Telegraph Superintendents.

A meeting of the entertainment committee of the Association of Railway Telegraph Superintendents was held April 16, in the office of Mr. L. S. Wells, superintendent of telegraph, Long Island Railroad, New York.

It was finally decided to make the Waldorf the association's headquarters, and to hold the meetings at the same place, instead of in the United Engineering Societies Building, as originally proposed.

The rates for accommodations at the Waldorf-Astoria are as follows:

Two dollars per day for single room without bath for one person, with bath, $3.00 up.

Double rooms for two persons, without bath, $4.00 per day up, with bath, $5.00 up.

Two double rooms, with bath, for four persons, from $8.00 up, for the two rooms, or $4.00 per room.

The tentative programme, as published in our issue for April 16, was slightly changed in a few details.

On Monday, June 3, an informal reception will be held at the Waldorf at 8:30 p. m.

On Tuesday, June 4, there will be business meetings morning and afternoon, and the ladies will be taken on a sight-seeing tour in automobiles in the afternoon. At night there will be a theatre party, as already announced.

The programme for Wednesday is unchanged. There will be a shopping tour for the ladies in the morning and in the afternoon the men will make a visit of inspection to the Western Union Telegraph Company's headquarters, and the New York Telephone Company's Cortlandt Street Exchange, and at 5 p. m. the entire party will take a trip to Coney Island by steamboat.

On Thursday there will be business sessions morning and afternoon and the ladies will be taken on a trip around Manhattan Island by boat. In the evening the entire party will attend a roof-garden entertainment.

On Friday a visit will be made to the Edison works, at West Orange, N. J., and after luncheon at the Country Club at West Orange, as the guests of Mr. Edison, the party will return to New York over the Erie Railroad and land at West Twenty-third Street, where they will take automobiles for the Country Club, Travers Island. At Travers Island, the party will be entertained at a clambake given by Mr. Belvidere Brooks, in behalf of the Western Union Telegraph Company.

It was the sense of the meeting that buttons be supplied to the members instead of badges, and a sample button submitted by Mr. W. E. Harkness met with general approval.

The advisability of having an exhibition of apparatus and appliances was discussed, the general sentiment being against it on account of lack of time out of business hours and entertainment to give the exhibits the proper inspection. The matter, however, was referred to Mr. A. P. Eckert to ascertain the views of the various companies that usually have exhibits at these conventions.

The following members of the committee were present: L. B. Foley, E. P. Griffith, L. S. Wells, A. D. Walters, and E. E. Hudson. Messrs. A. P. Eckert and W. E. Harkness were also present.

The Turner Monument Dedication.

All arrangements have been completed for the dedication on May 2 of the monument at Harriman (formerly Turner), N. Y., to commemorate the sending of the first telegraphic train order, and there is every indication that there will be a large attendance.

Mr. E. P. Griffith, chairman of the monument committee, has arranged for the presence of 200 school children, who will sing in the exercises. The children will be given a holiday for the day, and this feature of the programme will no doubt be highly appreciated by all present.

The programme of the exercises was given in our issue for April 16 and it will be adhered to as there announced.

A special train will leave the Erie station, Jersey City, N. J., at 10:20 a. m., May 2. It will consist of two Erie Railroad private cars, the Western Union Telegraph Company's private car, one first-class coach, and one combination coach. The train will remain at Harriman until the close of the ceremonies, and will return at once thereafter, reaching Jersey City about 2 p. m.

All railroad, telegraph or telephone employees and dependent members of their families are entitled to free transportation and can procure the same by making application through the regular channels.

Round trip tickets New York to Harriman can be purchased at any Erie Railroad ticket office for $1.95 each.

Meeting of Telegraph Superintendents of New York Central Lines.—The regular quarterly meeting of the superintendents of telegraph of the New York Central Lines was held at Cleveland, Ohio, April 18, to consider general matters pertaining to the service Those present at the meeting were: W. W. Ryder, general superintendent, Chicago, Ill.; and the following superintendents: E. C. Keenan, Lake Shore & Michigan Southern, Cleveland, Ohio; A. B. Taylor, New York Central & Hudson River Railroad, New York; J. J. Ross, Michigan Central, Detroit, Mich.; C. S. Rhoads, Cleveland, Cincinnati, Chicago, & St. Louis, Indianapolis, Ind.; G. C. Todd, Nickel Plate, Cleveland, Ohio, and W. L. Connelly, Chicago & Indiana Southern, Gibson, Ind.

Mr. T. C. Harlan, of the Western Union Telegraph Company at Kankakee, Ill., in renewing his subscription for another year, writes: "To be without TELEGRAPH AND TELEPHONE AGE would make me feel that I were isolated from the world in which I am naturally most interested."

Dinner of Magnetic Club.

The spring dinner of the Magnetic Club, New York, was held at Mouquin's on Fulton Street, April 24 and was attended by a large number of members and guests.

The meeting at a down-town establishment was an innovation, and although the quarters were somewhat limited, there was no lack in enthusiasm and good-fellowship.

All present sat down to the tables at 7 o'clock and enjoyed an excellent dinner, served in the style for which Mouquin's is famous. Music from a fine orchestra, and singing, enlivened the occasion and put every one in a happy frame of mind.

At the conclusion of the dinner president C. P. Bruch introduced the principal guest of the evening, Hon. W. A. Prendergast, controller of the City of New York, who made an address that was frequently punctuated by hearty applause.

The keynote of Mr. Prendergasts' speech was efficiency in public service. He paid a graceful compliment to the Postal Telegraph-Cable Company on its progressiveness and its policy of rendering quick service to the public. Too many persons and corporations, he said, tended to follow the line of least resistance and such methods would never result in progress. Mr. Prendergast then cited several instances where he had applied scientific management in city departments and mentioned the opposition he had encountered from men who were slaves of the old regime. A point which we must not neglect, he said, however, is the possibility of losing sight of the personal element. The maximum amount of work must not be placed above the development of the proficient qualities of the man himself. We should strive to broaden and develop him. The first duty of society is to man and our laws should safeguard him from early childhood both as regards conditions of employment and discrimination against any class. This conservation of our flesh and blood, Mr. Prendergast said in conclusion, is the ideal Americanism.

Mr. Bruch then introduced Mr. D. D. Moore of the New Orleans *Times-Democrat*. Mr. Moore described himself as being not a telegraph man, but an "ultimate consumer." He touched upon the close relations between the newspapers and the telegraph and humorously denied the aspersions which the telegraph had cast upon his State, Louisiana, in representing that a large part of her was submerged by the recent floods. They still had a few acres above water, he said, and were constantly reclaiming new areas.

As chairman of the James Douglas Reid Memorial Committee, Mr. Bruch reported that a pamphlet, setting forth the plans of the committee, had been prepared and would shortly be sent out.

Mr. Armour was then introduced, who kept the company in a continuous roar of laughter with his cleverly rendered songs and stories.

After a short intermission the special entertainment features were presented. The artists rendered an excellent performance and received many encores. The dinners of the Magnetic Club are always most enjoyable and the present one was no exception.

Those present were:

Bridgeport, Conn.—S. H. Flint.
Burlington, Vt.—F. H. Dernell.
Elizabeth, N. J.—J. G. Sutliff.
Harrisburg, Pa.—C. E. Diehl.
Hazelton, Pa.—J. C. McGeehan.
Jersey City, N. J.—A. C. Ackerman.
New Brunswick, N. J.—C. W. Oran.
New London, Conn.—F. Orchard.
New Orleans, La.—D. D. Moore.

New York, N. Y.—J. De Jara Almonte; J. J. Alcock; M. H. Albertson; C. C. Adams; C. P. Bruch; J. J. Cardona; A. G. Clark; E. A. Concy; J. J. Cochrane; J. Costello; S. Cohen; F. A. Crippa; W. I. Capen; M. R. Cockey; T. L. Cuyler; R. H. Corson; T. J. Cusack; W. Deegan; F. E. D'humy; T. J. Donovan; J. Doran; J. F. Duggan; W. B. Dunn; F. H. Dernell; W. Ellis; J. S. Ellis; A. J. Eaves; J. H. Flood; W. Finley; E. T. Flanagan; V. Fiore; S. G. Fitch; J. J. Fitzpatrick; M. J. Fitzpatrick; J. J. Ghegan; R. B. Gordon; R. Gould; H. A. Guyon; J. J. Gillies; W. B. Hynds; J. Hennessey; T. E. Heffren; P. Hickey; E. B. Hagerty; L. R. Hallock; E. F. Howell; W. E. Harkness; W. S. Hallett; W. E. Huntington; T. J. Howlett; L. L. Howell; F. Kernan; T. J. Keogh; J. Kempster; R. C. Kempster; H. Kitt; W. J. Kavanaugh; E. Kimmey; C. F. Leonard; L. Lemon; D. F. Mallen; W. A. Malpas; H. G. Madden; Jos. McCauley; F. E. McKiernan; H. McNamee; J. F. McNeill; G. A. McLaughlin; D. McQuade; J. Manning; J. A. Meade; A. B. Minard; D. McNichol; C. B. Mears; J. T. McCoy; E. J. Nally; M. J. O'Leary; J. O'Donohue; C. W. Orman; F. G. Payne; E. B. Pillsbury; M. Pike; N. C. Pangburn; C. Ruffer; H. J. Reinhardt; J. A. Reagan; D. F. Regan; E. Reynolds; J. F. Skirrow; J. Sheffrey; J. Shandley; W. Scrivens; J. Schrugue; W. Stahl; C. Shirley; T. G. Singleton; F. W. Schmidt; W. Scarsborough; J. Schaff; E. Smith; E. P. Tully; T. H. Tierney; J. B. Taltavall; T. R. Taltavall; A. P. Troutwine; E. M. Underhill; J. J. Whalen; H. Weiss; H. T. Woods; A. J. Ward; R. J. Weeks; A. Walsh; W. J. Walsh; H. Zweifel.

Norwich, Conn.—W. B. Hynds.
Meriden, Conn.—J. C. Churchill.
Monticello, N. Y.—J. H. Hess.
Philadelphia, Pa.—C. E. Bagley.
Poughkeepsie, N. Y.—T. F. Burke.
Schenectady, N. Y.—C. F. Horstman.
Scranton, Pa.—S. G. Fitch.
Troy, N. Y.—M. L. Barnes.
Washington, D. C.—G. M. Foote.
Wilkesbarre, Pa.—B. F. Ziegler.
Woods Hole, Mass.—H. G. Haddon.

T. M. B. A.'s Prosperity.—The Telegraphers' Mutual Benefit Association is experiencing a great boom, and applications for membership are coming in rapidly. This prosperity is the result of systematic and sustained efforts on the part of the officials. Mr. M. J. O'Leary, 195 Broadway, New York, is the secretary and will be glad to give information to all interested.

Wired-Wireless Telegraphy.

The April number of the *Journal of the Franklin Institute,* Philadelphia, Pa., contains an article by Major George O. Squier of the Signal Corps, U. S. A., describing some preliminary experiments in "wired-wireless" telegraphy. The article is illustrated and the author summarizes the results of his experiments as follows:

"This brief paper has outlined some methods of telegraphy involving the principles of the wireless art as applied to wires. It has been shown that the wireless telegraph equipment developed by the Signal Corps for use on aeroplanes or for communicating with mobile troops in the field, can be employed to create additional telegraphic channels of communication as follows:

"(*a*) The standard insulated field wire furnished to the Signal Corps, when paid out on the ground and normally operated by the standard field buzzer, may be efficiently used to transmit Morse signals by electric waves by connecting it directly or inductively to the 500-cycle generator supplied for the wireless equipment, and the signals interpreted at the receiving end of the line by the standard low-resistance telephone.

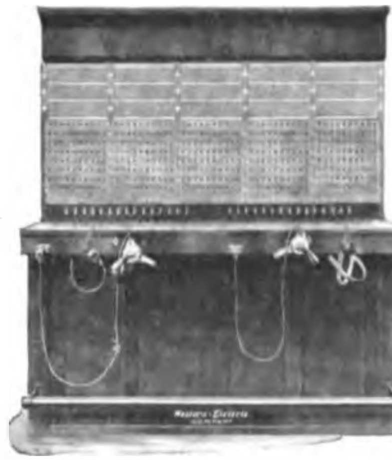
"(*b*) This same wire may also be used to guide the high-frequency electric waves transmitted by the complete field wireless quenched spark sending set and received by the complete wireless receiving set with the usual detector and high-resistance telephones. This gives three well-defined and distinctly separated methods of transmitting intelligence over wires, and permits the possibility of using them either separately or in any operative combination in accordance with the particular requirements of the case. These results can be accomplished without the addition of a single piece of apparatus over what is already in the hands of the field companies of the Signal Corps."

New Magneto Multiple Switchboard.

The Western Electric Company has developed a magneto multiple switchboard with a jack for every line within easy reach of each operator. It is known as the No. 1013 type, and is designed for use on local battery magneto telephone systems where, on account of local conditions, a central battery board would be out of the question.

This switchboard is intended for telephone systems having an ultimate capacity of 1,500 lines or less where the traffic conditions make it necessary to take advantage of the inherent rapidity and efficiency of operation obtained with a multiple switchboard. The sections are five-panel, two-position and, when lined up in the operating room, present the appearance of one continuous cabinet. A cable turning section with a terminal rack is provided for the head end of the switchboard line-up, matching the other sections in design and finish.

The line and cord circuit apparatus makes use of the combined jack and signal with the red spherical shutter. The multiple jacks are mounted in strips of twenty, each jack being on an individual frame so that any one may be removed at will. The clearing-out signal or supervisory sig-



MAGNETO MULTIPLE SWITCHBOARD

nals are modified combined jacks and signals in which the jacks have been replaced by push buttons for restoring the signals. This provides positive supervision.

Portable Sound-Proof Telephone Booths.

After considerable experimental and research work, a practical sound-proof booth for telephone service has been developed by the Western Electric Company. The booths have double, interchangeable walls, with an air space between, which excludes outside noises and secures privacy. They are mounted on rubber cushions. The doors can be furnished in either the single or double pattern to swing to the right or left, as desired. Wooden panels are interchangeable with glass sashes, which are removable to facilitate cleaning. Compartment booths can be supplied in any number desired. Bulletin No. 1083, issued by the Western Electric Company, gives a detailed description of these booths.

Telegraph Typewriter Patent.—Mr. Donald Murray, of London, England, the well-known inventor of the printing telegraph system bearing his name, was on April 2 granted a United States patent (No. 1,021,942) on a "printer for multiplex printing telegraph systems." The invention consists of power-driven selecting and printing mechanism for operating a typewriter.

Artillery Review.—Grand-Regent R. H. Starrett and staff of the Royal Arcanum, reviewed the Thirteenth Regiment Coast Artillery in Brooklyn, N. Y., April 8. Mr. P. J. Tierney, of the central cable office of the Western Union Telegraph Company, New York, was one of the reviewing officers as one of Mr. Starrett's staff. The exercises were very interesting and there was a crowd of 9,000 present.

Western Electric Business.—Decreases which marked the first two months of the Western Electric's current year came to a halt in March, when sales ran about equal with March, 1911. The first quarter of 1912 shows sales at the rate of about $67,000,000 for the year, or slightly better than 1911, which showed sales of $66,200,000.

"Dots and Dashes" at Dinner.—The "Dot and Dash" Club of Philadelphia, which, as already announced, will hold its first dinner, May 11, and has invited as guests several well-known and prominent telegraph people, including Messrs. James Merrihew, David Homer Bates, and Charles P. Bruch, of New York. Ex-governor Stuart, of Pennsylvania, has also been invited to attend the dinner.

Philadelphia Electrical Aid Society.

The Electrical Aid Society of Philadelphia held a very successful entertainment Friday night, April 19. Several hundred persons attended the entertainment, supper and dance, and the proceeds collected were large.

The vaudeville entertainment started at eight o'clock and the dancing continued until midnight. William R. Harmstad is president of the society. The other officers are: vice-president, A. G. Strickland; recording secretary, W. E. Vanarsdall; financial secretary, R. C. Murray, and treasurer, James H. Wilson.

Western Union News from Denver.

Mr. W. McD. Milne, division auditor, Denver, Col., has been transferred to Chicago, as acting division auditor. He is being succeeded by Mr. C. W. Carver of New York.

Miss Pearl M. Cairns, of New York, has been appointed manager at Santa Fe., N. M., vice A. B. Bush, resigned.

Mr. R. W. Gray, division plant superintendent, San Francisco, Cal., was a recent visitor at Denver. Mr. W. Salisbury, district plant superintendent, Omaha, Neb., recently visited Denver on company business. Mr. P. L. Mounce, manager, Indianapolis, Ind., was a recent visitor at Denver.

Mr. B. L. Brooks, division traffic superintendent, and Mr. E. E. McClintock, district commercial superintendent, Denver, have returned after an inspection trip to various New Mexico points.

General superintendent J. C. Nelson has returned after an extended trip over his division.

Mr. C. R. Fisher, district plant superintendent, Denver, has completely recovered from his recent operation for appendicitis, and has resumed his duties.

An independent office has been opened at La Junta, Col., Mrs. A. R. Woods, formerly manager at Telluride, Col., being appointed manager. Mrs. Woods was succeeded by Mr. Frank Shadell, formerly manager at Cripple Creek, Col., and Sheridan, Wyo.

Mr. E. A. Thompson, manager, at Paonia, Col., has resigned to go into the publishing business, having bought the local newspaper at Paonia. He is succeeded by Mr. H. Redfield, formerly night operator at Cripple Creek, Col.

New York Western Union Notes.

Mr. Robt. H. Morris, electrical engineer of the operating department, has the sympathy of many friends in the loss of his wife, who died at Roselle, N. J., April 13 at the age of 66 years. The remains were buried at Glendale, N. J. Old-timers will remember Mrs. Morris as the happy good-natured operator at old "DX" office, 134 Pearl Street, New York, which was under the management of Mrs. M. E. Lewis. Mrs. Morris is survived by her husband and two children, George W. and Maud A.

Rubber Telegraph Key Knobs.

Telegraph and Telephone Age

No. 10. NEW YORK, MAY 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Progressive Methods—The Unit System.

When one compares the equipment of a modern telegraph office with that of one of not many years ago he is impressed with its altered appearance, but seldom does one really appreciate the real factors which have made such changes possible.

The usual conclusion arrived at by many is that the business, filling a long-felt want, grew of its own accord so rapidly that the company was able to enlarge and elaborate its plant by the mere expenditure of the money thus received, granting, of course, good management.

Good management is the principal factor in every industry, but let us see what auxiliary methods the managers have evolved that have contributed much toward the present high state of efficiency.

During the early period of telegraphy progress consisted principally in the enlargement of the plant, developing new and improved apparatus, and educating the people to appreciate the advantages of quick communication. There was little or no profit in the industry at first; every new venture was guesswork and a hazard. There was no uniformity in construction, and each office was adjusted to the conditions then prevailing. Being an adjunct in a railroad station or a drug store, the office was installed to suit the environments.

Naturally the equipment was not interchangeable between offices, and economy derived by uniform construction was probably never thought of, but today uniformity is the principal factor in the economical and rapid development of the telegraph. Today each piece of apparatus or equipment is, or soon will be, a unit, interchangeable with any other similar part, in any office and at any time.

Not only that, but each unit is given a type number together with a description of its particular construction, use and operation. This information is printed and distributed to all employes directly concerned.

Tables for multiplex and repeater apparatus are constructed of uniform dimensions and spaced for a uniform layout and assembly for each class. Unnecessary and inefficient equipment has been discarded; such, for example, as that of the terminal switchboard in the cellar for incoming wires. Today one distributing frame near the operating switchboard fills the requirement in a more satisfactory manner and at the same time saves not only space, but considerable expense in work, wire and other material.

The mounting for each class of units is itself also a unit, constructed to take care of a given number of other apparatus units within a specified space on the table or elsewhere.

What is particularly noticeable is the smaller dimensions of recent apparatus and other items of equipment. For example, the condensers are very small as a rule compared with the older designs. The old type 3 M. F. condensers used on multiplex circuits occupied a box about 18x24 inches in size and weighed several pounds. Today we can get its equivalent in the hip pocket and experience little discomfort from its weight. A dozen of them may be readily concealed under the table framework, if necessary, and the space formerly occupied by condensers can be utilized for other purposes. In actual practice part of this space is now taken up by a combination condenser box unit much smaller than the former type, yet containing a number of other condensers required in the operation of quadruplex circuits.

Another innovation in telegraph engineering is that of using enameled wire in place of inflammable silk or cotton-covered wire in the windings of sounders, relays and other magnet coils. This wire has been found not only more durable, but it occupied less space. Silk and cotton covering becomes carbonized when overheated by excessive currents; and as carbon is a good conductor of electricity, the current in time cuts across adjacent convolutions and thus creates a "lopsided" relay in the differential types, or a defective one in the single line apparatus.

Last but not least uniformity in apparatus, installation, and instructions concerning the operation tends toward better results all around. Each attendant, regardless of where he works, receives the same official instructions and becomes familiar with the assembly and operation of apparatus in vogue, no matter what office he may be working in. He himself is therefore instantly "interchangeable" as a substitute, or available in cases of emergency, wherever required.

Historians have divided the past into epochs designated the Stone Age, the Iron Age, etc.; but surely there is no term that would so fittingly represent the present, as "The Unit Age." (Future historians please note.)

Recent Telegraph and Telephone Patents.

ISSUED APRIL 16.

1,023,185. Telephone-Exchange System. To H. G. Webster, Chicago, Ill.

1,023,480. Telephone-Exchange System. To E. E. Clement, Washington, D. C.

1,023,482. Party-Line Selective Signaling System. To C. E. Scribner, Chicago, Ill.

1,023,557. Multiple Telephone-Transmitter. To C. E. Egner, Stockholm, and J. G. Holstrom, Saltsjo-Storangen, Sweden.

ISSUED APRIL 23.

1,023,900. Telephone System. To H. G. Webster, Chicago, Ill.

1,024,088. Signal-Transmitter for Telephone Exchanges. To G. W. Lorimer, New York.

1,024,131. Detector for Party-Line Telephones. To H. Y. Haley, Rushsylvania, Ohio.

1,024,184. Automatic Telephone-Exchange System. To G. Deakin, Berkeley, Cal.

1,024,205. Printing Telegraphy. To Isidor Kitsee, Philadelphia, Pa.

1,024,444. Automatic Signal-Operator. To E. R. Gill, New York.

1,024,445. Selective Signalling System. To E. R. Gill, New York.

1,024,446. Signaling System. To E. R. Gill, New York.

1,024,487. Telephone-Exchange System. To E. E. Clement, Washington, D. C.

ISSUED APRIL 30.

1,024,498. Telephone System. To H. P. Clausen, Chicago, Ill.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange May 11:

American Telephone and Telegraph Co....	146
Mackay Companies	82
Mackay Companies, preferred.............	68⅝
Western Union Telegraph Co.............	84

Personal.

Mr. D. H. Bates, Jr., son of Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, New York, was married on May 15 to Mrs. Eleanor Loring Lord.

Mr. Cecil P. Poole, a former telegrapher, and for the past seven years co-editor of *Power*, New York, has retired from editorial work to engage in engineering practice in Atlanta, Ga.

Mr. F. Douglas Watson, general manager and secretary of the Constantinople Telephone Company, has returned to Constantinople after spending two or three weeks in England.

Mr. F. J. Scherrer, secretary to Col. R. C. Clowry, formerly president of the Western Union Telegraph Company, New York, has returned from Chicago and Omaha, where he went on business.

Mr. W. H. Sawyer, a well-known old timer, and for many years actively identified with the Phillips Insulated Wire and Cable Company, Providence, R. I., has returned to his Providence home from Pasadena, Cal., where he spent the winter.

Mr. Jeff W. Hayes, of Portland, Ore., a well-known old time telegrapher and author, is now a special correspondent for *The Oregonian*, of Portland. Mr. Hayes expects to visit the larger cities throughout the United States and Canada for his paper.

Mr. Francis W. Jones, former electrical engineer of the Postal Telegraph-Cable Company, New York, accompanied by Mrs. Jones, has returned from Palm Beach, Fla., where they spent the winter. They will take up their residence at Spring Valley, N. Y.

Mr. J. E. Peacock, former manager of the Jacksonville, Fla., Western Union office, was, on April 30 nominated in the Democratic primary election for treasurer of Duval County, Fla. The nomination is equivalent to election. Mr. Peacock, since leaving the Western Union service in January, 1911, has been successfully engaged in the real estate business in Jacksonville. He will continue in the real estate field after assuming the duties of county treasurer.

Mr. Guy E. Paine, formerly superintendent of the Postal Telegraph-Cable Company at Chicago, Ill., has become a member of one of the most successful insurance firms in the South, which is located at Atlanta, Ga. The style of the new firm is Bagley, Willett & Paine. Mr. Paine will have charge of the independent agency at Macon, Ga., and his territory will cover over thirty counties in central and southern Georgia. He has had a wide business experience and is eminently fitted for his new line of work. Mr. Paine will give his entire time to the business of the new agency, and his many friends in and out of the telegraph service wish him much success in his new field of endeavor.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, New York, is in New Orleans, La., at the present time and expects to return to New York in a week.

Mr. Edward Reynolds, auditor, has been appointed fifth vice-president of this company, in recognition of services.

Mr. Minor M. Davis, electrical engineer and chief engineer of telephones, New York, has been in Chicago on company business for the past two weeks.

Mr. Edward S. Williams, manager of the Chicago office, has been appointed superintendent of the first district, western division, to succeed Mr. H. G. McGill, who becomes superintendent of the second district.

Mr. John Nering, for many years assistant manager of the Chicago office, has been appointed manager to succeed Mr. E. S. Williams, promoted. The position of assistant manager has been abolished for the time being.

Manager J. A. McNichol and cashier J. H. Wilson, of the Philadelphia office, visited New York recently to study the organization and operation of the Mutual Investment Association with a view to starting a similar organization in Philadelphia. Such associations are now in successful operation in Chicago and Washington as well as in New York.

During the absence of chief operator A. Klein, at Birmingham, Ala., who left May 9, for Hammond, La., to take a much needed rest, traffic chief E. E. Hydinger will act as chief operator; night chief operator R. D. Burger will act as traffic chief; all-night chief operator R. L. Figgatt, as night chief operator; night traffic chief C. J. Raley, as all-night chief operator, and operator J. A. Price, as night traffic chief. Mr. Klein, who is one of the most efficient chief operators in the South, will probably be absent three months.

Edward Reynolds, Fifth Vice-President, Postal Telegraph-Cable Company, New York.

Mr. Edward Reynolds, whose election as fifth vice-president of the Postal Telegraph-Cable Company is announced in the executive column, received this appointment as a recognition of his faithful services. He still retains the active position of auditor of the company n New York, of which he is also a director.

Mr. Reynolds was born at Catskill, N. Y., November 11, 1866, and began his telegraphic career at the age of 18. Coming to New York in 1889, his service with the Postal Company began on August 1 of that year as an operator. His faithfulness, intelligence and capacity met with early acknowledgment, and on April 1, 1891, he became chief clerk to superintendent E. G. Cochrane. On February 1, 1897, he was appointed to a like position in the office of the general superintendent, thence on July 1 was promoted to the chief clerkship in the office of vice-president Bradley. On January 1, 1900, he was advanced to the position of as-

EDWARD REYNOLDS.
Fifth Vice-President and Auditor, Postal Telegraph-Cable Company, New York.

sistant auditor, and on May 1 of the same year to that of auditor, which position he still holds with credit to himself and satisfaction to his company.

Telegraph Money Order Forger Convicted.—George P. Westerfield, operator at Hot Springs, Ark., forged two telegraphic messages on the morning of April 9, dating them New Orleans, La., and addressed to the Arkansas National Bank, Hot Springs, Ark., instructing it to pay him nine hundred dollars. The bank suspected fraud, refused payment, and on investigation Westerfield was arrested. Almost immediately after his arrest, he was indicted by the grand jury. Westerfield was tried on April 29, convicted on the charge of forgery, and sentenced to four and one-half years in the penitentiary.

To Entertain German Naval Officers.—Messrs. Clarence H. Mackay, president Postal Telegraph-Cable Company; W. C. Brown, president New York Central Lines; Melville E. Stone, general manager Associated Press, and Andrew Carnegie, are among the members of the reception committee appointed by Mayor Gaynor of New York to entertain the officers and crew of the German warships, which are due at New York June 9.

Mr. H. W. Carty, local manager of the Diamond State Telephone Company, Salisbury, Md., writes: "I have just finished reading the May 1 issue of TELEGRAPH AND TELEPHONE AGE and I wish to assure you that it is one of the most instructive journals that I have ever had the pleasure of reading."

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, who has been in Europe for several weeks, is expected back in New York toward the middle of June.

Mr. Newcomb Carlton, vice-president of the company, who has been on a business trip to Chicago, Omaha, Denver and Pacific Coast points, accompanied by his secretary Mr. E. Everett, is expected back at his office the first of next week.

Mr. Belvidere Brooks, general manager; Mr. A. G. Saylor, general superintendent, and Mr. E. M. Mulford, division commercial superintendent, of this company, all of New York, were in Boston last week on business connected with the service.

Mr. L. A. Harrison, of the Albuquerque, N. M., Santa Fe office, has been attached to the plant department of this company, with headquarters at Denver, Col. Much sympathy is expressed for Mr. Harrison in the death of his wife, which occurred on April 13.

Mr. W. E. Dickinson, manager of the Worcester, Mass., office has been promoted to a position in the office of Mr. E. M. Mulford, division commercial superintendent, New York.

Mr. R. L. Jackson, formerly manager of the Western Union Telegraph office at Atchison, Kan., is now manager for the same company at Victoria, B. C.

Mr. T. A. Darling, manager of the Postal Telegraph-Cable Company of Texas, at Beaumont, Tex., has resigned to accept the managership of the Fort Worth, Tex., office of this company.

Mr. C. H. Frary, of Lawrence, Kan., has been appointed assistant to manager E. J. Sullivan of the Wichita, Kan., office.

The Spring dinner of the Commercial Managers' Association of New York was held at the Broadway Central Hotel May 4. Addresses were made by Mr. John C. Willever, United States manager cable system; A. C. Kaufman, division cable manager; P. D. Callum, division commercial agent; S. M. Williams, manager of press service; J. F. Nathan, commercial superintendent, and P. J. Casey, special agent. These gentlemen were guests of the association, together with Messrs. E. M. Mulford, division commercial superintendent; W. A. Sawyer, district commercial superintendent; J. A. Hill, division traffic superintendent, and M. W. Hamblin, special agent. Papers were read by Miss N. C. Laughlin, manager of the branch office at 172 Fifth Avenue; Mr. Albert Lister, district cable agent; Mr. J. C. Van Cura, cable agent, and John Simmonds, district commercial manager. A delightful time was had by all. There were over 150 persons present.

A managers' conference of the Western Union Telegraph Company, embracing managers of offices in Maine, New Hampshire and part of Massachusetts, was held at the Congress Square Hotel, Portland, Me., Saturday, April 26, for the purpose of devising ways and means for the securing and handling of summer business. This is the first time that meetings of the fifth district have been held outside the city of Boston, and Portland was the first city to welcome the managers. The meeting was called to order by Mr. C. F. Ames, district commercial superintendent, Boston, Mass., at 2 p. m., and the following speakers were introduced: Mr. P. D. Callum, division commercial agent, New York, who spoke on "Scientific Solicitation of the Telegraph Service"; Mr. A. C. Kaufman, division cable manager, New York, who explained to those present new and interesting features pertaining to the cable business, his remarks being very enlightening and instructive. He was followed by Mr. W. J. Fraser, district cable manager, Boston, who talked on "Cable Solicitation." Mr. E. M. Mulford, division commercial superintendent, New York, thanked the managers for their endeavors in the past and bespoke a continuance of their efforts to increase their receipts, assuring all present that they were being given due credit for their work. After a few remarks by Mr. Ames the meeting adjourned until 6.30, when one of the Congress Square Hotel's famous dinners was enjoyed. During the evening remarks were made by all the managers present, outlining their methods of soliciting business in their respective cities, which developed into a very interesting and instructive debate. Among those present were the following: P. W. Johnson, district commercial manager of Maine and New Hampshire, Boston, Mass.; A. M. Pearson, district commercial manager Eastern Massachusetts; F. D. Byrne, district cable manager, Philadelphia, Pa.; and the following managers: H. H. White, Portland, Me.; J. J. Flanagan, Bangor, Me.; A. D. Allen, Newburyport, Mass.; W. B. Mennealy, Lewiston, Me.; E. M. Fisher, Portsmouth, N. H.; T. H. Harrigan, Gloucester, Mass.; C. A. Pearson, Haverhill, Mass.; C. H. Abbott, Manchester, N. H.; E. I. Herbert, Augusta, Me.; Z. I. Bissonnette, Lowell, Mass.; J. F. Hanrahan, Lawrence, Mass.; W. E. Dickinson, Worcester, Mass.; W. P. Walsh, Rockland, Me.; and J. H. Lang, Lynn, Mass.

Mr. Loren J. Mink, whose appointment as district commercial manager at Chicago, Ill., was announced in our issue dated May 1, was born in Elgin, Ill., June 30, 1881, and started his career as a telegrapher in his native town, August 7, 1901. Since that time he has filled the positions of operator, manager, chief clerk and district commercial manager at Chicago.

Mr. Harry McKeldin, whose appointment as general traffic chief at Washington, D. C., was announced in our issue of May 1, has been in the service at Washington since 1876. As an expert telegrapher he has a nation-wide reputation, and is a man of genial personality. He has a host of friends who will congratulate him on his deserved advancement. Mr. McKeldin did some remarkably fast press work during the Hayes-Tilden presidential controversy and President Garfield's illness, handling a large amount of press matter on these occasions.

Mr. McKeldin was born in Baltimore, Md., and entered the service of the Insulated Lines Telegraph Company in that city in 1866. In 1872 he became manager of the Southern Atlantic Tele-

HARRY McKELDIN,
General Traffic Chief, Western Union Telegraph Company, Washington, D. C.

graph Company at Charleston, S. C., and in 1884 he was appointed night chief operator of the Bankers and Merchants Telegraph Company in Washington, D. C. Mr. McKeldin has worked for about all of the so-called "opposition" companies at different points in the southern and eastern states.

He went to Washington in 1876 and has remained there practically ever since, occupying various positions with the press and telegraph companies, finally settling down with the Western Union.

Redemption of Western Union Bonds.—The Western Union Telegraph Company deposited with the Equitable Trust Company, New York, the sum of $8,560,000 to meet the principal, premium and accrued interest of its $8,000,000 convertible 4 per cent. bond issue, redeemable at 105 May 1.

The New Telegraph and Telephone Buildings in New York.

Work on the new building being erected on Walker and Lispenard streets, New York, to be occupied jointly by the American Telephone and Telegraph Company, the New York Telephone Company and the Western Union Telegraph Company, is progressing rapidly. The steel frame-work has been erected to the sixth story and presents a massive appearance. This building, which was described and illustrated in our issue for February 16, 1911, is planned for an ultimate height of twenty-four stories.

Active work is also going forward on the foundation of the Dey street section of the new building of the Western Union Telegraph Company, to be erected on the site of the present structure at the corner of Broadway and Dey street.

"The Morsel."—We have received a copy of a pamphlet issued under the name "The Morsel" by the commercial department of the Western Union Telegraph Company at Boston, Mass. It is to be issued periodically for the purpose of spreading the gospel of commercialism. The first number contains contributions from several commercial managers in the district, and gives evidence of a lively commercial spirit among the staff. The pages are produced on the mimeograph.

The Cable.

New Japanese Cable.—A new telegraph cable has been laid between Osaka and Tokushima, Japan. This is an inland sea cable about seventy miles in length.

Quick Cable Service.—The Western Union Telegraph Company on May 3 arranged special cable service for the *New York Times* to transmit the story by "Arsene Lupin" of the recent operations and capture of the Paris automobile bandits. The story, consisting of 6,141 words, was put on the wires at London at 2.15 a. m. (New York time) and was sent by the Penzance-Canso cable and the Penzance-Bay Roberts cable, being relayed from these points by cable to Coney Island and thence to the central cable office in New York. The message consumed exactly two hours in transmission, being completed at 4.15. Expert operators were on duty at the relaying points and the whole story was sent over the cables without a break or hitch of any kind.

Obituary.

Andrew Ott, aged 49 years, a well-known telegrapher, died in Cincinnati, Ohio, April 28.

Hubert Child, aged 78 years, a member of the United States Military Telegraph Corps, died at Wichita, Kan., April 29. He was a native of England.

David D. Kennedy, aged 57 years, a former telegrapher and late chief clerk in the passenger department, Baltimore and Ohio Railroad, died at Baltimore, April 29.

E. W. Bradford, aged 75 years, for the past thirty-seven years employed as an operator in the Western Union Telegraph office at Worcester, Mass., died in that city May 6.

J. E. Thomas, aged 90 years, an old-time telegrapher, died in Indianapolis, Ind., April 27. He worked for the Western Union Telegraph Company for over forty-five years, and was retired in 1905.

Jesse H. Bunnell, aged 30 years, son of the late J. H. Bunnell, New York, died recently while on his way from California to New York. He was taken ill on a Santa Fe train and was removed to the hospital at La Junta, Col., where he died a few hours later, supposedly from poison.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

Give the formula for ascertaining the multiplying power of a shunt.

In connecting shunts to the galvanometer what special care should be taken regarding the connections?

Why should the shunt of greatest multiplying power be used first?

What instrument does the modern condenser resemble in principle?

What are the principal elements of a condenser and how are they assembled?

What part of the condenser is called the dielectric?

What substances are used as dielectrics in condensers?

Describe the construction of a condenser.

What dielectric is best for a testing condenser?

What is an adjustable condenser?

How is the capacity of an adjustable condenser varied?

What are keys or switches used for in connection with condensers in electrical testing?

What are the insulated parts made of?

What material is used for contact points? Why?

Why are the hard rubber pillars grooved?

Why do the grooves increase the resistance, and decrease the leakage?

What is a reversing key?

How is a reversing key constructed?

Study the diagram showing the construction and connections of a reversing key.

Why should the reversing key be so connected that the platinum contacts will not form part of the circuit?

What is the feature of the Rymer Jones reversing key?

Why are keys with rubbing contacts preferable to those having striking or abutting contacts?

What is a commutator?

How is a commutator constructed?

Why are the brass contact pieces of a commutator mounted on hard rubber pillars?

What is a "discharge key"?

How many binding posts are there to the Kempe discharge key, and how are they connected?

When the lever is up, what are the connections?

When the lever is down, what are the connections?

President Taft's After-Dinner Speech by Telephone.

The Associated Press and American Newspaper Publishers' Association held a dinner at the Waldorf Astoria in New York on the evening of April 25 and extended an invitation to President Taft to partake of their hospitality and deliver an address. Mr. Taft, however, already had an engagement to deliver a political speech in Boston, but at this point the telephone made its appearance upon the scene and saved the day.

The American Telephone and Telegraph Company, in conjunction with the Western Electric Company, made arrangements which would enable the President to talk directly to the ear of each of the 810 diners. Seven trunk lines were brought in from Boston to the Cortlandt central office in New York, and two from Hot Springs, Va., to enable Premier Burden of Canada to say a few words, thence through seven Western Electric telephone repeaters to bring up the transmission, and then over fourteen trunks to a special switchboard installed in the gallery of the banquet hall.

The table circuits were divided into branches, so that there would not be over 128 receivers on any one, and as each branch was in a "series-multiple" arrangement, tests were made before each speech as a rupture of one wire would have broken up the branch. A special and most successful feature was introduced, whereby two microphones placed in the gallery of the hall conveyed the cheers and applause to the speaker.

The speeches of President Taft and of Premier Burden were heard with marked distinctness, and the successful carrying out of the plans may be regarded as a feat unparalleled in the history of the telephone art. Not only were more receivers in use than ever before, but the transmission obtained was better than it had been possible to obtain previously.

Newspaper Preparations for News of "Titanic" Disaster.—Many of the reporters of out-of-town newspapers who came to New York to handle the news of the "Titanic" disaster on the arrival of the rescue steamer "Carpathia," brought along their own telegraph operators in order that nothing should prevent their papers from having the best of service. On arriving in New York, the reporters had to obtain credentials from the Federal, municipal and police departments before they could get to work, a task that entailed considerable hustling on their part.

High Tension Interference in Ohio.—The Western Union Telegraph Company has complained to the State Utilities Commission of Ohio that the high-tension currents used by the Cleveland, Painesville and Eastern Traction Company interfere with the operation of its telegraph lines, and are a public menace and danger. A hearing of the matter was had at Columbus recently.

CONSERVATION TALKS.—VI.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLAHOMA.

The Disconnect Problem.

Probably one of the greatest of all wastes in the telephone business is due to premature disconnects or telephones ordered out before a reasonable amount has been earned on the investment. The following is a solution of the problem submitted by the writer. The idea is not new but is an elaboration of a practice frequently employed in private branch exchange contracts.

At first sight the solution may seem impractical but the writer believes that if properly presented by competent commercial men, it would not only prove practical but successful. It would naturally take some time to cover the field, yet every subscriber added would be just that much gain. It is proposed to rent telephones to property owners only; to have the owners collect the telephone rent with the house rent, and allow the owner a percentage for looking after the interests of the company, whether telephone, electric light, water, or other utility. In the case of the telephone in which we are especially interested, benefits would be derived both by the owner and the telephone company.

Let us now consider some of these benefits: On the part of the owner much damage to his property would be avoided, permanent wiring could be put in, more than one outlet being provided for if necessary. His tenant would be able to get prompt service, as the owner on renting his house would simply call the telephone company and notify them that the house was rented. A form of postal card could be used to confirm the telephone message, and this postal card would furnish the data for directory, etc. The owner would not be responsible for rent when the house was vacant. All that would be required of the owner would be permission to wire his property, and a contract for telephone service subject to terms agreed upon, such as no charge when property is vacant, commission on collections, charges for moving telephone, notifying company when premises are vacant or rented, privilege of removing telephone at option of the company, etc.

On the part of the telephone company the advantages are almost too numerous to mention, but a few may be mentioned.

(1) Disconnects would be reduced to a minimum, for people would be more liable to take and keep a telephone if it was a part of the rent, than otherwise: (2) Collections would be more easily handled and would reduce uncollected per station; (3) Equipment could be arranged on a permanent basis, e. g., a desk stand could have a plug and jack attachment, and wall sets could be installed in a cabinet flush with the wall. This would be of great advantage to the telephone company and a convenience to the subscriber, since when the telephone was not in use, he could pull the plug and lock the telephone up in his desk or close the cabinet, as the case may be. This would save him much annoyance from the non-user, and the company disputes over toll calls, etc., thus eliminating considerable loss of revenue; (4) It would reduce to a minimum the accounting for in the case of buildings, flats, hotels, etc., only one account would be necessary, hence it is safe to estimate that the number of subscribers' accounts would be cut almost in half. There are many other equally important benefits, but these will serve to illustrate some of the advantages. There are practically no disadvantages to the system and the only serious question involved is how successful we would be in interesting owners of property.

An objection might be raised that having a number of telephones not in use and tied up in empty houses would be a poor investment, but since we reserve the right to take out telephones when necessary, the depreciation would be less with the instruments hanging on the wall than when kept in storeroom, as at present. A record of all such inactive telephones would be kept by the plant department and used to the best advantage possible.

Much damage is done to telephone sets by improper handling on installation wagons, etc., and this would be cut down to the minimum, if telephones are left on premises until absolutely necessary to use them. If the owner can afford to risk his plumbing, etc., in an empty house, surely we should be willing to risk our small investment.

This method of handling the disconnect problem might be gone into in more detail, but the object of this article is to start thought along these lines, and it is the belief of the writer that if this method is adopted, the problem will soon be a thing of the past, much waste will be prevented and revenue and efficiency increased very materially.

The plan submitted is a radical move but the writer believes that only a radical change of method in securing contracts will bring desired results and insure a complete cure.

The following remedy is suggested as a palliative one, and would materially improve matters, be less radical, and probably more quickly assimilated by the public, namely:

Insert in all future contracts a proviso, that, in the event of the patron ordering his telephone taken out for other reasons than failure of the company to comply with its provisions, before the expiration of one year from date of installation, the patron would be liable for the cost of installation and take out, in proportion to the time the telephone has been in service, e. g., telephone has been in three months, he would be liable for 9/12 of the total installation and take out charges. The total of these charges being inserted in the contract so that the patron would know just where the charges would be.

These figures can easily be made at the time of making the contract and may fit each case, or an average cost could be agreed upon.

At first I was inclined to think that a maximum amount should be inserted, but to fit all cases and be fair to all parties, I believe it is best to leave the amount to be filled in .

There should also be inserted in all contracts a proviso, permitting the telephone company to charge for moving a telephone when not in constant use in same location one year. These provisos are not only very necessary from a company viewpoint, but as a part of our duty to conserve the interests of the public, whose servants we are.

Radio-Telegraphy.

Mr. W. W. Bradfield, manager of the English Marconi Wireless Telegraph Company, London, is in New York on business in connection with the service. He will return to England on the "Mauretania" May 22.

Signor Guglielmo Marconi sailed for Europe April 30 on the North German Lloyd steamer Kaiser Wilhelm II. Mr. Marconi arrived in New York March 14. Since that time he has been kept very busy. He inspected the Marconi transatlantic station at Glace Bay, N. S., delivered a lecture April 17 before the New York Electrical Society on recent developments in wireless telegraphy, and was for over a week a witness before the Senate Committee in New York and Washington investigating the "Titanic" disaster. He expects to return to New York in the fall.

Wireless Between Rome and Tripoli.—Direct wireless communication between Rome and Tripoli was opened April 15.

Marconi Stock Increase.—The Marconi Wireless Telegraph Company of America has filed a certificate with the secretary of state of New Jersey showing an increase in its capital stock from $1,622,500 to $10,000,000.

Wireless Equipment Wanted.—Bids are invited by Captain R. J. Burt, Signal Corps, U. S. A., Washington, D. C., for four 1-kw. wireless telegraph equipments for installation in land stations. Bids will be received until May 25.

Violations of the Wireless Act.—The Federal grand jury at Norfolk, Va., on May 8 found indictments against the masters of five British steamers for the violation of the act requiring vessels to be provided with wireless apparatus.

Authority Over Wireless Stations.—A federal wireless regulation bill was passed by the United States Senate May 7 giving the Secretary of Commerce and Labor authority over all wireless stations in the United States, and provides for licensing them. The measure complies with the general wireless treaty recently ratified by the Senate.

Wireless News from Ships at Sea.—Mr. Willis C. Pratt of New York states that he is working in conjunction with the Marconi Wireless Telegraph Company to have a competent and trained newspaper man on board every ocean steamship to report to land by means of the wireless any happening of interest. So far he has not been able to get an answer from the steamship owners on the proposal for the sending of news without the censorship of the captain.

Opposes Wireless Regulation.—Mr. John Stone Stone, of Boston, Mass., the well-known wireless-telegraph inventor, is opposed to government regulation of wireless telegraphy, and he advises against the United States subscribing to the Berlin wireless treaty. Such action or the passage of bills now before Congress establishing government regulation would, he says, check progress in a new art which is now daily advancing in flexibility, in range and in importance.

Col. Wilson's Testimony.—Col. Christopher C. Wilson, former president of the United Wireless Telegraph Company, appeared before United States Commissioner Alexander in New York for examination in the bankruptcy proceedings of the company. He testified that the only personal property he had was a watch. He denied specifically that he had any life insurance or any equity or beneficial interest in any property anywhere. His real property in Long Beach, Cal., and Denver was mortgaged and sold to pay for his lawyer's fees, he said. He received altogether between $600,000 and $800,000 from the sale of United Wireless stock, all of which he has expended in personal expenses and mining speculations.

Two Wireless Operators on Steamers.

The United States Senate on May 1 passed a bill requiring that two or more wireless operators be employed on every ocean-going vessel carrying one hundred persons, whether passenger or crew, an operator to be on duty all the time, night or day, and the wireless apparatus to be capable of transmitting and receiving messages over a radius of at least one hundred miles. The bill goes into effect July 1, 1912.

Proposed Memorials for Phillips, the Titanic's Wireless Operator.

The Maritime Association of the Port of New York on April 30 appointed a committee to solicit subscriptions for a memorial to Jack Phillips, the wireless operator who lost his life on the steamer "Titanic" April 15. Mr. C. C. Galbraith, general manager of the United Wireless Telegraph Company, now a part of the Marconi system, was designated to head the committee which will have charge of the raising of funds for this purpose.

Mr. Harold Bride, the surviving wireless operator of the lost steamer "Titanic," was the first subscriber to the Phillips Memorial Fund, contributing $25 thereto. Mr. Bride sailed for England May 4, on the steamer "Caronia."

A fund is being obtained in England by popular subscription to erect a monument in Phillips' memory in his native town, Godalming, England.

The telegraphers of the Madrid, Spain, office, as announced May 1, will place a portrait of Phillips in the main operating room, and they propose to ask the International Telegraph Bureau at Berne, Switzerland, to take suitable action toward perpetuating the memory of the brave young operator.

Dedication of the Telegraph Monument.

The monument commemorating the sending of the first train order by telegraph was dedicated at Harriman (formerly Turner), N. Y., May 2, under the most favorable circumstances. The day was a beautiful one; the air was balmy and the surrounding country was garbed in its spring loveliness. The scene at the station was charming and those who were fortunate enough to be present at the ceremonies were deeply impressed with the glorious surroundings. Nature, as well as man, contributed to make the event one of enjoyment.

Two special trains left the Jersey City terminal of the Erie Railroad at 10.30 a. m., with an enthusiastic party of about 400 guests, including many distinguished gentlemen in the telegraph and railroad worlds, and arrived at the Harriman station after a pleasant run of a little more than an hour.

The party repaired at once to the stand especially erected near the monument, where the ceremonies were to be conducted. Around the monument were gathered several hundred townspeople who had come to witness the interesting event. Over a hundred school children, boys and girls, each waving a little American flag, marched to the grounds and formed a semicircle about the monument, where they assisted in the singing during the exercises. The little girls were dressed in white and added much charm to the animated scene.

The guests' stand was tastefully decorated with bunting and colors, and all the houses in the neighborhood were likewise adorned.

One of the prettiest tributes to the occasion was

FIG. 1. THE MONUMENT.

the stationing of four New York messenger boys around the base of the monument, one on each corner. They were manly, intelligent young fellows, and stood as guards of honor all through the ceremonies, removing their caps as the patriotic airs were sung.

After the guests had been seated, Chairman E. P. Griffith called upon the Rev. J. Holmes McGuinness, rector of Arden, to open the ceremonies with prayer. At the conclusion of the prayer, "America" was sung by the audience, led by Mr. Edson S. Miller, cornetist, after which Mr. Griffith gave a brief history of the inception and development of the project, culminating in the finished memorial.

Mr. Henry D. Estabrook, orator of the day, was then introduced. His address was highly inter-

FIG. 2. VIEW OF MONUMENT AND HARRIMAN STATION.

esting as well as appropriate and he handled his subject in a masterly and logical manner. He gave a sketch of Charles Minot, and reviewed the circumstances that led to the sending of the first train order by telegraph. The engineer refused to obey the order and Mr. Minot himself took the throttle and ran the train to Goshen, as his own order directed. Mr. Estabrook's fine sense of humor was shown in the many anecdotes and humorous references judiciously employed throughout his address, and his audience was kept in an attentive and happy frame of mind throughout.

At the conclusion of Mr. Estabrook's address, Miss Gertrude M. Griffith, escorted by Mr. David Homer Bates, advanced to the monument and, as the audience was singing the "Star Spangled Banner," and the school children waved their flags, unveiled the bronze tablet which had up to the moment been hidden by an American flag.

Mr. David Homer Bates then, in a very interesting address, presented the monument to the Erie Railroad Company.

He told of a recent call upon Mr. Andrew Carnegie, during which he asked Mr. Carnegie to tell about his first experience in the movement of trains. Mr. Carnegie told of how he knept trains moving on the Pennsylvania Railroad one stormy morning in the winter of 1854. He was then 18 years of age. Mr. Thomas A. Scott, superintendent at Pittsburgh, did not reach the office on account of the storm, and Mr. Carnegie had to answer inquiries from the crews of the stalled trains. He took the risk of signing Mr. Scott's initials to telegraph train orders and soon had the trains moving. Late in the afternoon Mr. Scott came hurriedly into the office exclaiming, "Andy, where are the freights?" Young Carnegie pointed out the window, as one of them was pulling into the yard, and explained that the others were coming along. "Mr. Scott," he said, "I couldn't help it. The crews were nearly frozen, and I signed your initials to the orders." Next day in talking about the incident to Mr. Franciscus, the freight agent, Mr. Scott said, "Charlie, do you know what that little Scotch devil of mine did in that storm yesterday? Before I reached the office he signed my name to train orders all day, and got the trains through safely, and all of the train

FIG. 3. ORIGINAL TURNER STATION, 1848.

men thought I was at the key myself sending the orders."

"After that," said Mr. Carnegie, "Mr. Scott left the running of the trains almost entirely to me." This was Mr. Carnegie's first experience in running trains by telegraph.

Mr. Bates referred in complimentary terms to the generosity of Mrs. E. H. Harriman in providing the stone for the monument and bearing the cost of its carving and setting. He also complimented Mrs. Harriman's representative, Mr. C. T. Ford, who erected the speakers' stand and had general supervision of the planning of the arrangements at Harriman for the dedication.

The address of acceptance was made by Mr. George N. Orcutt, general attorney of the Erie Railroad. Mr. Orcutt stated that the greatest improvements in railroading came with the introduction of the telegraph. It was fitting, he said, to have this monument erected along the line of the railroad which was first to recognize the value of the telegraph in railroad work. He closed his address with an eulogistic reference to the late E. H. Harriman, who, he stated, had done more than any other individual in the development of the American railroad.

The "Ode to Morse" was then sung by the audience, led by its composer, Mr. Marion H. Kerner, after which the benediction was pronounced by Rev. J. Holmes McGuinness, and thus the interesting exercises were, at 1.10 P. M., brought to a close.

The party then returned to the train and reached New York a little before three o'clock. A lunch was served on board of the train during the return trip, and all expressed themselves as highly pleased with the events of the day and congratulated the committee on the successful manner in which the programme had been carried out.

The monument stands a short distance west of the station and forms a conspicuous object on the landscape. It is classic in design and was greatly admired for its massive elegance. The committee, with the generous assistance of Mrs. E. H. Harriman, have good reason to feel proud of their achievement.

A second special train conveying the officials of the Erie Railroad to Chicago was stopped and held at Harriman in order to permit these gentlemen to attend the ceremonies. President Underwood occupied a seat on the stand next to Mrs. E. H. Harriman, and both showed great interest in the proceedings. Mr. Thomas A. Edison also occupied a seat on the speaker's stand and at the conclusion of the ceremonies met many old friends who were in the party. He was introduced to the audience by Chairman E. P. Griffith, and bowed his acknowledgment of their applause. Mr. Edison was accompanied by his daughter.

Among those who occupied seats on the speaker's stand besides the monument committee and speakers, were: Mr. F. D. Underwood, president, and all the executive officials of the Erie Railroad; Mrs. E. H. Harriman, Arden, N. Y.; Mr. Thomas A. Edison and daughter, West Orange, N. J.; Col. R. C. Clowry, New York; Mrs. G. S. Minot, Brookline, Mass., niece of Charles Minot; James Merrihew and wife, New York, and 100 others.

The press was represented as follows: B. B.

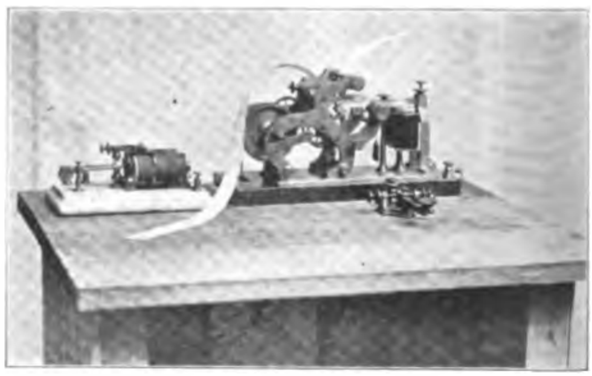

FIG. 4. COPY OF ORIGINAL MORSE REGISTER USED AT TURNER IN 1851.

Adams, *Railway Age-Gazette*, New York; Angus Sinclair, *Locomotive Engineering*, New York; J. B. Taltavall and T. R. Taltavall, TELEGRAPH AND TELEPHONE AGE, New York; A. W. Munkittrick, *Erie Railroad Employes Magazine*, New York; H. W. Stokes, New York *Sun*. Among those who came from New York on the special, in addition to those already named were: Jas. Monahan, Elmira, N. Y.; F. W. Millspaugh, Goshen, N. Y.; T. M. DeVere, A. Meredith, wife and daughter, H. C. Radcliffe, Jersey City, N. J.; J. B. Bertholf, Monroe, N. Y.; W. J. Camp and wife, Montreal, Que.; J. Arrigan, D. L. Doran and wife, M. J. Regan, Paterson, N. J.; F. T. Bird, G. S. Richtmyer and wife, E. W. Wade and wife, A. T. Zabriskie and wife, Passaic, N. J.; J. C. Haring, Piermont, N. Y.; S. L. Van Akin and wife, Syracure, N. Y.; W. C. Banks, D. H. Bates and wife, D. H. Bates jr., Miss Batsford, T. M. Brennan, F. W. Brindle, C. H. Bristol, wife and daughter, R. Bunten, P. J. Casey and wife, Col. R. C. Clowry, R. H. Corson, F. G. Curry, Mrs. Chas. Davis, W. J. Dealy, F. N. Dowler, L. Dresdner, A. N. Dugan, T. H. Ellett, H. D. Estabrook, L. B. Foley, M. Green, E. P. Griffith, wife and daughters Lura and Gertrude, Mrs. Bert Griffith, W. E. Harkness and wife, Miss Millie Heuser, G. W. Hickey, G. R. Hill, E. E. Hudson, Gardner Irving, W. L. Ives, B. A. Kaiser, Charles Keck, M. H. Kerner and wife, J. W. Lewis, Mrs. Eleanor Loring Lord, Wm. Maver, jr., and wife, James Merrihew and wife, M. J. O'Leary, G. N. Orcutt, Mrs. E. Peak, C. D. Reed, F. J. Scherrer, C. L. Seeley, wife and son, C. N. Sigison, C. M. Smith, E. E. Taffany, J. B. Taltavall, wife and daughter Florence, A. B. Taylor and wife, J. B. Van Every, T. B. Van Nortwick, A. D. Walters and wife, E. M. Weaver, L. S. Wells, J. C. Willever, J. W. Young, New York.

A laughable incident occurred as Mr. Orcutt began speaking. As he started, a train arrived at the station blowing off steam and keeping up a constant bell ringing. The noise caused him to halt until the train resumed its journey. After it had proceeded far enough away, as he thought, he endeavored to resume his speaking and had hardly uttered half a dozen words when he was again interrupted, this time by a loud whistling by the same train. The incident created a great laughter, but Mr. Orcutt turned it to his advantage.

Mr. E. P. Griffith, chairman of the Monument Committee, is deserving of much credit for the masterly way in which he conducted the affairs of the undertaking, from beginning to end. He has been an active and watchful worker all through the period of development and took the lead in the work of arousing interest in the project and managing the collecting of subscriptions. He originated the idea, and the entire enterprise was skillfully managed by him, and, finally, when the supreme moment arrived he showed himself to be as skillful as a master of ceremonies as he was a manager. Much credit is also due to his fellow-committeemen, who, by their advice, encouragement and active assistance aided him in the achievement of such successful results. The members of the Monument Committee present at the unveiling, besides Mr. Griffith, were W. J. Camp, David Homer Bates, J. B. Taltavall and F. J. Scherrer.

Since the last acknowledgment of contributions, two more remittances have been received. The fund now stands as follows: Previously acknowledged, $2,325.09. F. A. Stumm, Ridgewood, N. J., $1.00; Frank J. Howell, Corning, N. Y., $5.00. Total, $2,331.09.

In sending his contribution Mr. Howell writes from Corning, N. Y.: "I well remember in the early '60's of Charles Minot, the red-faced, black-haired superintendent that would step out from his special car to our (then) new Pine street depot, over the platform to the Erie telegraph office, for his telegrams. Sometimes in his car a few Corning boys would be favored with a trip to New York City and return at his expense. They enjoyed such joy-rides as well if not better than 'Huckleberry Finn' ever enjoyed any of his adventures. In 1860 Mr. Minot built a new stone station in Corning at Pine street and Erie avenue. In the upper west end story, I learned in 1864 on a brand new Tillotson register, the first symbols of the Morse art, from operator W. H. Kinney, now of Mansfield, Pa. The upper story of the station burned a few years later, and it is a now a humble one-story historical monument to the late Charles Minot."

Wireless Facts From Mr. Marconi.

The following interesting facts are gleaned from the testimony of Signor Guglielmo Marconi before the Senate Committee in charge of the investigation into the "Titanic" disaster.

It is against the regulations of the Marconi Company for its operators to act as newspaper reporters while on duty.

In England government control aims to avoid interference with wireless messages by providing different wave lengths for different kinds of service. Thus, the Post Office Department, in charge of the service, has one wave length for domestic messages and another length for the Continent. The army and navy stations have each a wave length of their own. A scientist wishing to experiment is also assigned a special wave length, and is required to practice in the part of the country where he will not interfere with the service of similar length.

The contract between Mr. Marconi and the English Government is signed by the Postmaster General, but is still pending for the approval of Parliament.

The contract runs for twenty-eight years, but the Government may cancel it at the end of eighteen years. It provides, Mr. Marconi said, that within two years we shall erect stations in England, India, Cyprus, South Africa, Singapore, and other places. We are paid a lump sum for the erection of each station, but before acceptance must satisfy requirements as to speed, effectiveness, and reliability. "I am required to run the stations for six months after their erection," he said, "then for ten years the Government pays me 10 per cent. of gross receipts from all messages."

The wireless station at Cape Race, N. F., can send reliably a message 400 or 500 miles by day and 1000 miles or more by night.

The greatest distance on record covered by a wireless message is 6000 miles, between Buenos Aires, Argentine Republic, and Clifden, Ireland.

Wireless operators on transatlantic steamers receive in England from $4 to $12 per week, with board and lodging.

Standards of Telephone Transmission.

BY B. GHERARDI, ENGINEER OF PLANT, AMERICAN TELEPHONE AND TELEGRAPH COMPANY, NEW YORK.

In a paper read recently before the Telephone and Telegraph Society of New England, at Boston, Mass., the author said that telephone transmission is ordinarily stated as being equivalent to transmission obtained over a given number of miles of No. 19 B. & S. gauge cable having defined constants and with given terminal conditions. In other words, we use No. 19 gauge cable as our measuring rod. The type of No. 19 gauge cable used is not the No. 19 gauge cable which we are now employing so extensively, but is the No. 19 gauge cable which was used a number of years ago when the standards were established, and which is of somewhat lower capacity than the cables now employed. The transmission efficiency of our present No. 19 gauge cables is about ninety per cent. of the standard No. 19 gauge cable used for measuring purposes, that is, nine miles of the present cable are equivalent to ten miles of the standard.

When we speak of service which from a transmission standpoint has an efficiency of eighteen miles, what we mean is that the talk is equal to that obtained over a circuit consisting of eighteen miles of the standard low capacity No. 19 gauge cable already referred to when there is connected at each end of it a standard common battery substation set applied with current from 24-volt storage batteries through No. 25-A repeating coils over zero subscribers' loops. The standard of transmission usually adopted for local service is eighteen miles. One of the combinations which would give this standard which might occur in service would be—two subscribers, each having subscribers' loops of No. 22 gauge wire three-fourths of a mile long, connected together at the two ends by the standard "A" and "B" cord circuits and a trunk line between the two offices of seven miles of No. 22 gauge cable or ten miles of No. 19 gauge cable or twenty-two miles of medium loaded No. 19 gauge cable. When the subscribers' loops are longer than the figures assumed the trunk line must be shorter in order to give the same transmission. For example, if the subscribers' loops are each equivalent to two miles of No. 22 gauge cable the limiting lengths for the trunk lines to give eighteen-mile transmission are—about three miles for No. 22 gauge cable, four miles for No. 19 gauge cable, unloaded, and eight miles for No. 19 gauge cable medium loaded.

The standards of transmission very generally used are:

For local service..............18 miles
For suburban toll service ....25 miles
For long haul toll service ......30 miles

Large sums of money are being spent annually for the construction of plant. A considerable portion of this is spent to obtain good transmission; for if we were willing to be satisfied with a plant which did not talk so well we could plan so that the plant could be built more cheaply. We must not forget, therefore, that substantial expenditures have been made to get transmission and that all of the departments concerned in the design, construction, maintenance and use of the plant must contribute their part to the getting of the most economical results.

In reference to the maintenance of the plant, there are many features which react upon the transmission:

The maintaining of all lines so that they are quiet is important. Even a small amount of noise on a line substantially impairs its transmission efficiency as far as the results obtained are concerned. A very moderate amount of noise—an amount which is often considered to be entirely unobjectionable—will impair transmission by as much as three or four miles of cable.

Attempts are sometimes made to improve noisy lines by the insertion of "bug traps" rather than by removing the cause by well known methods. We know of cases where "bug traps" have been inserted to remove noise, which traps have impaired transmission by as much as ten miles. The principal effect of the "bug trap" was to remove the noise by removing the transmission.

The making of unauthorized modifications of standard apparatus or circuits to improve some operating feature without regard to its effect on transmission. A common example of this is the opening of the non-inductive winding on series relays to improve the signaling.

The failure to properly maintain repeating coils, retardation coils, etc., so as to see that coils having a considerable number of short circuited windings in them are removed from service. Such short circuited windings do not usually affect the signaling efficiency of the circuits, and are too frequently ignored by those maintaining the plant.

Dry Cells.

At the meeting of the American Electrochemical Society, in Boston, Mass., April 18, 19 and 20, a paper on the performance of dry cells was presented by Mr. Carl Hambuechen. The author stated that the three important characteristics of dry cells by which merit is judged are the short-circuit current, the shelf life and the watt-hour output. The latter is of most importance, and the first is of least importance, but is, perhaps, the most commonly used. Consequently some manufacturers have, during the past few years, developed cells which give an increased flash test, and curves were given showing this general increase, which amounts to over 50 per cent. This has not been accompanied by any improvement in durability, shelf-wear or capacity. The adoption of better methods of testing will probably result in more attention being given to long life and energy output. The latter are especially desirable for telephone and alarm service and the use of cells for emergency purposes. Curves were given showing the average shelf life as determined by the customary flash test. Cells having the highest initial flash deteriorate most rapidly. However, a falling off in the flash test does not necessarily indicate a corresponding reduction in useful capacity.

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May 16, 1912.

Testing and Developing Inventions.

The man who invents something for the first time is naturally an enthusiast, so far as his invention is concerned, and he cannot understand why everyone does not appreciate the importance and value of his invention as he does himself. The best of us are, to more or less extent, narrow-minded, and we usually look at a subject from our own viewpoint, overlooking the fact that others look at the same thing in a different light.

Many inventors complain that they are handicapped by the telegraph companies and electrical concerns, who, they assert, place every obstacle in the way of the development of their ideas. We have taken the trouble to investigate the facts in some such cases, and we find that every reasonable encouragement is given the inventor by the companies. Their experts first determine whether the principle involved is correct, and if there is anything new in the supposed invention. If it is wrong in principle and contains nothing new, it would of course be a waste of time to make any further investigation or test, and this is the reason why would-be inventors in many cases get the impression that their inventions do not receive the proper recognition.

The companies are always on the lookout for new things and it is to their best interest to encourage inventors, but inventors are seldom impartial judges of the value and patentability of their own inventions. Frequently they produce something that has already been accomplished and possibly abandoned, and because they are ignorant of what others have found out before them they assume that they are the first on the ground.

Inventors are proverbially poor business men, and even if they do produce something new they place upon their invention a valuation that is out of all proportion. Trivial inventions are valued by them at thousands of dollars; sometimes the figures run into the millions. They are so completely dominated by the idea that they have made an important discovery that all else is blotted out of their minds and they lose control of their better judgment.

One inventor who made bitter complaints had actually been favored by the telegraph companies to the extent of loaning him on Sundays the use of long circuits for experimental purposes. He tested his invention himself and because it did not fulfill his expectations he blamed the companies for its failure.

Some inventors present ideas to the telegraph companies and ask the latter to give them a practical test and develop the apparatus at their own expense, and after this has been done ask a fabulous sum for the invention which sometimes proves to be not their own. Then again if the inventor wishes to secure an opinion as to the value and utility of his invention he asks the telegraph companies to pass upon these points, thus placing the burden of an investigation upon the telegraph interests.

Inventors should approach the companies in a businesslike manner, and should be sure of their ground before opening negotiations. The telegraph companies, as we have already pointed out, are favorably disposed toward inventors, and are usually willing to aid in the test if the invention appears to have merit, but the inventor should not ask too much of the companies. The latter have expert advice at their command and can soon arrive at a correct conclusion with respect to the invention, whereas the inventor is usually inexperienced in such matters and should not assume to tell the companies what is already known to them, and thus in many cases jeopardize their own interests.

Lessons From the Titanic Disaster.

Our present-day knowledge is the result of experiments, successes and failures, but largely failures. Failure to immediately achieve or realize what we hope for is one of the most profitable lessons humanity can experience, because it teaches what to avoid in order to gain our end.

The Titanic disaster, although a terrible event in itself, has taught the world many important lessons, which will bear fruit for the benefit of the living and those to come after.

The lessons that chiefly concern the readers of this publication relate to the conduct and operation of wireless telegraphy on shipboard, not only in times of emergency but at all times.

In the advancement of many large human activities the principle of being prepared at all times to meet emergencies is well recognized and established. Thus we find that nations in times of peace prepare for war; business enterprises carry insurance in one form or another against possible loss, and the running of trains on modern railways is conducted on the theory that there is danger ahead unless the signals show that the track is clear.

The Titanic disaster has publicly revealed the fact that wireless telegraphy has many weak points, as well as many strong ones. The fact, however, that it has weak points is no condemnation of the system, for nothing that man has ever devised is perfect. As the weak parts of a machine are revealed they are replaced by stronger parts, and this is true in all lines of progress—as we discover faults we correct them.

The importance of having some one on duty at the wireless instrument every moment of time was strongly emphasized in connection with this awful event, although it has been pointed out before. Where there is only one wireless operator on shipboard there must necessarily be periods of time when the wireless is without attention, because the operator needs rest.

Unattended wireless service is certainly a weak point and steps have already been taken by the Federal authorities to compel the employment of two operators on certain classes of steamers. There should be no distinction shown, however. All steamers, freight, passenger and others, carrying wireless equipment, should be placed on an equal footing in this respect, for it is just as possible for a freighter or even a tug to need assistance and be of service in emergencies as for a passenger steamer. The lesson has been a costly one, but perhaps it was necessary in order to bring the world to a realization of the folly of neglecting the most important requirement of ocean wireless telegraphy.

Considerable complaint has been made of the domineering attitude of some of the wireless operators concerned in this tragic event, and it has been suggested that no one but men of mature years, capable of exercising sound judgment at all times, should be employed in the wireless service. This brings up a point of vast importance, which, however, cannot be settled in an off-hand manner. The principle is all right, but the practice of it presents many difficulties, moral and commercial. It is not fair to condemn all wireless operators because a few have acted in an arbitrary and impulsive manner, yet on the other hand, every means should be adopted to employ men not only because they have passed an examination as operators, but because they measure up as well to the standard of moral qualities necessary to fit them to hold such important positions.

The matter of interference is one of the most pressing that has been brought forward in this connection. Some international arrangement seems to be the only practical solution of this problem. There certainly should be some sort of an understanding for guidance in times of emergency, and no doubt this important matter will receive due attention at the London radio-telegraph conference next month.

It is evident from the experiences that wireless telegraphy has just passed through that there is much room for improvement. But the situation is not by any means discouraging. International agreements and inventive genius will certainly bring about the much desired relief from the dangers which have beset the past and no doubt wireless telegraphy on steamers will undergo a refinement and development that will gain for it the confidence of the traveling public that it is entitled to, in place of the feeling of lack of faith in it that seems to prevail to some extent just now.

The Selector Situation.

The announcement was made in our issue dated May 1 of the consolidation of several railway equipment concerns which will be of special interest to railway telegraph and telephone departments. The new corporation, the General Railway Equipment Company, represents the combined interests of various well-known selector manufacturing companies and the consolidation of these separate concerns means greater economy in industrial operation and increased efficiency of the product. The experieince, technical skill and manufacturing facilities of the separate companies combined in one going concern cannot fail to be productive of the best results and meet the requirements of modern railway operation which demand only the best equipment.

Railway managers will experience greater satisfaction in dealing with a concern of larger responsibility than with smaller companies acting separately and individually, each handicapped by the burdens resulting from divided effort and rival claims. The ample capital at the command of the new organization is an assurance of the strength of the sponsor for the apparatus offered and of its ability to execute contracts involving the installation of complete standard equipment.

The new company will be the only one in the United States making a specialty of manufacturing and installing selective and telephone and other electrical equipment for railroad uses. Its product is covered by broad patents. It is also understood that the company will act as sales agent in the United States for important foreign manufacturers whose equipment is already well known in this country.

Posts and Telegraphs in Germany.—The published statistics of the German Empire show that the cost of operation, maintenance, and extension of the German system of posts and telegraphs was as follows during the fiscal years named: 1911, $153,202.218; 1910, $148,157,180; 1909, $146,086,089. The number of telegrams received for transmission in Germany in 1909 was 46,802,000 and the number delivered in the same year was 44,800,000. The number of messages received in 1905 was 42,647,000 and the number delivered in that year was 41,479,000.

A correspondent asks to know which inventor has "created more talk than any other person in history." The man who invented the telephone is certainly entitled to the credit.

Course of Instruction in the Elements of Technical Telegraphy—XV.

(Copyrighted.)

(Continued from page 280, May 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Example: To find the resistance of a branch of a derived circuit when the fall of potential through it is 5 volts and the current in the branch .25 ampere.

Solution:

$$\frac{E}{I} = R, \text{ or } \frac{5}{.25} = 20 \text{ ohms.}$$

Example. To find the resistance of a branch of the dividing and uniting points of the branches of a derived circuit when the joint resistance of the branches is 2 $\frac{6}{7}$ ohms, and the total current in all the branches 1.75 amperes.

Solution:

$$IR = E \text{ or } 1.75 \times 2\tfrac{6}{7} = 5 \text{ volts.}$$

NOTE.—In the last example since the potential falls through all three branches, R, in the equation, must evidently be the combined resistance of the branches, and I, the combined or total current strength.

If the joint resistance of two wires in parallel be known, and the separate resistance of one of the wires, the resistance of the other may be found.

Example. The joint resistance of two wires in parallel is 50 ohms. The resistance of one of the wires is 75 ohms, find the resistance of the other.

Solution:

Let x stand for the unknown resistance; then by the rule for finding the joint resistance of two wires in parallel,

$$\frac{x \times 75}{x + 75} = 50.$$

Clearing the equation of fractions,

$$75x = 50x + 3750$$
$$25x = 3750$$
$$x = \frac{3750}{25} = 150 \text{ ohms.}$$

A thorough comprehension of the laws relating to derived circuits, is of the utmost importance, as they form a feature of the Duplex and Quadruplex arrangements, and in fact enter largely into every department of technical telegraphy.

In dealing with all problems relating to Current, Resistance, and Potential, remember that Ohm's law, $\frac{E}{R} = I$, involves the total circuit resistance, the total current strength, or the current in the main circuit, and the fall of potential through the total circuit resistance.

Also, that $\frac{E}{R} = I$ involves the resistance of part of the circuit, the fall of potential through that part, and the current in that part, whether the part be the branch of a derived circuit or a section of the main line.

Parallel circuits are formed in practice when two or more wires are connected to one battery, or when a wire touches another wire, or tree, or other object connected with earth, or earth itself.

If a wire were connected to a telegraph line at an insulator, and led down the pole to ground a derived circuit would be formed, the earth making the second connection for although the resistance of the materials of which the soil is composed may be comparatively high, yet the area of the conductor is so large that the resistance actually offered is reduced to nothing, provided always that the soil in the immediate vicinity of the "ground" conducts well.

Example. Two circuits are connected to one battery consisting of 50 gravity cells. The current given out by the battery is .1 ampere. The resistance of one circuit is 500 ohms.

(1) Find the resistance of the other circuit.

(2) Find the current in each circuit.

(3) If the 500 ohm circuit be open how is the current in the other circuit affected?

Solution:

(1) Here we have the total potential and the total current, therefore by applying $\frac{E}{I} = R$, we will obtain the total resistance of the circuit.

$$\frac{50}{.1} = 500 \text{ ohms.}$$

Since there are 50 cells in the battery there is an internal resistance of 100 ohms which is included in the total circuit resistance. To obtain the resistance of the circuits alone we must therefore subtract the battery resistance from the circuit resistance: 500 — 100 = 400 ohms.

The two circuits being in parallel, this resistance of 400 ohms is the joint resistance of both circuits, and as one of them has 500 ohms resistance, we have, by letting x stand for the other.

$$\frac{x \times 500}{x + 500} = 400 \text{ ohms.}$$

x = 2000 ohms, or the required resistance.

Solution:

(2) The current from the battery is .1 ampere. The separate resistances of the two circuits are 500

and 2000 ohms, therefore the resistance ratio is as 500 is to 2000, or as 1 is to 4.

As the current divides between the branches of a derived circuit inversely as the respective resistances of the branches, it follows that if the current were divided into 5 equal parts, 4 of these parts, or $\frac{4}{5}$ of the current, would go by the 500 ohm branch, and 1 part, or $\frac{1}{5}$ of the current, by the 2000 ohm branch.

$\frac{4}{5}$ of $.1 = .08$ = current in 500 ohm circuit.
$\frac{1}{5}$ of $.1 = .02$ = current in 2000 ohm circuit.

Or this may be solved as follows: The circuit resistance is 500 ohms. The battery resistance is 100 ohms. The potential therefore at the junction of the battery and wires has fallen $\frac{1}{5}$, since $\frac{100}{500} = \frac{1}{5}$ of the current resistance has been overcome.

$\frac{1}{5}$ of $50 = 10$ volts.

The potential which falls through the circuits is consequently $50 - 10 = 40$ volts.

To find the current in the branches $\frac{E}{R} = I$.

$\frac{40}{500} = .08$ amp.
$\frac{40}{2000} = .02$ amp.

Solution:

(3) If the 500 ohm circuit be open, the other branch will receive the entire current from the battery, which, assuming a perfect line insulation, is the same in all parts of the circuit.

The resistance in circuit is now $2000 + 10 = 2100$ ohms; therefore, to find the current, $\frac{E}{R} = I$

$\frac{50}{2100} = .023$ ampere.

The current has risen from .02 to .023 ampere in the 2000 ohm circuit by the other circuit being opened.

Determining Resistance for Station Selectors.

BY W. J. DOHERTY, MILES CITY, MONT.

With reference to the various methods of determining the required added resistance to be placed in series with station selectors, in any built-up combination, where all the selectors are to receive equal volume of current, permit me to offer an extremely simple method applicable to any circuit, regardless of the resistance of the selector used.

Referring to the illustration, take as an example, a 16,000-ohm selector. Assign to each section between stations a number, beginning with the distant station section as 1, the next, 2, 3, and so on consecutively.

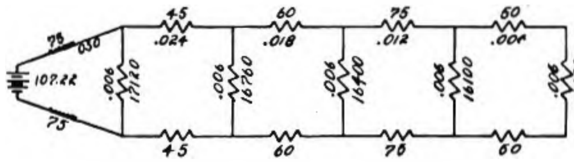
Multiply the line resistance (both sides) by the number of the section, in each case, adding it to the previously derived value.

In the illustration $1 \times 100 = 100$, which, added, to 16,000, the selector value, gives 16,100, or first value. To this add twice the resistance of the next section—300 ohms—giving 16,400; for the second station, proceed in like manner, adding to this three times the resistance of the next section, 360 ohms, giving 16,760 for the third section, and so on. The current values are similarly obtained. Merely write the required amount to operate the instrument in the last selector, multiplying this amount by the number of the section for each new line current as shown.

Then to obtain the total voltage required, where coils or other resistance are inserted between the main battery and the line, it is only necessary to multiply the last resistance by the current. To this must be added the product, which, in this case is 4.5 volts, making the total voltage required 107.22 volts.

[Regarding this method of computing tapering resistances, Mr. G. K. Heyer of the Western Electric Company, New York, says:

"We have been using this method of figuring the tapering resistances for a long while, and after the taper resistance nearest the sending battery is computed, it is merely necessary to divide its resistance which, as shown in the diagram, is 17,120 ohms by .006 ampere, which gives the voltage to be applied to the line at the point where



DETERMINING SELECTOR RESISTANCES.

this bridge is connected. This voltage is 102.72.

"Assuming that the line resistance between the battery shown on the diagram is 0, then the battery voltage, of course, would be the same; however, in practice between the points where the first selector is connected to the line and the sending battery, there are retardation coils which have a resistance of about 150 ohms, so that the voltage at the battery terminals would be determined by multiplying the current flowing in the section of the line between the battery terminals and the first station, by the resistance, or 150. This would give the drop in voltage for this section of the line, and by adding this drop to the 102.72 volts, the battery voltage would be determined.

"The method outlined by Mr. Doherty works very nicely on straight circuits without branches, but on circuits where branches are connected, complications arise and in using this method for such circuits, care should be taken to assign the proper numbers to the various sections."—Editor.]

High Tension Transmission in Tennessee.—The Tennessee Power Company has been organized in Tennessee to generate and transmit 161,000 electrical horse power to Nashville and other cities in that state for light, heat and manufacturing purposes. If the three-phase system of generation and transmission is adopted, and the phases are well balanced, telegraph and telephone service in the vicinity need not suffer in consequence of the proximity of the power-carrying wires.

The K R Law as Applied to Quadruplex Working.

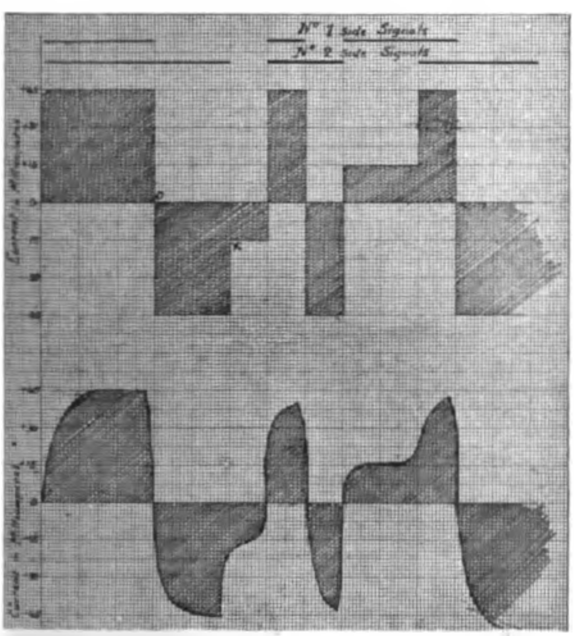
BY JOHN H. BELL, TELEGRAPH ENGINEER, WESTERN ELECTRIC COMPANY, NEW YORK.

The article on the KR law in TELEGRAPH AND TELEPHONE AGE, dated April 1, is interesting reading. From an analysis of the circuit conditions obtaining during the trial of quadruplex working between New York and Chicago, the following particulars have been deduced.

The wire resistance was 2682 ohms, and assuming that the resistance in the power leads and instrument coils added 900 ohms more, the total circuit resistance was approximately 3600 ohms. Had the insulation of the line been perfect, the 360 volts applied at Chicago would have given 100 milliamperes received current at New York. Actually, however, 57 milliamperes were received, from which it can be found. assuming the leakage to have been uniformly distributed, that the total insulation of the line was about 1200 ohms, or $1200 \times 868 = 1{,}041{,}600$ ohms per mile.

Further, it can be shown that at the sending station (Chicago) the currents were of the value of 286 milliamperes, i. e., 143 passing out to the line and 143 to the artificial line.

It will be seen, therefore, that despite the comparatively good insulation per mile, the great length of the circuit was such that, of the 143



FIGS. 1 AND 2. VALUES OF TRANSMITTED AND RECEIVED SIGNALS.

milliamperes sent out by Chicago 86 milliamperes leaked away and only 57 milliamperes were received at New York.

As Great Britain is the only country outside of America where the quadruplex system is widely used and its range of working definitely fixed, it may be of interest to your readers to learn in what respects the British system differs from the American, and some particulars of its efficiency in working. Before referring to these points, however, it will perhaps not be out of place if the theory of quadruplex working is considered in some detail.

Fig. 1 shows the perfect "square" signals which would be sent out by a perfect polechanger on an imaginary circuit having no capacity and no inductance. Fig. 2 shows the signals at the receiving instrument of an actual circuit, mutilated by capacity and inductance. The main problem in quadruplex working is to devise a means for maintaining a continuous signal at the No. 2 side relay while the polarity of the No. 1 side is changing. This particular condition is shown at o in Fig. 2, and is represented in enlarged form in Fig. 4.

Fig. 3 shows schematically the construction of the No. 2 side relay. Normally, the armature is held away from the polepiece by a spiral spring

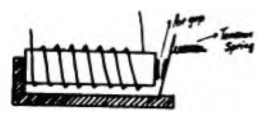


FIG. 3. CONSTRUCTION OF NO. 2 RELAY.

the tension of which is regulated so that a certain strength of current through the coil is required to attract the armature. When once attracted, however, the armature can be held over by a weaker current than is required to produce its initial movement, because the air gap in the magnetic circuit is reduced. The ratio between the "operating" and "holding" currents varies with different instruments, and with different adjustments of the same instrument. For the purposes of this paper let it be assumed that the operating current required is 30 milliamperes, and the "holding" current 20 milliamperes.

Fig. 4, curve *B O D*, shows in exaggerated form the shape of the current curve at the receiving instrument on a long line when the polarity is changing, as at *O* in Fig. 1, the armature of the No. 2 side relay meantime being required to remain attracted. If this relay be adjusted as mentioned the tension spring will pull back the armature immediately the + current drops below 20 milliamperes, and hold it till the current rises to 30 milliamperes on the — side, at which point the magnetic attraction produced by the current will again overcome the tension of the spring and the armature be attracted. This is the interval which must be bridged over by some local arrangement at the receiving apparatus: it is represented graphically by *d* (Fig. 4), and is known in professional circles as "the *B* side kick."

On a short line having small capacity the rise of the current at the receiving station is retarded to a lesser extent than in the case of a line having high capacity, and the received current may be represented by the curve *B O C*. The time interval to be bridged is then considerably shortened —as represented at *c*. If now, the insulation of this short line drops, the received current will be reduced. It may be represented by the curve *B O E*, which is shown as reaching a maximum value of 34 milliamperes instead of 45; the interval to be bridged over being represented at *e*. Under such circumstances this interval may be reduced by slightly releasing the tension of the adjusting spring so as to allow the non-polarized relay to operate with a weaker current, say 26 milliamperes instead of the normal 30. This is shown at *F* and the reduced time interval at *f*. As the releasing of the tension spring also reduces the "holding" current required, this means for overcoming the trouble must not be pushed too far.

Otherwise the holding current will drop below the No. 1 side current with the result that the armature of the No. 2 relay will remain attracted instead of releasing on the termination of a signal as at the point *x* in Fig. 1.

It will be noticed that part of the time-interval in each case includes a period *q* which represents the time taken by the positive current in falling from the "holding" current value to zero. The current does not cease immediately the armature of the pole-changer at the sending station breaks contact, but tails off, owing to the capacity discharge from the line and the self-induction of the relays at the receiving station. It will be seen, therefore, that the self-induction and capacity assist in reducing the time interval to be bridged over, as otherwise the current would immediately drop to zero, increasing the time interval by a period *Y-q*.

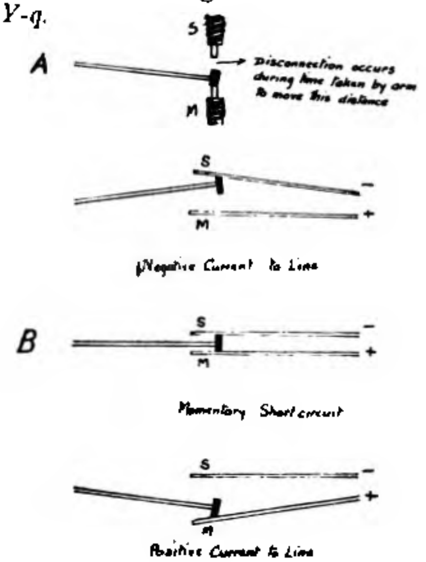


FIG. 5. FORMS OF POLE-CHANGER CONTACTS.

If now, the total time taken by the polechanger at the sending station to travel from one contact to the other is halved the moment of disconnection will occur at *N* instead of *M* (Fig. 4), and then the falling current will pass the "holding" current value at *n* instead of *m*. The time interval

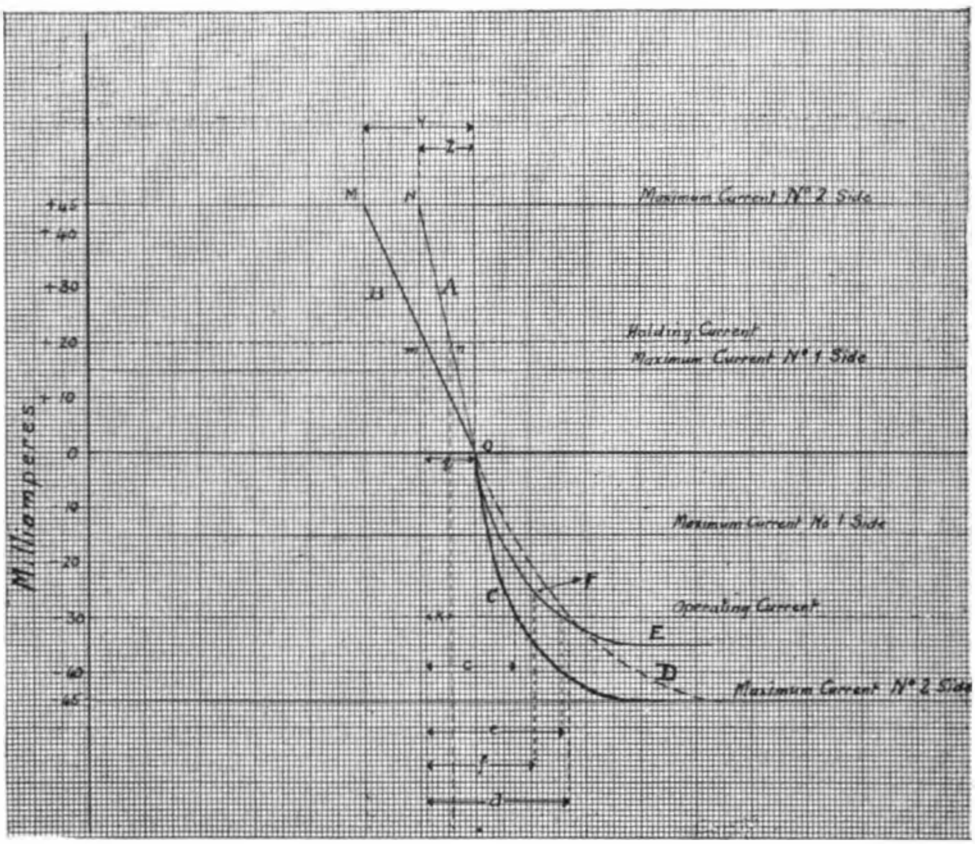


FIG. 4. CURRENT CURVES.

to be bridged over is therefore reduced by a period represented as K.

Various methods have been suggested to reduce this time interval and the question arises as to the comparative merits of a polechanger having a rigid armature and fixed contact points, making a total disconnection, and a polechanger having a rigid armature and spring-mounted contacts which momentarily short-circuit. Theoretical consideration of this question leads one to regard the latter as being the more efficient for two reasons:

(1) The period of no current is shorter.

(2) The balance is less disturbed.

Fig. 5 shows the contacts of the two forms of polechanger mentioned. In A, depicting fixed contacts, a period of no current exists during the time taken by the armature to travel from S to M. The distance of travel is made as small as possible, due care being taken that no sparking at the contact points exists. In B, the contacts are shown as being mounted on springs which follow up the movement of the armature so that when the latter moves from S to M, the S contact does not disconnect until the armature has made contact with M. Assuming that the same distance is observed between contact points as in A, it is clear that by this method the period of no current can be reduced to a very minute interval. Further, a slight rubbing of the contact points takes place and this tends to keep them clean.

The second advantage of the spring contact arrangement can perhaps best be explained with the aid of a diagram.

Assuming a potential of 150 volts at each power generator or battery (Fig. 6) necessitating a pro-

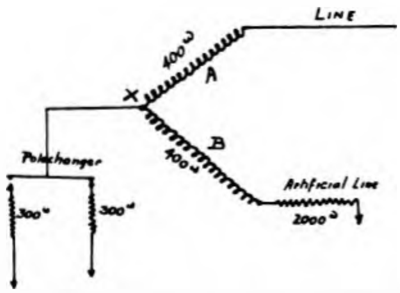


FIG. 6. DIAGRAM OF BALANCING RESISTANCES.

tective resistance of 300 ohms in each lead, and a resistance of 2000 ohms in the artificial line. At the distant office of the circuit shown in this figure the artificial line balances the line wire, the coil A, and the joint resistance of the two paths from X to ground, one being via coil B and the home station artificial line, the other via the polechanger and one or other of the power leads. The path via B is considerably greater than that via the polechanger the ratio assumed in this case being 2400 : 300, the joint resistance of which is approximately 266 ohms.

With a polechanger producing a disconnection the path through it is broken, the only path from X to ground being that via B, of 2400 ohms resistance. The balance at the distant office is therefore momentarily upset to the extent of 2400—266= 2134 ohms.

With a polechanger producing a short circuit, the path is not broken, but, instead, two paths exist, one via each power lead, giving a joint resistance of 150 ohms. The joint resistance of these paths and that via B then becomes approximately 141 ohms. In this case, therefore, the distant office balance is upset to the extent of 266 — 141 = 125 ohms.

When dynamos are used as generators of power, sparking is said to be more frequently experienced with a spring contact type of polechanger than with one having rigid contacts. The writer, however, has had no experience in this connection.

The spring contact type of polechanger is used in Great Britain and the correct adjustment of the contact points is regarded as of much importance. Unfortunately, however, the full advantage of this means of producing the minimum period of no current is not secured on account of the operating key being used as the polechanger. The speed of travel of the armature is thus dependent upon the operator's style of sending, and is consequently slower than if the armature were actuated by an electro-magnet, as is done in this country.

Having referred to the method employed for reducing, by apparatus design, the duration of the time interval which must be bridged over, let us now consider the construction of the bridge.

In this country the usual practice is to employ an additional coil to the No. 2 side relay, in series with a condenser, and so rectify the distorted signals at the relay. The British method is to provide a means for rectifying the signals in the local circuit, as shown in Fig. 7.

The functions of the various parts are as follows: When the relay armature is attracted there is an initial rush of current to charge the condenser, and to prevent its reaching too high a value, a 50-ohm coil is placed in the circuit. It was found that when no resistance was provided the momentary current was such as to cause welding at the contact points.

As the time taken to charge the condenser is very short, the only retarding factor being the 50-ohm coil, the flow of current through the sounder is not appreciably delayed. When the short "kick back" of the relay armature takes place the circuit conditions are exactly as repre-

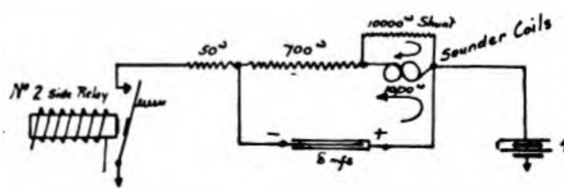


FIG. 7. METHOD OF RECTIFYING SIGNALS IN LOCAL CIRCUIT.

sented in Fig. 7. The self-induction of the sounder coils sets up a rapidly weakening current which circulates round the sounder shunt coil in the direction indicated by the smaller arrow. The condenser discharges through the 700-ohm resistance coil and the sounder coils, as represented by the larger arrow.

A quadruplex of this design has been found to work over an artificial line of KR 84,000. On an actual underground circuit, free from inductive interference and of KR value 60,000, perfect signals have been obtained, but the margin for adjustment was small, and it was found necessary to adopt a firm style of sending on the No. 2 side.

On aerial lines, however, where varying insulation prevents a steady balance being maintained, the range of quadruplex working is much smaller and the limiting KR value must necessarily be an arbitrary one.

It can hardly be regarded as good practice to instal quadruplex apparatus on a circuit of high KR value which will work efficiently for a few days of the year only, nor is it advisable to regard quadruplex working as being impracticable on a circuit because it works inefficiently during a few days of the year when the insulation is very low. The limiting KR value should lie somewhere between these conditions. In Great Britain the figure has been placed at 30,000, and, generally speaking, an aerial quadruplex circuit of this KR will work efficiently for at least eleven months of the year.

In America the weather conditions are such as to lead one to place the limiting KR value slightly higher than in Great Britain.

When Mr. Finn's article was written the KR law was doubtless used in comparing the speech efficiency of telephone circuits, but, as probably most of your readers are aware, it has been shown that the KR law does not hold good for this purpose. Other factors besides K and R have to be considered. The efficiency of telephone circuits is now based upon comparison with a standard cable of known electrical constants.

The English-Marconi Wireless Telegraph Agreement.

Mr. Charles Bright, the well-known English authority on submarine cable matters, in commenting on the arrangement between the English postoffice department and the Marconi Wireless Telegraph Company for imperial wireless service says that although he could not understand the Government's opposition to a state-owned cable he thought the Government's contract with the Marconi Company for the establishment of an imperial wireless service sounded a good deal to its credit, inasmuch as it showed that the Government had the courage of its apparent convictions and purposed taking up and furthering an industry which was still in the making, so to speak.

"As a rule," he added, "British Governments wait till an industry has been thoroughly worked out before absorbing it, by which time the purchase price becomes abnormally high. If fairness is to be observed, it also redounds to the credit of the Government that it thinks to be before other countries in this matter. Whether it actually will be is another story. In any case, such prompt, go-ahead action on the part of the Government in regard to wireless contracts contrasts favorably with the lukewarmness in the matter of imperial cables, such as we have become accustomed to in our country for many years."

Regarding the relative value of cable or wireless, Mr. Bright said he thought that, in view of the extreme importance of the subject from national and other standpoints, a commission should be instituted to inquire fully into the whole matter.

"It would seem to me," he said, "if one method of telegraphic communication with the rest of the empire is to be regarded as a future substitute rather than as supplementary to another, that the greatest possible pains should be taken to arrive at which is the more reliable and efficient.

"One of the first subjects for investigation would be, I suppose, as to which method is being most effectively used in any particular quarter, say from the seat of war in Tripoli; or, again, which is most seriously affected by the weather and which is more vulnerable to attack.

"The Marconi system of wireless telegraphy has achieved much, and deserves hearty congratulation and support, but the Post Office does not at present seem to encourage the public use of wireless telegraphy much for transatlantic purposes, notwithstanding the apparent preference for the wireless on a larger scale."

Retirement of Mr. Weaver as Editor of the Electrical World.

Mr. William D. Weaver, for many years editor of the *Electrical World*, New York, retired from active journalistic work on May 1. On Monday, April 29, Mr. James H. McGraw, president of the McGraw Publishing Company, gave a luncheon at the Engineers' Club, New York, in honor of Mr. Weaver's retirement, at which were present all the members of the *Electrical World* staff and a few former associates and personal friends of Mr. Weaver. Several addresses were made highly complimentory to Mr. Weaver as a man and an editor, and as a token of the esteem with which he was held by his office associates, Mr. McGraw presented him with a handsome gold watch and chain, and a watch fob.

Mr. Weaver replied feelingly to the compliments paid him.

Among those who spoke were Dr. Louis Bell, of Boston, Carl Hering, of Philadelphia, and T. C. Martin, Secretary of the National Electric Light Association, of New York, all former editors of the *Electrical World*; Gano S. Dunn, President of the American Institute of Electrical Engineers, New York, and a former telegrapher; John J. Carty, chief engineer of the American Telephone and Telegraph Company, New York, and several others. There were about forty-five persons present and at the conclusion of the luncheon all joined in expressing their best wishes for Mr. Weaver's future welfare and happiness.

Trans-Atlantic Telegraphy.*

BY CHARLES BRIGHT, F.R.S.E., LONDON.

At a recent meeting which had for consideration the proposed Imperial Atlantic Cable a resolution in its favor was, for some unaccountable reason, withdrawn. If the case against the cable was so strong, it seems strange that those opposed to it should ask for the withdrawal of a resolution in its favor; still more that those in favor should—out of awe or affection—fall in with so complacent a course on such an occasion. However, no reply having been given to the speech in opposition to the resolution, the following brief observations may be made in that connection:

1. The existence of a trans-Atlantic cable monopoly *commercially* speaking has never been suggested, but our communication with Canada being now in the hands of two American companies constitutes a highly undesirable monopoly in a *national* sense.

2. A cable landed on British territory with British clerks, and *foreign ownership, directors and managers,* does not constitute British control, as anyone knows who has to do with the working of a cable system. There are several cases that might be cited to prove this. Meanwhile, the following may be quoted from an American contemporary; [TELEGRAPH AND TELEPHONE AGE, March 16]: "The eight trans-Atlantic cables of the Western Union, Anglo American, and Direct United States Companies were consolidated on March 8, under one operating management, and will be known hereafter as the *Western Union Cable System.*" Here we have evidence of the way facts are appreciated at their correct value in the United States.

As further evidence, but from *this* side, we have the following remark made by the chairman of the Anglo American Telegraph Company at its last shareholders' meeting:

"All we have to do now is to sit down and receive our dividends."

3. It is unwise to rely upon Naval supremacy as sufficient reason for allowing all our British trans-Atlantic cables to pass into American hands, especially when we remember that control of cable communication with other parts of the Empire is even more important during the period when international trouble is brewing, than during actual warfare. Germany and France have recently recognized this by establishing separate cable links to their own colonies.

4. The loss quoted on the Pacific cable as of last year was, as a matter of fact, that of some years ago—a loss which is steadily decreasing each year. Parenthetically, it may be added that we do not talk about a loss on our Navy and Army; yet efficient and reliable telegraphic communication with the rest of the Empire is equally essential, and is, indeed, *inter alia,* a necessary strategic adjunct.

5. As an argument against the proposed Imperial Atlantic Cable, it was stated that the line would require to be laid in duplicate. Personally, I should propose that the duplication should be effected by "wireless," either with the existing Marconi system or by establishing a new wireless system on an extreme northern route. But, in any case, it may be pointed out that, whereas a cable on the route of the "All British" Pacific Cable would be far more likely to give trouble than one across the Atlantic, the Pacific line has only once been interrupted—and that quite recently—for a very brief period, on one of the shorter sections. It has, in fact, got on very well by itself ever since it was laid, some twelve years ago. On the other hand, its value as a strategic asset was more or less wiped out on the day when its Atlantic connecting links became entirely American.

6. A great deal was said about the government wireless scheme; but though much was made of the cost of the proposed Imperial Atlantic Cable, there was no reference to the corresponding cost of the wireless project, a cost which has been already estimated at a figure considerably in excess of that which would be entailed by the Atlantic cable link.

7. A point was made that all the new wireless stations were to be on British territory. But this by itself does not appear to be of transcendent value in the case of wireless, unless the intervening ether space can be also rendered "All-British."

8. Apparently the principal opponent to the Imperial Atlantic Cable was greatly impressed with the efficiency of "Wireless;" for he spoke of the cable system as being conceivably "knocked out" by wireless. Suggestions of this sort, unfortunately have their effect when coming from certain quarters, even though based on no direct technical knowledge of the two methods of telegraphy. Thus, holders of cable stock are being needlessly disturbed, partly on this account and partly due to the constant "writing up"—very much "up" —in the non-technical press of everything to do with wireless telegraphy, without any corresponding announcement as to what is being done by cables in the ordinary every-day course.

9. Special attention was called to "a new automatic method by which messages would be ticked off at the rate of 50 words a minute." Apparently this had reference to the Imperial wireless scheme; and if this be so superior—as seemed to be thought —why trouble about cable rates? It was also stated that each station was to work "practically instantaneously," yet each was to "repeat to the other"; most of us know something of those repetitions, while we also know of the great value (and the reverse) of simultaneously spreading news and information to a wide and attentive audience—whether for legitimate press purposes or otherwise. In the case of war it would be distinctly "otherwise."

The present position certainly suggests the desirability of full and important public inquiry into the relative merits of cable and wireless telegraphy —as I have constantly urged for. The two systems should, in fact, be put to actual test by independent parties under similar conditions. That would be better than mere generalizations such as seem so rife just now.

**Electrical Review*, London.

Testing on Railroad Telephone Circuits.

(Continued from page 276, May 1.)

BY K. W. ENDRES, NEW YORK.

BATTERY TROUBLE.

If there is no thump on the line when the dispatcher is calling a way-station, and he is unable to ring the station bells, the sending battery circuit is open. The dispatcher should look into the battery cabinet and see if the fuse, which is placed in the battery circuit, is blown. This can easily be replaced. If not, he should examine the sending relay to see if the contacts are made firmly.

RELAY OR KEY TROUBLE.

If the sending relay does not operate, there is an open in the local circuit, or trouble in the sending key. It should be tried with another key or with the strap key. This will place the trouble. Then examine the connections of the eight cell battery which operates the relay. This is wired to the line binding posts on the relay. If the trouble is in the sending key and cannot easily be located by inspection, or fixed, this key should be taken out and replaced by a spare key which can be adjusted for the station desired, or else the particular station whose key is gone may be called by means of the strap key, temporarily.

TELEPHONE SET TROUBLES.

If able to signal way-stations, but unable to talk or hear, the dispatcher's telephone cord may be broken at the plug or the fuses may be blown at the protector which is wired in his telephone set leads.

A heavy, scratching noise while the dispatcher is calling a station would be caused by a ground on the line, condensers broken down in his telephone set, or the condensers which are bridged across the retardation coils to eliminate noise, broken down. The latter would be noted by an exceedingly loud "click" in the receiver as the contacts are made in the sending key.

If the dispatcher's talking battery circuit is open, he will not obtain any "click" by opening and closing the switching key in his transmitter circuit.

If the induction coil in the dispatcher's desk set box is open, the grade of transmission both for talking and receiving will be very faint indeed, if he is not totally unable to talk or hear. If the dispatcher is equipped with a hand generator for calling siding and portable telephones, and this should become bridged across the circuit by accident, it will act in exactly the same way as a short circuit between the dispatcher's office and the first way-station, and he will be unable to signal any stations on his line.

WAY-STATION TROUBLES.

Following is a list of some of the possible troubles which may occur at a way-station to prevent the selector bell at that point from ringing.

1. In case selector sets using local battery-ringing are employed, the local battery bell circuit at the stations may be open, or the batteries may be exhausted and need replacing. A pocket battery gauge may be used for testing this battery.

2. While the bell and selector box are nearly dust-proof, the bell contacts at the way-station may, if the set is located in a very dusty place, become dirty and prevent the bell from ringing.

3. The contact on the selector at the way-station which controls the bell may, after long continued use, become dirty in extreme cases. The chance of this, however, is very remote since the contacts are of platinum and the selector is hermetically sealed. The selector can be tested for this trouble by short circuiting the local circuit binding posts upon the selector. If the bell rings in this case, it is an indication of trouble in the selector contact. If it does not ring, it is an indication of trouble in the bell battery or in the bell itself.

4. The answer-back signal may not be received. This indicates either that the bell does not ring, or if it does ring, the front contact on the armature of the bell is not making properly, or that the answering-back circuit at the way-station is open.

WAY-STATION CANNOT TALK NOR HEAR.

One advantage of a telephone circuit is that if anything is the matter with the line, a way-station telephone set, or the dispatcher's equipment, it will generally betray itself in some way when an attempt is made to talk. It may be that there is noise; possibly the operator cannot talk nor hear. Again, he may be able to talk and not hear and vice versa. The matter of noise has already been covered. It is usually due to line trouble.

If the way-station can neither talk nor hear, a receiver should be bridged across the line terminals where they enter the building. This will indicate whether the trouble is inside or not. Conversation will be heard if there is no trouble outside. Having found the trouble to be inside, the circuit should be carefully gone over to see that it is correctly wired and that there are no open or loose connections nor short circuits. Test the induction coil for continuity in both the primary and secondary windings. Test the condenser to see if it is crossed. Finally, try a new transmitter and receiver after testing their cords for continuity.

TRANSMITTER TROUBLE.

In case trouble is found in a transmitter, it may be found to be "packed"; in other words, the granular carbon inside of it, which transmits speech through the variation of its resistance caused by the movement set up by the voice may become jammed together in a solid mass and have no motion under the action of the voice vibrations. This can be remedied by loosening the button on the face of the transmitter diaphragm and shaking or tapping the instrument, then tightening the button.

RECEIVER TROUBLE.

Receiver trouble is liable to be either an open circuit of the windings which can be easily found, or weak magnets. These latter can be noticed by observing the strength of the pull on the diaphragm as compared to that on a receiver in good order. Rough treatment of a receiver, such as dropping it, will sometimes cause this demagnetization.

WAY-STATION CANNOT TALK.

Inability of a way-station to talk, while still able to hear perfectly, is likely to be caused by an open circuit in the secondary of the induction coil (in desk set box). No side tone will be obtained in this case.

WAY-STATION SWITCHING KEYS.

Care should be taken when installing, as well as when locating trouble, to see that the switching keys at the way-stations are all operating as they should, and that there are no crosses between the springs. This key is the one used by the way-station operator when he talks on the circuit, and which he releases when he listens. A drop of solder or a bit of wire carelessly thrown away will often cause just such trouble as this, and the telephone set is very likely to be found open or crossed in the springs of this key.

TESTING CONDENSERS AND RESISTANCES.

All condensers and resistances installed around relay contacts and across retardation coils, as well as in desk set boxes, should be tested to see if they are in good condition. In testing a condenser, connect five or six cells of battery through a milliameter or a buzzer to its terminals. If there is no reading nor any sound, the condenser is not short circuited. Then connect the condenser in series with a hand generator and the bell. Operate the generator, and if the bell rings, the condenser is all right and not open.

A resistance coil is tested for continuity of its circuit by placing it in series with a battery and buzzer or ammeter.

PRIVATE RAILROAD TELEPHONE CIRCUITS.

In addition to the telephone train dispatching circuits which are being rapidly spread over the railroads at the present time, on all the large systems at any rate, there also exists a class of telephone lines which differs in no respect from the ordinary commercial local and long distance circuits, except that they are used by the railroad companies. These lines may have circuits extending hundreds of miles between the various division headquarters, in which case they are exactly similar to the commercial long distance lines, or they may be short local lines running from different private branch exchanges in the various office buildings of the railroad company. In both cases, however, provision must be made for testing these lines and maintaining them in first class condition.

Means of doing this are exactly the same as are employed in regular telephone offices. The elaborate and complicated wire chief's desk is not, however, required in these cases, owing to the fact that there are hardly ever a sufficient number of lines on an equipment of this character to warrant it. Condensed wire chief's desks, therefore, have been brought out by the Western Electric Company (one of which is described herewith), that afford means for accurately testing for practically all troubles common to both magneto and central battery exchanges. The application of such a testing cabinet is universal. It can be arranged for mounting either alongside of the switchboard or in the terminal wires, or in the terminal room.

Tests can be made a very simple matter without complicated mathematical calculations for grounds, short circuits, opens, bad joints, and in fact practically all troubles common to exchanges.

TESTING BATTERY.

A sufficient number of dry cells, usually about twenty-four, connected in series to give thirty volts is required for the testing battery (Fig. 11). Great care should be taken that the testing bat-

FIG. 11. TESTING CABINET.

tery maintains a constant voltage, otherwise the voltmeter calculations will not be dependable. The voltage of the testing battery may be measured by having a vacant jack on the switchboard short circuited (in other words, the "tip" and "ring" connected together). By plugging into this jack and operating the key *V* (Fig. 12), the voltage of the testing battery will be indicated upon the voltmeter. If the voltage is lower than thirty, it may be increased by connecting one or more dry cells in the series; if the voltage is higher than thirty, it may be reduced by removing one or more cells from the series.

The condition of the testing batteries should always be tested by plugging the test cord into the special jack and operating the keys *V* and *VS*. If the operation of the key *VS* causes the needle to fall back more than four or five points, or if the needle begins to move back gradually after the keys have been left operated for a few seconds, the testing battery is too far exhausted to give readings which may be considered dependable.

The testing batteries may be located in the terminal room and wiring therefrom connected to the testing cabinet. Not more than thirty feet of No. 20 B. & S. gauge copper wire should be used for this connection. If it is absolutely necessary to locate the batteries at a greater distance from

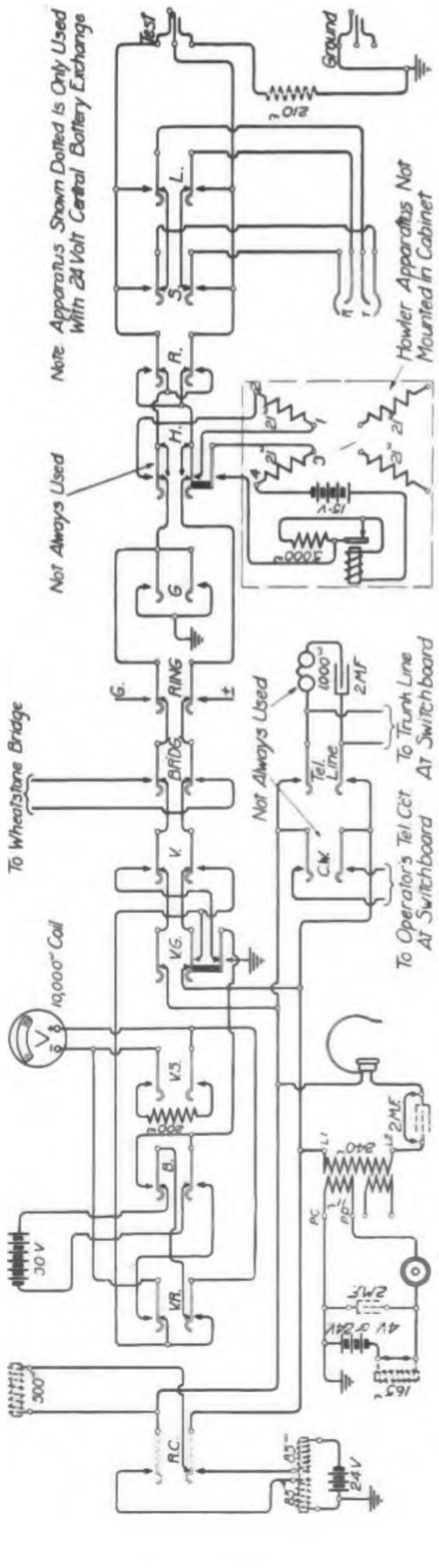


FIG. 12. CIRCUIT OF TESTING CABINET.

the testing cabinet, correspondingly larger sized wires should be used.

The lead, or wire, from the zinc side or negative pole of the dry cell is to be connected to the terminal marked "—30V", meaning the negative side of the 30-volt battery.

The lead from the carbon, or positive side of the dry cell is to be connected to the terminal marked "+30V," meaning the positive side of the 30-volt battery.

(*To be continued.*)

Sulphated Storage Cells.

"The Regeneration of Sulphated Storage Cells," was the subject of a paper presented by Messrs. C. W. Bennett and D. S. Cole before the recent meeting in Boston of the American Electrochemical Society.

The method of regeneration recommended was to produce sodium hydroxide in the sulphated grid. This is done by electrolysis with sodium sulphate as electrolyte, the current being sent through the cell in the direction of charging. Sodium hydroxide is then formed in the pores of the lead plate and sulphuric acid at the lead-dioxide plate. The results obtained were remarkably good. The concentration of sodium sulphate recommended is 200 grams of the crystallized salt per liter. It should be chemically pure. After treatment the plates need not be thoroughly washed, but dipping in water is sufficient. The time of charging for the worst cells was about sixty hours at the eight-hour rate. The method was tried upon a battery of fifty-two cells which had been improperly handled and were in bad condition. Before the treatment the energy efficiency was found to be 42.5 per cent. and the capacity was only half of the rated capacity. After treatment the energy efficiency was found to be 81.1 per cent., the energy capacity was 88.7 per cent. of rated capacity and the ampere-hour capacity 96.9 per cent. of rated capacity. This battery had a capacity of 7.5 amperes and the cost was about 20 cents per cell. The gain in efficiency would pay for the treatment after ninety charges and discharges, providing energy cost five cents per kilowatt-hour.

Telegraphs and Telephones on Panama Canal.—The United States Government now has forty copper telephone and telegraph lines across the isthmus of Panama from the Atlantic to the Pacific. The first lines used by the Government were constructed of iron wires. Ants made the use of wooden poles impractical along the canal. The present line is constructed of old steel rails left by the French after their canal work. There are 1400 telephones in use and seven exchanges. There are thirty American female operators, most of them the daughters of canal employes. The canal work is all directed by telephones. Mr. A. B. Kratz is superintendent of telephones and telegraphs for the Panama Canal.

Telephone Pioneers of America.

F. E. KINSMAN.

Mr. Frank E. Kinsman, of North Leominster, Mass., of which place he is a native, is one of the first telephone pioneers in point of early connection with the industry, having taken up the work in the fall of 1876. He was at that time engaged in the development of an express cable system in Boston, Mass. The device meant instantaneous communication, something on the plan of the district telegraph service which about that time was introduced in Boston, but involved a far more complicated apparatus. It was while engaged upon this work that he first heard of the telephone as exhibited at the Centennial Exposition. As a result of an acquaintance very close to Mr. Alexander Graham Bell, and others interested, Mr. Kinsman was shown a telephone which he believes was the one exhibited in Philadlphia, or the one following it. As soon as possible thereafter he got into communication with Mr. Sanders, who referred him to Mr. Gardner G. Hubbard as the business man of the affair. Mr. Kinsman succeeded in getting Mr. Sears to subscribe $15,000 for a one-third interest. Mr. Kinsman was to have a third and the remainder was to be used for future promotion purposes, but circumstances finally prevented the consummation of the deal with Mr. Hubbard for the exclusive use of the telephone for what has since been denominated central office purposes. He then engaged with Mr. E. T. Holmes of the Holmes Burglar Alarm Company of Boston to enter his employ for the purpose of assisting in the establishment of a telephone express call central office system. The first line was built from Tremont Street near Boylston over the housetops to the Holmes Burglar Alarm office on Washington Street, near the corner of Milk Street. Mr. Kinsman remained with Mr. Holmes until the fall of 1877 when he went to New York and from there to Chicago, where he took what is believed to have been the first telephone subscription west of the Alleghany mountains. Mr. George Sturges, president of the Northwestern National Bank was the subscriber.

F. E. KINSMAN,
Retired, Leominster, Mass. (1876).

After his experience in Chicago, Mr. Kinsman spent some months in Ohio with Mr. Frank G. Beach, establishing exchanges in different localities, after which he returned to New York as manager of the Fourteenth Street, the Williams Street and the Whitehall Street central offices. Following this, he was made superintendent of repairs and attachments and was succeeded by Mr. John A. Seely, who in turn was succeeded by Mr. J. J. Carty, now chief engineer of the American Telephone and Telgraph Company, New York. Mr. Kinsman resigned his telephone position August 1, 1881, to go into construction business on his own account.

During the subsequent business career Mr. Kinsman was prominently identified with the early work in the electric light industry and he is the inventor of several devices, the most notable being the automatic train stop which is now used in the New York and Boston subways and underground railroad tunnels.

Mr. Kinsman retired from active business four years ago, but still keeps up his interest in the telephone and other electrical improvements.

Press Rates in Canada.

The Board of Railway Commissioners of Canada heard a complaint from the Canadian Press Limited at Toronto on Wednesday, May 1. The complaint was a request that the Great North Western Telegraph Company and the Western Union Telegraph Company charge the same rates for Associated Press service in New Brunswick and Nova Scotia as does the Canadian Pacific Railway.

The second item of the complaint asked that the rate for newspaper day-specials between points in New Brunswick and Nova Scotia be reduced from ½c. per word to ¼c. per word, the same as charged between points in Ontario and Quebec, The Board of Railway Commissioners practically ruled out the first item of the complaint and has taken the second item under consideration.

The Great North Western Telegraph Company was represented by its general manager, Mr. G. D. Perry, Toronto; the Canadian Pacific Railway Company's Telegraph by Mr. W. J. Camp, assistant manager of telegraphs, Montreal, Que., and the press was represented by Mr. McCreedy of St. John.

The Board of Railway Commissioners was represented by Mr. D'Arcey Scott, Dr. Mills and Mr. Maclain. The chief commissioner, Judge Mabec, was not present, having been operated on for appendicitis the day previous.

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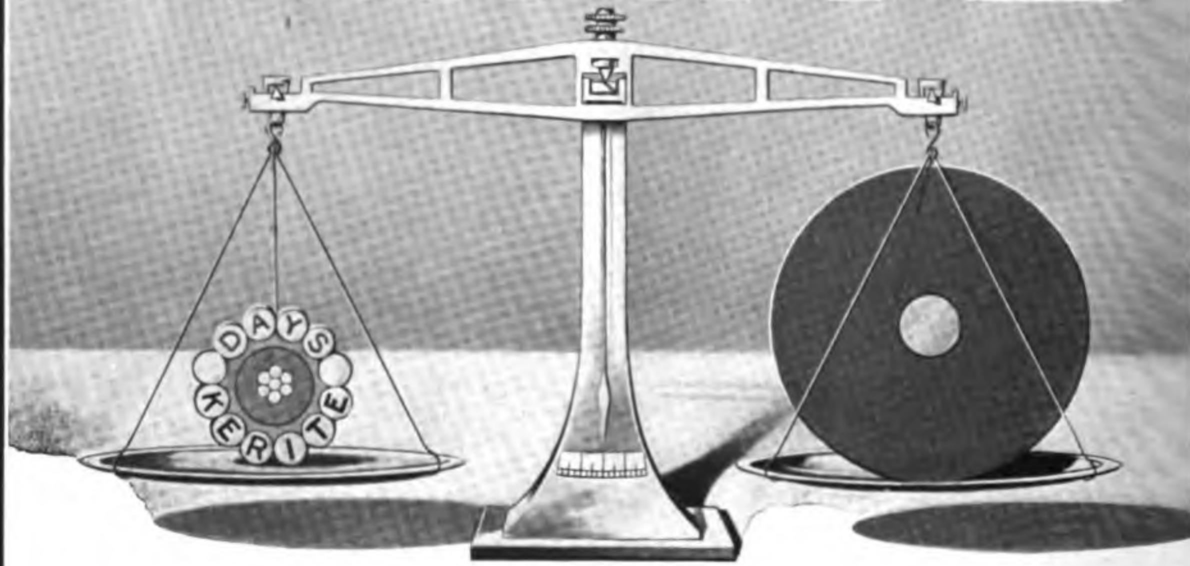

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The Railroad.

Mr. Charles Selden, superintendent of telegraph of the Baltimore and Ohio Railroad Company, Baltimore, Md., was a recent New York visitor, as was also Mr. W. J. Camp, assistant manager of telegraphs, Canadian Pacific Railway, Montreal, Que. Mr. Camp was accompanied by Mrs. Camp, and both attended the ceremonies at the unveiling of the telegraph monument at Harriman, N. Y., May 2.

Mr. Joseph P. Church, chief clerk to the superintendent of telegraph, Wabash Railroad, Decatur, Ill., has been appointed acting superintendent of telegraph of that road, vice G. C. Kinsman, resigned. Mr. Kinsman will hereafter reside on the Pacific Coast.

Mr. Carl R. Gray, president of the Spokane, Portland and Seattle Railway, and who is to become president of the Great Northern Railway, began his railway career as a telegrapher in 1882 on the St. Louis and San Francisco Railway. He was born in 1867.

Convention of Association of Railway Telegraph Superintendents.

The topics committee of the Association of Railway Telegraph Superintendents announces the following papers to be read at the annual convention to be held in New York, June 4:

"Maintenance Standards and Methods," by G. M. Yorke, engineer, Western Union Telegraph Co., New York; "Possibilities of High Speed and Automatic Telegraph Systems in Railroad Service," by W. N. Fashbaugh, traffic engineer, Western Union Telegraph Company, New York; "The Handling of Supplies," by W. G. Higgins, superintendent supplies, Western Union Telegraph Company, New York; "Construction Standards and Methods," by R. E. Chetwood, engineer of construction, Western Union Telegraph Company, New York; "What the Telephone Has Done for the Santa Fe Railway," by L. M. Jones, superintendent telegraph, Atchison, Topeka & Santa Fe Railway, Topeka, Kan.; "The Use of the Main Line Relay in Telephone Selector Operation," by W. W. Ryder, general superintendent of telegraph, New York Central Lines, Chicago, Ill.

A meeting of the entertainment committee was held May 8 in the directors' room of the Thomas A. Edison Company, Inc., West Orange, N. J., and discussed the programme. (See TELEGRAPH AND TELEPHONE AGE, April 16 and May 1, for details of programme). Mr. Edison was present and promised to accompany the party to the clam-bake to be given at Travers' Island by Mr. Belvidere Brooks in behalf of the Western Union Telegraph Company, Friday, June 7, after the entertainment at the Edison works and Country Club luncheon in the afternoon at West Orange. The following members of the Committee were present at the meeting, besides Mr. Edison: L. S. Wells, L. B. Foley, W. E. Harkness, A. D. Walters, A. P. Eckert, E. E. Hudson and R. A. Patterson.

The headquarters of the Association will be at the Waldorf-Astoria hotel and the meetings will be held at the same place.

The rates for accommodations at the Waldorf-Astoria are as follows:

Two dollars per day for single room without bath for one person, with bath, $3.00 up.

Double rooms for two persons, without bath, $4.00 per day up, with bath, $5.00 up.

Two double rooms, with bath, for four persons, from $8.00 up, for the two rooms, or $4.00 per room.

Following is the programme:

On Monday, June 3, an informal reception will be held at the Waldorf at 8:30 p. m.

On Tuesday, June 4, there will be business meetings morning and afternoon, and the ladies will be taken on a sight-seeing tour in automobiles in the afternoon. At night there will be a theatre party, as already announced.

On Wednesday there will be a shopping tour for the ladies in the morning and in the afternoon the men will make a visit of inspection to the Western Union Telegraph Company's headquarters, and the New York Telephone Company's Cortlandt Street Exchange, and at 5 p. m. the entire party will take a trip to Coney Island by steamboat.

On Thursday there will be business sessions morning and afternoon and the ladies will be taken on a trip around Manhattan Island by boat. In the evening the entire party will attend a roof-garden entertainment.

On Friday a visit will be made to the Edison works, at West Orange, N. J., and after luncheon at the Country Club at West Orange, as the guests of Mr. Edison, the party will return to New York over the Erie Railroad and land at West Twenty-third Street, where they will take automobiles for the Country Club, Travers Island. At Travers Island, the party will be entertained at a clambake given by Mr. Belvidere Brooks, in behalf of the Western Union Telegraph Company.

Mr. P. W. Drew, superintendent of telegraph, Minneapolis, St. Paul & Sault Ste. Marie Railroad, Chicago, Ill., will be glad to furnish any other information regarding the convention.

Telephone Dispatching on Birmingham and Southeastern Railway.—The Birmingham and Southeastern Railway Company has placed an order with the Western Electric Company for the apparatus necessary to equip ten way-stations with selective signalling apparatus. The telephone circuit is to be of No. 14 B. & S. gauge copper wire, and will be approximately forty-six miles in length, extending from Union Springs to Eclectic, Ala. The train dispatcher will be located at Union Springs.

Telephone Dispatching Equipment on East Carolina Railway.—The East Carolina Railway Company has placed an order with the Western Electric Company for telephone train-dispatching equipment. Ten way-stations are to be equipped with selective signalling apparatus. A large quantity of miscellaneous material is also to be furnished. The telephone circuit will be about forty miles in length, extending from Tarboro to Hookerton, N. C. The dispatcher will be located at Hookerton.

Municipal Electricians.

Electrical Engineer New York Fire Alarm Bureau.—Mr. Leonard Day has been appointed electrical engineer in charge of the Fire Alarm Telegraph Bureau, New York, vice John C. Rennard, resigned.

Convention of Municipal Electricians.—The mayor of Peoria, Ill., in which city the seventeenth annual convention of the International Association of Municipal Electricians will be held August 26-30, will deliver the opening address on the evening of August 26 at the Jefferson Hotel, which will be the Association's headquarters. Ample room will be provided at the hotel for the exhibition of apparatus and appliances. Mr. W. E. Walgamott, city electrician, Peoria, Ill., will be glad to give further information regarding exhibit space. Mr. Clarence R. George, city electrician, Houston, Tex., is secretary of the Association.

The Telephone.

New England Telephone Directors.—Thomas B. Bailey and Charles H. Wilson have been elected directors of the New England Telephone and Telegraph Company, to succeed John F. Hill and F. D. Proctor.

Injunction to Restrain Telephone Merger.—Application has been filed in the Superior Court in San Francisco, Cal., for an injunction restraining the Pacific Telephone and Telegraph Company from operating or conducting the plant of the Home Telephone Company in the city and county of San Francisco, and to prevent the merger consummated March 15.

New England Telephone Company's Report.—The New England Telephone and Telegraph Company, in its report for 1911, shows gross earnings of $13,849,394, an increase of $677,686 over 1910. Net earnings were $2,995,487, equivalent to 7.64 per cent. on the capital stock, compared to 8.15 earned on the same stock last year. The surplus for the year was $350,965, a decrease of $492,343.

Long Distance Telephone Charges by the Mile.—Application has been made by the Pacific Telephone & Telegraph Company to the California state railroad commission for permission to charge long distance telephone rates by the mile. With the commission's consent, it will establish a rate of half a cent per air-line mile, with an additional five cent terminal charge for a one-minute conversation.

Telephony in Italy.—The Italian Telegraph and Telephone Department has commissioned the Bell Telephone Manufacturing Company of Antwerp, to extend the telephone exchange at Rome, equipped by that firm some years ago. Since the taking over of the telephone service by the State, the Bell Company has equipped not only the exchange at Rome, but those at Milan, Naples, Catania, Genoa and Turin.

Telegraph and Telephone in Straits Settlements.—In the Straits Settlements there are now 218 miles of telegraph and 7,321 miles of telephone wire. The Oriental Telephone and Electric Company (Ltd.) operates in Singapore, and the Government elsewhere. The 2,018 miles of telegraph and 3,118 miles of telephone wire in the Federated Malay States are all Government owned.

Deaths of Telephone Pioneers.—Secretary Henry W. Pope of the Telephone Pioneers of America has issued memorial leaflets of five telephone pioneers who have died since the first of the year, as follows: W. S. Chapman (1879), at Chicago, February 5; C. A. Nichols (1879) at Springfield, Mass., March 29; J. W. Wilson (1885), at Oklahoma City, Okla., March 30; F. C. Simpson (1890), at Kansas City, Mo., April 6; G. H. Hubbard (1889), at Jersey City, N. J., April 10.

Telegraph and Telephone Employes in London.—According to a recent official statement, the London Central Telegraph Office employs 4,456 persons, and the London Telephone Service 1,796. The former includes thirteen superintendents, 112 assistant superintendents, and 158 overseers, with 1,632 telegraphers, and 387 members of the cable-room staff. The latter comprises twelve exchange managers, and a female staff consisting of one superintendent, three supervisors, 160 assistant supervisors, and 1,402 telephonists.

Decision Affecting Extension Telephones.—A citizen of Granville, N. Y., complained to the Public Service Commission that the New York and Vermont Home Telephone Company made an excessive charge for an extension telephone, and asked the Commission to issue an order permitting him to install in his office and home at his own expense an extension telephone and have the same connected with the telephone system of the company and that he be permitted to use this extension telephone without any charge on the part of the company. In the order made by the Commission it is recited that if it were to grant the relief asked for by this complainant, it would necessarily throughout its entire jurisdiction have to permit the unlimited connection of extension telephones by subscribers to the service without charge and without control of the character of instruments connected or their maintenance by the telephone company. This practice, the Commission says, would be so obviously improper that it cannot be sanctioned by the Commission.

Associated Press.

Mr. Frank H. Trickle has been appointed traffic chief in the Eastern Division of the Associated Press, with headquarters in New York.

The London Radio-Telegraph Conference.

Prof. Willis L. Moore, chief of the United States Weather Bureau, Washington, D. C., will represent the Department of Agriculture at the Radio-Telegraph Convention in London, June 4. As previously announced, the United States Navy will be represented at the convention by Rear-Admiral John R. Edwards, U. S. N., head of the American delegation, Lieutenant-Commander David W. Todd, U. S. N., and Mr. Louis W. Austin, Ph. D. The delegates appointed to represent the Department of Commerce and Labor are John I. Waterbury, of New York; Dr. Arthur D. Webster, of Clark University, Massachusetts; John Hays Hammond, Jr., and William D. Terrell, of New York. The War Department will be represented by Major George O. Squier, Major Edgar Russell and Major Charles McK. Saltzman.

The United States delegation to the London Radio-telegraph conference held a tentative meeting in Washington May 3. This meeting will be followed by others for the purpose of outlining a programme for the work at London. It is stated that one of the propositions to be submitted before the conference by the American delegates will be to lengthen the radio wave for distress communications so as to avoid confusion.

Mr. W. D. Terrell, one of the American delegates to the London Radio-Telegraph conference, is an old-time telegrapher and has occupied many positions of prominence in and out of the telegraph service. He was born in Golansville, Va., August 10, 1871, and entered the telegraph service in that place in 1889 as manager for the Postal Telegraph and Cable Company, afterwards becoming manager at Alexandria, Va. Later he went to Washington for the same company as operator, where he was promoted to the positions of traffic chief and wire chief successively. His next change was to the position of manager of the telegraph and telephone department of the American Can Company, New York. Later he was placed in charge of the telegraph department at the New York Custom House, and since July 1, 1911, he has filled the position of U. S. Wireless Ship Inspector for the Department of Commerce and Labor, North Atlantic District, which extends from New York to the Canadian boundary.

T. M. B. A. Assessment.—Assessment No. 537 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of W. H. Campbell at New York, J. Egan at Winnipeg, Man., C. W. Henderson at Dorchester, Mass., C. E. Case at Norwich, Conn., and C. M. Cunningham, at Brooklyn, N. Y.

An Old Telegraph Key.—Mr. George C. Wood, of the Western Union office at Gloversville, N. Y., possesses a telegraph key which it is stated was designed by Prof. S. F. B. Morse in 1845. It came into Mr. Wood's possession in 1848.

Dinner of the "Dot-and-Dash" Club.

The first dinner of the "Dot-and-Dash Club," of Philadelphia, Pa., was held at Kuegler's, May 11, and was a highly enjoyable and successful affair. Fifty-six persons sat down to the horseshoe-shaped table at seven o'clock, including invited guests who came from New York and nearby cities. Mr. James Merrihew and Mr. Ashton G. Saylor, general superintendent of the Western Union Telegraph Company, New York, came over from New York in their automobiles. Mr. S. S. Garwood, president of the club presided.

It was "Reminiscent Night," and some of the old-time stories told were revelations to some of the younger set. Col. Joseph S. Green carried off the honors as being the oldest operator in the service having begun November 11, 1846. A stand of handsome roses was presented to him by the club and he was heartily cheered.

Resolutions of regret at the absence of Mr. J. B. Taltavall, Mr. W. T. Westbrook and Mr. D. H. Bates were adopted by a standing vote. Mr. C. B. Wood made a humorous speech and was unmercifully ridiculed somewhat after the fashion of the Clover and Gridiron clubs, but the more he was interrupted the wittier he got and retorted upon his annoyers with telling effect. Mr. I. D. Maize gave a history of the Philadelphia bible and stated that in a week it would be placed in the operating room as the property of the Philadelphia office.

A letter, dated 1846, from Amos Kendall was read making appointments of operators; also one from James D. Reid, of an early date, and action was taken to co-operate in the Reid memorial project.

Mr. A. G. Saylor made an excellent address, his subject being mainly on the friendly feelings he still held for "Slow Old Philadelphia." Messrs. C. E. Bagley, F. H. Griffin, Harvey Williams, F. E. Maize and W. S. Burleugh, also made addresses.

Mr. C. P. Bruch, president of the Magnetic Club, New York, made some complimentary remarks about the Dot-and-Dash Club, and was heartily cheered.

Those present were Messrs. James Merrihew, C. P. Bruch and A. G. Saylor, of New York; S. S. Garwood, F. W. Griffin, C. E. Bagley, J. H. Wilson, Robert C. Mecready, C. W. Wendel, R. A. Barton, H. A. McCanna, E. W. Miller, C. E. Diehl, J. A. McNichol, A. W. Ford, W. M. Fitzgerald, G. M. Foote, A. E. Zintl, A. C. Bagley, R. L. Massey, W. P. Bowers, M. N. Redding, A. G. Strickland, R. P. Atkinson, Edw. L. Fitzgerald, Morris Ruberg, E. H. Locke, Robert C. Murray, R. C. Bartley, W. W. Anderson, Dan'l P. Carlin, Jos. MacIver, Ed. J. Smith, G. O. H. Bentz, R. A. Black, David R. Mitchell, Henry C. Leahy, Edwin C. Boileau, John A. Maguire, W. W. Donnelly, A. G. Wallace, E. H. Shriner, J. S. W. Phillips, C. W. Zecker, Edmund H. Zinser, John A. Shea, Harry M. Hughes, Clement H. Congdon, Leo D. Firman, Harvey Williams, Frank E. Maize, I. D. Maize, Andrew S. Weir,

C. B. Wood, John A. Chapman and John V. Berger.

Entertaining Chicago Night Messengers.

On the afternoon of April 16 about 100 members of the night messenger force of the Western Union Telegraph Company at Chicago were entertained by the Y. M. C. A. and the telegraph company in that city. There was an indoor baseball game between the main and branch office messengers, which was quite exciting and resulted in a score of 8 to 7 in favor of the main office team; after which there were relay races followed by the tug-of-war, in which all the boys participated. A substantial supper was provided for the boys by the company at the close of the games, and several of the officials of the telegraph company and of the Y. M. C. A. showed their interest in the affair by attending in person.

The entertainment was keenly enjoyed by all. Night captain of the messengers, William J. Holland, in letters to John Fitzpatrick, district commercial superintendent, M. J. Tully, chief of the delivery department and H. L. Lindstrom, manager of messengers, expressed the appreciation of his boys for the entertainment.

The company and the Y. M. C. A. entertained the day messengers in a similar manner December 18, 1911, but because the night boys could not attend, the entertainment of April 16 was provided for them.

Washington Western Union Note.—Mr. J. W. Collins, former general traffic chief of this office, who was recently appointed assistant plant superintendent at Philadelphia, Pa., was presented with a handsome diamond ring by the operating force on his departure to take up his new duties. The presentation was made by Mr. Joseph D. Steele, wire chief.

Notes from Western Union Headquarters, New York.

Mr. W. A. Young, formerly manager at Lakewood, N. J., has been attached to the office of district traffic superintendent Herbert Smith, New York.

Mrs. M. M. King, nee McLaren, formerly of this department, died in Brooklyn, April 28. Her remains were buried at Flushing, N. Y.

W. F. Wangerein, well known in newspaper circles, and an expert telegrapher, lately employed in this office, died suddenly at his home in Woodhaven, on April 28. The burial took place at Cleveland, Ohio.

The baseball season is in full swing and Mr. R. J. Murphy is in charge of the telegraph arrangements as in former years.

This company has moved into new quarters at 749 Broad Street, Newark, N. J. It also maintains an office in the telephone building on Washington street. Both offices are open day and night. Mr. C. H. Mulford is the Western Union manager and Mr. F. O. Ludlow is the local manager of the New York Telephone Company.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL NOTES.

Mr. J. P. O'Donohue, division electrical engineer, New York, paid us a visit recently.

Chief operator E. W. Miller went to Baltimore recently on company business.

The Mutual Investment Company of Philadelphia has been organized, with the following officers: finance committee, C. E. Bagley, A. E. Zintl, J. A. McNichol and J. R. Denniston; treasurer, J. A. McNichol; secretary, J. H. Wilson. The membership is limited to 100.

The Bridgeville, Del., office is being overhauled and new fixtures installed.

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 eceonomical form of protection for the home and family within the means of every telegraph and telephone employe. 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 employes not otherwise provided with adequate life protection.

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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. 11. NEW YORK, JUNE 1, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Electricity and Magnetism.

The principal reason why so many persons who pursue the study of electricity acquire only a superficial knowledge of the subject is that they devote too little attention to its basic principles, that is to say, the relationship of electricity and magnetism, one with the other, and depend entirely too much upon formulae, instead of getting results through a process of reasoning. They seem to be satisfied with getting the correct answer to the examples given by means of numerous rules, the logic of which is seldom given a thought.

The result is that with books of reference always before them many pass the test satisfactorily, to the gratification of the modern-day teacher, and the subsequent chagrin of the student himself after he learns, as in time he surely will, that formulas are quickly forgotten unless frequently used.

It is usually at a comparatively early stage of progress that the student begins to realize that the only formulas he can readily recall are those which convey a logical meaning to him, or in other words, those relating to examples he thoroughly understands through a process of reasoning. It will thus be seen that formulas are secondary to logic, but each is an aid to the other in the way of compensating elusive memory.

Now, before we endeavor to get at results, or an effect, by means of any given set of rules relating to electricity we should first analyze electricity and see what properties or peculiar actions it possesses that suggest the said rules and formulas.

For example, in the construction of relay and sounder magnets the rule tells us that with a given strength of current flowing through the coils the "pull" or attractive strength of the magnet will increase in proportion to the number of turns or convolutions of wire surrounding the iron core.

If a student is satisfied with that statement alone, and does not ask "why," his knowledge will be merely superficial and he can only figure out the value of a magnet so long as he can bear the rule in mind. If, however, he simultaneously ascertains the reason for such a rule he is not likely to forget the formula, and this will hold good with almost any rule or formula he may encounter. Let us see how a study of the properties of electricity verifies the rule just given.

We will learn that electricity possesses two distinct properties necessary for telegraph operation, one called "current," and the other "magnetism." It is not necessary to waste much time trying to ascertain their nature for the reason that so far no one has been able to solve that question. But we can learn that while the two are inseparable, magnetism and an electric current are each governed by a different law, while in a few cases one rule holds good for both.

Now in all cases for telegraph purposes, except where chemical action is required, it is "magnetism" which operates the instruments, and not the "current," except inasmuch as the current is the creator of the magnetism at work. Hence all of our relay and sounder magnets are constructed with a view of being able to collect and accommodate the amount of magnetism required to operate the armature properly.

Now in order to understand why $P = I \times T$ really gives us the means of regulating the pull or attractive force of a relay or sounder magnet. where P represents the pull, I the current and T the turns or convolutions in the winding, we must first learn where the magnetism or lines of force are to be found and how to collect them.

This question brings us back to an inquiry as to the properties electricity possesses. As previously stated these properties, so far as they apply to telegraph apparatus, are current and magnetism. The current flows through the conductor in volume measured by the electrical pressure and the resistance of the wire, while the latter is surrounded with magnetism, in the form of little rings or circles throughout its entire length. The number of these rings are the same per, say inch, all along the line regardless of the size of the wire. The stronger the current, the more lines per inch will there be.

Now, so long as the magnetic rings are confined to the conductor itself they can do no work in the way we desire. They will not desert the wire for air, brass or nickel under any circumstances, but if we place a bar of iron near them they immediately spread out and circulate through it and thus create what we call a magnet, capable of attracting other iron bars in close proximity to it. In our service this second bar is the armature of the relay or sounder as the case may be.

Now as each inch, or rather, let us say, each length of a turn or convolution of the wire used in winding the iron core possesses a given number of lines of magnetic force, it follows naturally that the total strength of the magnet must be equal to the strength of one turn multiplied by the total number of turns in the coil, as each turn adds its quota to those already in the iron.

As the volume of current regulates the number of magnetic lines collected per convolution, the formula $P = I \times T$ is merely "short-hand" for refreshing one's memory in regard to the information it requires so many words to tell. Hence it should be apparent that in order to acquire a lasting knowledge of electricity the main thing is to learn the "whys" and consider formulas as a secondary aid. If we know the "whys" we can easily recall the formulas.

Recent Telegraph and Telephone Patents.

ISSUED MAY 7.

1,025,167. Telephone Repeater System. To H. B. Stone, Providence, R. I.

1,025,269. Telephone System. To E. R. Hobbs, Buhl, Idaho.

1,025,347. Combined Telephone and Alarm System. To H. G. Webster, Chicago, Ill.

1,025,366. Telephone Equipment. To J. B. Briggs and V. P. Hall, Labette, Kan.

1,025,378. Telephone-Service Meter. To A. M. Crichton, Quincy, Ill.

1,025,427. Acoustic Optical Telegraph. To A. Sanandres, New York.

1,025,471. Telegraph Transmitter. To J. R. Jones, Detroit, Mich.

1,025,477. Telephone System. To J. G. Mitchell, Cleveland Ohio.

1,025,690. Telephone Attachment. To J. L. Donat, Chicago, Ill.

1,025,701. Telephone and Telegraph Contact for Movable Bodies. To H. F. Kunicki and M. Swiecicki, Philadelphia, Pa.

1,025,813. Telephone Cabinet. To G. W. Lancaster, Richmond, Va.

ISSUED MAY 14.

1,025,992. Transmitter for Telephonic or Audiphonic Systems. To H. G. Pape, Buffalo, N. Y.

1,026,020. Selective Electrical Signaling System. To C. L. Goodrum, Chicago, Ill.

1,026,057. Microphone. To H. E. Shreeve, New York.

1,026,150. Electric-Wave Transmission. To J. H. Cuntz, Hoboken, N. J.

1,026,199. Revertible-Call-Indicating Means for Telephone-Exchange Systems. To A. M. Bullard, (deceased), New York.

1,026,231. Audiphone Transmitter. To C. Williams, Chicago, Ill.

1,026,260. Telephone Bracket. To E. P. Guthrie, Oklahoma City, Okla.

1,026,297. Phototelegraphy. To T. T. Baker, Cricklewood, England.

1,026,328. Telephone System. To F. R. Parker, Chicago, Ill.

1,026,388. Mast for Wireless Telegraphy. To O. Fricke, New York.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange May 25:

American Telephone and Telegraph Co.	145¾
Mackay Companies	84
Mackay Companies, preferred	69
Western Union Telegraph Co.	83¾

Personal.

Mr. Andrew Carnegie sailed for Europe May 23 on the steamer "Celtic."

Mr. Charles Friedlander, traffic chief, central division of the Associated Press, Chicago, Ill., was a recent New York visitor on business.

Mr. Charles A. Tinker, formerly general superintendent of the Western Union Telegraph Company, New York, has returned from the Pacific coast where he spent the winter.

Mr. J. F. Gormley, of Canton, Mass., an old-time telegrapher, is suffering from cataracts in both eyes and will be operated on soon for their removal.

Mr. J. E. Wright, the well-known old-time telegrapher and inventor of the printer system known by his name, is now located at Swissvale, Pa., where his printing telegraph machines will be built in the future by the Union Switch and Signal Company.

Messrs. F. Douglas Watson, general manager and secretary, A. S. Duncan, assistant electrician and A. Podmore, assistant engineer to the Constantinople Telephone Company (Société Anonyme Ottomane des Téléphones de Constantinople), have left London for Constantinople to take up their duties.

Mr. and Mrs. David Homer Bates, jr., will be "at home" at The Ansonia, New York, after June 15. Mr. Bates is the son of Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, and was married on May 15 to Mrs. Eleanor Loring Lord.

Mr. Wm. B. Vansize, a well-known old-time telegrapher, but for the past thirty years a patent expert, has opened offices at 31 Nassau St., New York. Mr. Vansize has had a wide experience in soliciting patents in the United States and foreign countries and many years' experience as a patent expert in litigated cases and in assisting counsel.

Mrs. Marguerite C. Gates, of New York, a former telegrapher and a member of the Old Time Telegraphers and Historical Association, was present, on invitation, at the launching of the United States battleship "Texas" at Newport News, Va., May 16. Mrs. Gates was also present at the unveiling of the telegraph monument at Harriman, N. Y., May 2, and was one of the first contributors to the fund.

Brigadier-general James Allen, chief of the United States Signal Corps, Washington, D. C., and head of the army aviation department, took his first ride in a hydro-aeroplane around New York harbor May 15, to study the performance and applicability of that type of machine to war purposes. He was a passenger, and received a slight ducking in New York bay during the manœuvres. The trip included an aerial circle around the Statue of Liberty, and the machine was kept in perfect control.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay and his mother, Mrs. John W. Mackay, have donated $150,000 to the University of Nevada, making their total benefactions to this institution $400,000.

Mr. Clarence H. Mackay has presented to the New York Zoological Society a collection of mounted heads of large game captured in the West and on the Kenai peninsula, Alaska.

Mr. E. J. Nally, vice-president and general manager, has returned to New York after an extensive trip through the West and South.

Mr. E. W. Collins, general superintendent, Chicago, is making an extended business trip throughout his division, visiting offices in Colorado, Utah, Wyoming, Arizona, Texas and New Mexico. He will return to his office early in June.

The recent executive office visitors included Mr. Henry Scrivens, superintendent, Pittsburgh, Pa.; C. E. Bagley, superintendent, Philadelphia, Pa.

The Mackay Telegraph and Cable Company has filed a petition in the United States District Court at Little Rock, Ark., asking that the city of Hot Springs, Ark., be enjoined from interfering with the construction of its lines along the streets of that city,

Mr Edwin Stanton Williams, who, as announced in our issue dated May 16, was appointed district superintendent of the Postal Telegraph-Cable Company, with headquarters at Chicago, Ill., was born at Oak Hill, Ohio, April 14, 1866, and began his telegraphic career in December, 1882, as a messenger in the Baltimore and Ohio Railroad and commercial office at Oak Hill. In April, 1883, he became an operator for that road at Webster, and later went to Sciotoville, Ohio, afterward being employed on various other railroads in the West. Between 1884 and 1890 he was in the commercial service as operator for the Western Union at St. Paul, Minneapolis and Duluth, Minn., and in April of the latter year joined the forces of the Postal Telegraph-Cable Company in Chicago, serving successively as

E. S. WILLIAMS,
Superintendent Postal Telegraph-Cable Company, Chicago.

operator, assistant chief, chief operator and manager of the Board of Trade office and finally in January, 1907, becoming manager of the main office, which position he held at the time of his appointment as superintendent.

Postal vs. Western Union.

On May 20 the New York Public Service Commission, Second District, at Albany, heard the complaint of the Postal Telegraph-Cable Company against the Western Union Telegraph Company alleging discrimination and unreasonable charges by the Western Union on messages transmitted part way by the Postal Company and then turned over to the Western Union for transmission to destination. The Postal Company was represented by Messrs. W. W. Cook, general counsel; R. H. Overbaugh and John A. Delehanty, associates; C. C. Adams, second vice-president and Isaac Smith, superintendent of tariffs. The Western Union Company was represented by Messrs. Newcomb Carlton, vice-president; Rush Taggart, general counsel; J. C. Willever, United States manager cable system; Wm. Holmes, superintendent of tariff bureau; W. N. Fashbaugh, traffic engineer; R. G. Wilson, manager of the receiving and delivery department, and F. D. Giles of the commercial superintendent's office. Briefs are to be filed by counsel some time in June. The commission's decision will be awaited with much interest.

Mr. F. A. Mohr, manager of the Western Union Telegraph Company at Milwaukee, Wis., writes: "I am glad you renewed my subscription to TELEGRAPH AND TELEPHONE AGE, as it would be like losing an old and tried companion to have it stopped."

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, has been elected a director of the United States Rubber Company.

Mr. Newcomb Carlton, vice-president, has returned from a business trip which took him as far as the Pacific Coast.

Mr. C. F. Ames, district commercial superintendent, Boston, Mass., reports the following appointments in his district: F. W. Barth, formerly plant chief at New Haven, Conn., manager at Boston, Mass.; J. H. Harrigan, manager at Gloucester, Mass., vice J. C. Bonner who becomes cashier at Worcester, Mass.

Mr. J. R. Terhune, district superintendent, Nashville, Tenn., reports the following appointments at that point: Mr. C. W. Chenault, formerly manager at Ashland, Ky., district manager; Mr. H. H. Kirkpatrick, district cable manager, and Mr. E. S. Ridgeway, district traffic supervisor.

Mr. A. C. Terry, district commercial superintendent, Pittsburg, Pa., was a recent executive office visitor.

A conference of superintendents was held in Chicago, May 13.

Mr. G. F. Hoyte, who has charge of the *New York Times* telegraph bureau for this company, has returned from a two weeks' trip to Chicago.

Mr. C. H. Simpson, formerly manager at Brooklyn, N. Y., has been transferred to Worcester, Mass., as manager, vice Mr. W. E. Dickinson, transferred to superintendent Mulford's office, New York.

Mr. S. F. Shutt, assistant manager at Baltimore, Md., has, on account of ill health, been obliged to resign that position and apply for leave of absence, with the intention of taking a needed rest in the country, where he hopes to recover his health. He is succeeded by Mr. J. Tyson Sheldrake, formerly in the office of district plant superintendent R. J. Meigs of Philadelphia.

Printers have been installed between Denver, Col., and El Paso, Tex., with repeaters at Las Vegas, N. M.

A conference of Western Union superintendents and managers was held in the offices of district superintendent J. R. Terhune, Nashville, Tenn., May 20 and 21. The proceedings were conducted by Mr. Terhune and in the evening of May 20 a banquet was held at the Hotel Hermitage, Mr. Terhune acting as toastmaster. Those present, besides Mr. Terhune were: L. E. Rudd, manager, O. Stanley, commercial agent, and J. E. Lively, chief operator, Memphis, Tenn.; Charles Smith, manager, C. H. Carroll, district manager, and D. G. Breed, chief operator, Louisville, Ky., H. J. Carpenter, commercial agent. W. H. McClarrin, district plant manager, H. H. Kirkpatrick, district cable manager, E. S. Ridgeway, district traffic superintendent, C. W. Chenault, district manager, Wm. Bloomstein, assistant manager, T. B. Adams, chief operator, J. F. Fleming, night chief operator, A. F. Raymer, secretary and L. E. Pearce, chief clerk to superintendent Terhune, J. F. Grainger, chief clerk, Miss Ogilvie, cashier, Misses Howell, Williams and Mulligan, operators, and others of the Nashville office. J. B. Cheatham, special agent, Atlanta, Ga.; S. G. Quisenberry, manager, Paducah, Ky.; H. W. Whitsitt, district manager, and L. K. McNees, manager, Jackson, Miss.; J. S. Berger, manager, Lexington, Ky.; T. H. Gore, manager, Knoxville, Tenn.; R. H. Tudor, manager, Chattanooga, Tenn.; A. T. Cocke, manager, Meridian, Miss., and T. S. Bogan, manager, Bristol, Tenn. E. M. Fisher, special agent, and K. C. Hardcastle, traffic superintendent, of Nashville, represented the Cumberland Telephone & Telegraph Company.

Mr. T. A. Darling, whose appointment as manager of the Western Union Telegraph office at Fort Worth, Tex., was announced in our issue for May 16, was born in Whistler, Ala., April 8, 1872, and entered the telegraph service at Mobile, Ala., in February, 1891, for the Western Union Company. In 1894 he joined the ranks of the Postal Telegraph-Cable Company at New Orleans, La., and in 1901 went with the Postal Telegraph-Cable Company of Texas at Beaumont, Tex. On May 1, 1912, he returned to the Western Union service at Fort Worth, Tex.

Mr. Charles H. Simpson, recently appointed manager at Worcester, Mass., was born at Lima, N. Y., March 1, 1877, and entered the telegraph service in July, 1895, as operator for the New York Central Railroad at Victor, N. Y. In 1898 he took a position in the train dispatcher's office at Rochester, N. Y., and worked for that road at different points in various capacities until 1906 when he became manager of the Western Union office at Batavia, N. Y. On May 1, 1909, he was appointed manager at Niagara Falls, N. Y., and on September 1, 1911, was transferred to Brooklyn, N. Y., as manager, which position he held at the time of his appontment to Worcester.

Mr. J. B. Dillon, of Dallas, Tex., writes: "I wish to thank you for renewing my subscription to our mutual benefactor. The AGE, and I have gone hand in hand since I was a messenger boy and it shall forever be to me the same good cheering missive. A person in the telegraph business without TELEGRAPH AND TELEPHONE AGE is only half schooled, and will never be a graduate without it, for a little learning is a dangerous thing. The AGE fills the wants of all and pleases the most fastidious, and it makes one familiar with what a telegrapher should know, regardless of his title."

Mr. William Arnott, of Cleveland, Ohio, writes: "TELEGRAPH AND TELEPHONE AGE contains more information of general wireless news that I can get anywhere else. Enclosed find $2.00 for renewal of my subscription."

The Cable.

Mr. G. G. Ward, vice-president and general manager of the Commercial Cable Company, New York, accompanied by his wife, sailed for England on the steamer "Celtic," May 23.

Seventeen Minutes from New York to Argentina.—Mr. B. H. Reynolds, superintendent of the Central and South American Telegraph Company, New York, made an address before the Pan-American Trade Conference at the Waldorf-Astoria hotel, New York, May 16. He stated that Argentina is only seventeen minutes from New York.

Italian-Tunisian Cables.—An agreement has been reached between the Italian Government and the Eastern Telegraph Company in regard to the vested interest held by the company, covered by its contract with the Turkish Government, for operating the cable between Tripoli and Malta. The Italian Government, in consequence, is commencing to lay a cable between Sicily and the port of Tripoli, to be followed by a cable between Sicily and Benghazi. It is stated that the Italian Government intends to connect Benghazi and Tripoli by a cable within a few months. The Italian Government has authorized the construction of a submarine cable between Sicily and Tripoli.

The Telephone.

Mr. N. C. Kingsbury, vice-president of the American Telephone and Telegraph Company, New York, made an address before the Philadelphia Telephone Society recently on the subject of corporation publicity. Remarks were also made by Messrs. F. H. Bethell, president, and P. L. Spalding, second vice-president, of the Bell Telephone Company of Pennsylvania; U. N. Bethell, president New York Telephone Company, New York, and E. D. Nims, vice-president of the Southwestern group of Bell companies.

Mr. Leland Hume, general manager of the Cumberland Telephone and Telegraph Company, Nashville, Tenn., addressed a "booster" meeting at Jackson, Miss., May 13.

Automatic Telephones in Lincoln.—The Lincoln Telephone and Telegraph Company, Lincoln, Neb., has decided to substitute an automatic system of telephony for the present manually-operated system.

Women Cashiers at Telephone Headquarters.—Twenty men in the offices of the auditor of the New York Telephone Company, New York, have been replaced by women. The men have been transferred to outside work as solicitors.

Telephones in Durban, South Africa.—Durban has the only municipal telephone system in the Union of South Africa. All others are owned and operated by the Union Government. Durban is also the only city of the Union which uses American telephones. All other cities use the Ericsson, a Swedish telephone.

Notes on Telephone Exchange Equipment.—Mr. Alex. J. Gayes, of London, on May 10 read a paper before the Junior Institution of Engineers in London entitled "Notes on Telephone Exchange Equipment." The paper was very fully illustrated with diagrams of circuits, etc. It deals largely with the London system, and it points out that the first telephone exchange in London was opened thirty-three years ago, with eight subscribers.

Telephone Rights in Louisville.—The Supreme Court of the United States on May 13 approved the action of the Federal Circuit Court for Western Kentucky, in permanently enjoining the city of Louisville from removing the telephone equipment of the Cumberland Telephone and Telegraph Company from its streets. The Supreme Court held that the company possesses its rights to use the streets under the State charter and not under the city ordinance.

Telephone Rates Between England and France.—A fifty per cent. reduction in telephone charges between England and France has not yet, according to a recent statement of Mr. Herbert Samuels, British Postmaster-General, been effected, because the new cables have not yet been connected by land lines to Paris. Steps were being taken, he said, to extend telephonic communication with the continent, and it would not be long before London was in communication with Berlin.

Dinner to Mr. J. P. Crowley.—Mr. J. P. Crowley, secretary of the Southwestern Telegraph and Telephone Company, was the guest of honor at a dinner tendered to him in Dallas, Tex., May 8, prior to his departure for St. Louis, Mo., which city will henceforth be his headquarters. Vice-president and general manager Joseph E. Farnsworth acted as toastmaster. Addresses were made by Messrs. C. A. Gates, J. E. Farnsworth, F. E. Shoup, P. K. Baker, T. J. Moseley and W. D. Keniston.

Telephone Papers Before the A. I. E. E.—At the Pacific Coast meeting of the American Institute of Electrical Engineers, held in Portland, Ore., April 16-20, three papers of interest to telegraph and telephone engineers were read. Mr. Alfred H. Dyson presented a paper entitled "The Application of Automatic Selecting Devices to Telephone Multiple Switchboards;" Mr. A. H. Griswold one on "Design of Telephone Pole Lines for Conditions West of the Rocky Mountains." and the third, entitled "Practical Joint Pole Construction," by Mr. J. E. Macdonald.

Telephone Conference.—A conference of officials of the commercial department of the Southwestern Telegraph and Telephone Co. was held at Dallas, Tex., May 8. Among those who attended were: General commercial superintendent P. K. Baker; M. J. Stimson, division superintendent, Little Rock, Ark.; W. W. Vaughan, division commercial superintendent, San Antonio, Tex.; E. G. Pike, division commercial superintendent, Houston, Tex.; W. C. Maas, division commercial superintendent, Dallas, Tex.; M. P. Campbell, assistant division commercial superintendent, Fort Worth, Tex.; F. B. Knight, special agent in charge of publicity, D. C. Rosser, commercial engineer, and C. H. Abbott, special agent commercial department, Dallas, Tex.

Mountain States Telephone & Telegraph Company.—In its report for its first seven months' operation, the Mountain States Telephone & Telegraph Co., Denver, Col., shows 178,745 stations, March 1, 1912, a gain of 15,810 in seven months; 396,915 miles of exchange wire and 68,987 miles of toll wire, a gain of 58,314 miles of the former and 10,158 miles of the latter Earnings for the seven months ended Feb. 29, 1912, were $3,679,562, as against $3,348,209 for the preceding seven months under old organization, or a gain of $331,353. Expenses were $2,393,347, a gain of $44,820, leaving net earnings for seven months $1,286,215, a gain of $286,553. The balance sheet shows a total investment of $25,942,176, with surplus and reserves aggrevatng $4,459,400 Mr. E. B. Field, president of the company, states that the seven months have shown a gain of 9.7 per cent. in stations, of 9.9 per cent. in gross revenue, of 28.6 per cent. in net revenue, 7.7 per cent. in total investment, 47 per cent. in surplus and reserves.

Radio-Telegraphy.

Wireless in Venezuela.—Wireless stations are to be established at La Guaira, Puerto Cabello, Maracaibo and Cumana, Venezuela.

Marconi Honored by Spanish King.—King Alfonso of Spain received Signor G. Marconi on May 20 and conferred upon him the Grand Cross of the Order of Alfonso XII.

Rapid Wireless Preparations.—It is stated that the signal corps at Ft. Myer, Va., can unpack its wireless machine, erect the antenna, forty feet high, and begin work in sixty-eight seconds.

Wireless Operators in the Navy.—Expiring enlistments in the navy are causing a scarcity of wireless operators, and special efforts are being made to secure new recruits for this branch of the service.

Marconi School of Instruction.—The Marconi Wireless Telegraph Company of America is establishing a school of instruction for operators at 29 Cliff Street, New York. The theory as well as the practice of wireless telegraphy will be taught.

To Teach Wireless Telegraphy in Chicago.—It is stated that wireless telegraphy is to be taught in the Chicago high schools. The Government should nip these silly schemes in the bud if it wants to prevent interference with legitimate wireless business.

Fined for Violating the Wireless Law.—Captain L. D. Johnstone, of the steamer "Sabine" of the Mallory Line, which steamer is in the coast trade was on May 22 fined $100 by Judge Mayer in the District Court, New York, for going to sea without a wireless operator. The offense occurred December 28, 1911.

Wireless Station at University of Michigan.—The University of Michigan, at Ann Arbor, maintains a completely equipped wireless telegraph station. The station has a wide operating range and has communicated with Cleveland and other cities nearer by.

Three Wireless Operators on the "Imperator."—Three wireless operators will be carried on the new steamer "Imperator" of the Hamburg-American line which was launched at Hamburg, Germany, May 23. This steamer is the largest ever constructed.

Wireless Telegraphy at Sea.—It is stated that since the beginning of 1909 the passengers on twenty-two shipwrecked vessels have owed their lives to the fact that the ships were equipped with a wireless telegraph system, and were consequently able to send out messages for assistance.

Wireless Telegraphy in Central America.—The National Electric Signal Company, of Pittsburgh, Pa., is taking up the matter of establishing a number of wireless stations along the Atlantic coast of Mexico and Central America with the purpose of obtaining constant communication between these countries and the United States.

Injunction Against Wireless Company.—The Marconi Wireless Telegraph Company has asked the United States District Court, New York, for an injunction against the National Electric Signalling Company of South Brooklyn on the ground of infringement of certain patented devices, rights, etc., owned by it.

Wireless on the Isthmus.—The United States Government is planning to spend $1,000,000 for wireless equipment at the Isthmus of Panama, and it is stated that arrangements have been made with the republic of Panama to prevent any private or commercial wireless companies from establishing stations in that country.

The Marconi Wireless Telegraph Company of America recently started a campaign of advancement by bidding on and taking contracts to supply the U. S. Government with radio communication apparatus, and placing before the public a line of experimental radio apparatus, at the same time employing engineers capable of carrying out this and other work.

Marconi Sues for Libel.—Signor G. Marconi and Mr. G. C. Isaacs, managing director of Marconi's Wireless Telegraph Company Limited, London, have sued the Berlin newspaper *Welt Am Montag* for libel contained in an article accusing them of exploiting the "Titanic" catastrophe for the company's benefit by holding out news for sale, etc.

Special Power Plant for Ship Wireless.—The new steamer "Megantic," of the White Star Line will be provided with a special generating outfit for the wireless equipment. The electric generator is driven by a gas engine, and will furnish current to light the ship and operate the wireless when accident has rendered the regular power equipment useless. The special equipment has been installed on the upper deck.

No More Love-Making by Wireless.—It is stated that a Government censorship of wireless messages has been established at Newport, R. I., in order to stop the sending of love messages from women ashore to sailors on ships. One Boston girl asked her "Darling Jack," who was with the fleet, to come back to her as soon as possible because she had not been kissed in so long a time that her lips were dry. The unsentimental Government authorities state that important business has been interfered with by trivial messages.

Federal Telegraph Company.—The Federal Telegraph Company of San Francisco, Cal., which uses the Poulsen wireless system, has acquired the exclusive rights for the United States, Alaska, Cuba, Panama, Porto Rico, Hawaiian Islands and Philippine Islands, and the transmarine rights of Vlademar Poulsen, of Copenhagen. It is stated that a speed of 400 words per minute is possible by this system. The Federal Company now has fourteen stations on the Pacific Coast and it is stated the company will establish stations throughout the United States for overland commercial service. Its factory and laboratories are at Palo Alto, Cal.

The Sale of United Wireless.—The United States Circuit Court of Appeals at Boston, Mass., on May 3, declined to permit the sale of the United Wireless Telegraph Company now in bankruptcy. The court based its decision on the fact that the property of the United Wireless Telegraph Company is now in litigation in the Court of Appeals in connection with a suit of alleged infringement of patent, brought by the National Electric Signaling Company. It is stated that this decision will not necessarily prevent the sale; that the prohibition applies only to apparatus involved in patent litigation, and is effective only until that suit is decided or until the further order of the court.

English Wireless Affairs.—Postmaster-General Samuels, of Great Britain, stated in the House of Commons, May 20, that the question of compulsory wireless installation on ships and the conditions that should be imposed for continuous service were matters that were engaging the close attention of the president of the Board of Trade and himself. Probably they would be considered at the International Conference on Wireless Telegraphy in London, June 4. Provisional arrangements, he added, have been made with the Marconi Company for the erection through the British Empire of wireless stations able to communicate with each other at a distance of 2,000 miles or more. Six stations would be erected at first. The cost in round figures for each station, excluding the sites of the buildings, would be £60,000 ($300,000).

Regulation of Wireless.

At a meeting of the Ohio State University Association of New York May 4, Mr. R. H. Marriott read from some of his notes and papers on wireless communication, gathered during eleven years' experience as an engineer in this field. He made some suggestions as to proper wireless regulations, among which are that each vessel be provided with at least three operators; that wireless operators be classified as (1) electrician operators; (2) expert wireless telegraph operators, and (3) wireless telegraph operators, and the use of certain wave lengths for distress calls.

The Late J. G. Phillips, Wireless Operator on the "Titanic."

John George Phillips, the wireless operator who lost his life in the disaster which overtook the "Titanic" on April 15, was born April 11, 1887, in Farncombe, Godalming, England. He was educated in the Godalming Grammar School and in 1902 became a student of telegraphy in the local postoffice under Mr. W. R. Williams, postmaster at Godalming. Phillips was a serious and efficient worker and gained the esteem of his superior officers. In 1906 young Phillips passed the examination admitting him to the Marconi Company's school at Liverpool and after two years' training took the examination which would qualify him for a position as operator on

THE LATE JOHN GEORGE PHILLIPS,
Senior Wireless Operator on the Steamer "Titanic."

one of the large steamships. In this test he stood at the head of the list of successful candidates and was shortly afterward appointed operator on the "Teutonic." Subsequently he served on the steamers "Mauretania," "Lusitania," and "Oceanic." On the "Titanic" he held the position of chief operator on her first and only voyage, and lost his life in the performance of his duty during the catastrophe which overtook that vessel.

The Godalming town council has taken steps to establish a memorial to Phillips and public subscriptions are now being received for the purpose.

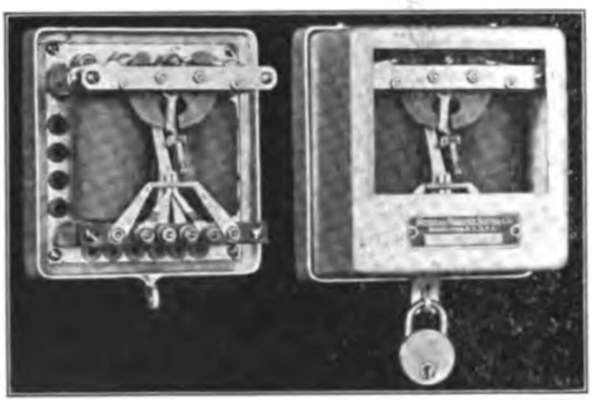
Selective Signaling System on Rochester Division, New York Central and Hudson River Railroad.

There was placed in service on the Rochester Division of the New York Central and Hudson River Railroad, April 20, a system of selective calling for telephone train dispatching differing radically from the general run of selective calling systems. The dispatcher's office equipment is shown in Fig. 1. This circuit extends from

FIG. 1.—TRAIN DISPATCHER'S OFFICE EQUIPMENT AT ROCHESTER, N. Y.

Rochester, N. Y., to Suspension Bridge, N. Y., a distance of 76.4 miles, which, together with its loops, makes a circuit of approximately 90 miles. The telephone equipment consists of Western Electric telephones with Van Akin arms. Among the many advantages of this arm, it requires the operator to talk directly into the transmitter; it also does away with the cord troubles incident to other makes of arms. There are thirty-three General Railway Signal Company selectors on this circuit. The dispatchers are located at Rochester, N. Y.

The system is known as the G. R. S. System and consists of three units, as follows: 1st. the

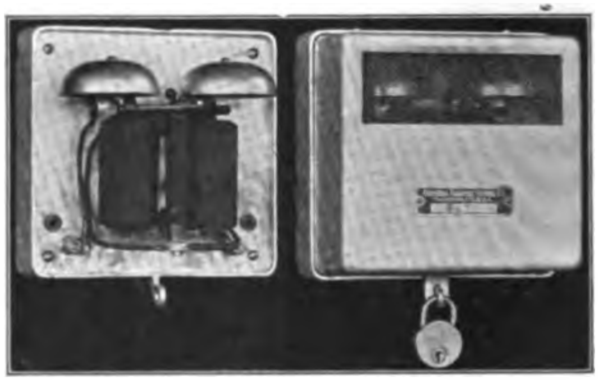


FIGS. 2 AND 3.—SELECTOR WITHOUT AND WITH COVER.

selector and bell located in the way stations; 2nd. the individual key cabinet in the dispatcher's office; 3rd. the motor generator, switchboard and battery located in a supply room approximately 300 feet from the dispatcher's office.

The selector, shown in Figs. 2 and 3, is a two-sector polarized device; the magnetic circuit is so designed that the flux always flows in a direction to build up the magnetism of the permanent magnet, thus overcoming the principal objection to permanent magnets, which is, that in time they may become demagnetized. Such trouble cannot occur in this device. Two sectors are used instead of one in order to attain greater speed, reliability and economy than is possible with one sector; these three results are most certainly attained. The selector is adjustable to any combination in the range of 324 without removing it from the wall; that is, it is not necessary to return it to the factory or change the key in the dispatcher's office should a change in the combination or call be desired. The coils of the selectors are form-wound, that is, wound on a mandrel and placed on the cores in assembling, not spool wound on the cores.

The selector is mounted in a dust-proof macadamite case with a glass front so that the working of the selector may be observed without



FIGS. 4 AND 5.—BELL WITHOUT AND WITH COVER.

removing the cover. The cover is held in place by a padlock so that the maintainer may, if necessary, get at the apparatus for inspections, tests or change of combination. The external resistance unit for balancing the line is contained in a brass cup in the back of the selector and has a great range of resistances; this is considered a part of the selector.

The magnetic circuit of the selector is unique in that it has but one air gap where ordinarily there are two. The armature swings from the center and is supported on a knife-edge bearing which is an extension of the permanent magnet. The contacts are of platinum-iridium and are of the rubbing, self-cleaning type.

Each selector is sent out equipped to operate two local circuits and may be made to operate six local circuits by simply substituting a six-circuit block for the two-circuit block regularly furnished. The magnetic circuit and armature of the bell is similar in construction to the selector, except that the bell is not polarized. The bell is extremely loud in operation and there is no possibility of mistaking it for the ordinary telephone bell. The bell, which is shown in Figs. 4 and 5, is mounted in a case similar to the selector, except that a brass screen is substituted for the glass in the front to allow the egress of the sound waves.

All binding posts of selectors and bells are inside of the cases and protected by the padlocks, thus preventing unauthorized persons from tampering with or changing connections. The individual key is similar to a messenger call with additional discs for opening and closing the circuits of the motor control and line control relays.

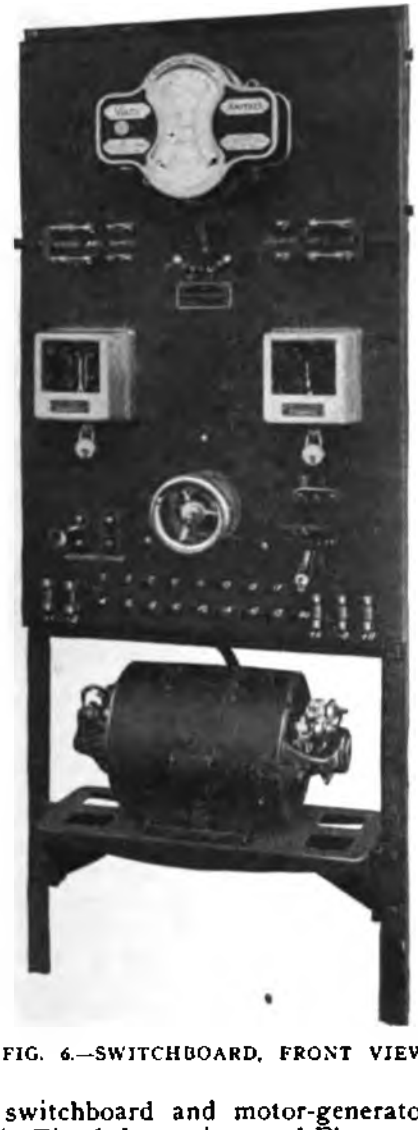


FIG. 6.—SWITCHBOARD, FRONT VIEW.

The switchboard and motor-generator set is shown in Fig. 6, front view, and Fig. 7, rear view. This equipment is made up in accordance with Underwriters' Rules and Regulations and includes the following apparatus: line control relay, motor control relay, volt-ammeter, switches for charging and discharging two sets of battery, ammeter jacks for charge and discharge current, underload circuit breaker, voltmeter-switches, retardation coils, condensers, field rheostat for generator and motor-generator.

The operation of the key is as follows: The first movement or setting of the key closes a circuit to the motor control relay, thus starting the motor generator set. As the key returns toward the normal position, toothed discs make contacts with the positive and negative contact springs operating the line control relay which sends the impulses to line operating the selectors and ringing the bell at the selected station. At the completion of the travel of the key the motor relay contact is opened and the motor generator stops. It will thus be seen that the motor generator is started and stopped with each call and runs only during the sending of a call. The main battery of six cells of eighty ampere-hour storage battery is all that is used in this system. The cost for current for charging this battery on a circuit having an average of 300 calls per day with current at 10c. per kilowatt hour, is less

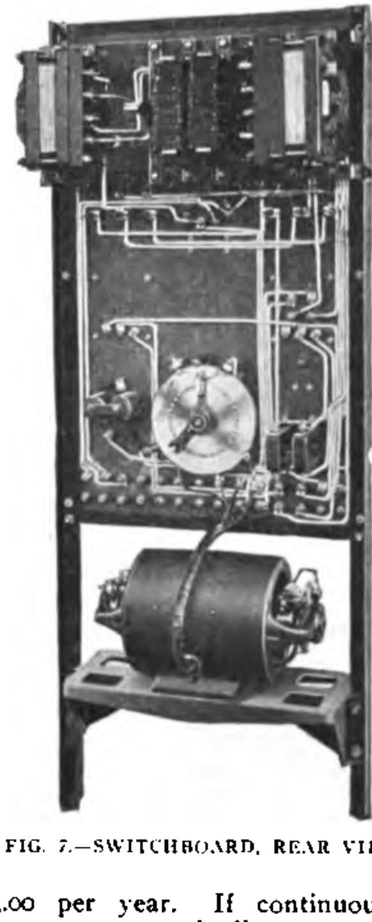


FIG. 7.—SWITCHBOARD, REAR VIEW.

than $3.00 per year. If continuous 110-volt direct current or 220-volt direct current is available the battery can be floated on charge and will require no attention, except an occasional filling of cells with distilled water to replace evaporated solution. If alternating current is available, then the battery is charged through the medium of an alternating current-direct current motor generator set of very small capacity. The battery is charged but once a month. If neither alternating current nor direct current is available, the battery may be floated on charge from gravity battery, the same as is done in signal work in many cases. It will thus be seen that the scheme of a small number of storage cells for a main battery may be used under all circumstances. With this motor generator storage battery scheme a great range of line voltage is available at all times. The line voltage may be raised or lowered at will, simply by turning the field rheostat arm of the generator. The generator is compound-wound so that a constant line voltage at any required point is maintained.

The key is silent in its operation and the line relay is mounted on the switchboard instead of in the dispatcher's office as is the usual practice. The operation of the line relay is silent and therefore could be mounted in the dispatcher's office if desired. In this system the switchboard, motor-generator and battery are located at any convenient point in the battery room or store room, cellar or attic, and the individual key cabinet is the only piece of apparatus placed in the dispatcher's office.

The General Railway Signal Company has recently brought out two other schemes to be used in connection with telephone train dispatching circuits. One is the sending of time over the telephone circuit and the other the connecting of adjoining train dispatching circuits together through the medium of a remote control relay located at the terminal point. In the time service the vibrating bells at the stations are automatically changed over to single-stroke bells while the time is being sent and the time is tapped off on one gong. This change is made by an individual key at the dispatcher's office in the key cabinet and a contact on each selector at the way station.

The connecting of one dispatcher's circuit to another so that dispatchers in adjoining districts may be in direct telephonic connection is now in service on the Illinois Central Railroad on the Water Valley, Miss., to Jackson, Tenn., circuit, and the Jackson, Tenn., to Mounds, Ill., circuit. This permits the dispatchers to get a "line up" without going through the terminal operator and gives them the advantage of direct personal conversation. The connecting and disconnecting is done at will by either dispatcher by simply operating a key in his cabinet.

Institute of Radio Engineers.

On the evening of May 13, the Wireless Institute and the Society of Wireless Telegraph Engineers held a joint meeting at Columbia University, New York, and combined under the new constitution and under the name of Institute of Radio Engineers. The following officers were elected: R. H. Marriott, president; Fritz Lowenstein, vice-president; Emil Simon, secretary; E. D. Forbes, treasurer. Board of Directors: G. W. Pickard, William Sphar, John L. Hogan, Jr.

Committees on standardization, papers and publicity were appointed.

Mr. Marriott exhibited charts showing symbols relating to radio communication and urged that the Institute take up the matter immediately as the art apparently is in need of standard symbols and nomenclature.

A meeting of the Institute was held May 20. Mr. F. Lowenstein, Mr. Clark, of the U. S. Navy Department and Mr. Weagant of the Marconi Company of America spoke quite strongly in favor of making the national logarithmic decrement of oscillations a numeric not greater than 0.2 per period.

Mr. Marriott exhibited a chart in which he showed that of 104 representative ocean-going vessels less than ten could use a wave length as short as 300 meters without materially decreasing the radiation. He suggested that distress calls be sent on twice the average natural period, which seems to be the wave length for which the open circuit and radiation resistance are least. From Mr. Marriott's data this would make the distress call wave length about 740 meters. This wave length would of course be affected less by absorption than the 300-meter wave length which has been proposed.

Mr. Marriott spoke strongly in favor of making emergency apparatus equal to or greater in strength than the apparatus used under ordinary circumstances.

Mr. Sphar and Mr. Fay of the American Bell Telephone and Telegraph Company said the London convention should define the Continental code and abbreviations which are to be used.

Dr. Goldsmith, of the College of the City of New York, spoke very emphatically along the lines of compelling all companies, where engaged in communication with vessels, regardless of the system employed, to so construct their apparatus that they would receive and answer any distress signals that might be sent out.

The general opinion of the Institute seemed to be that all considerations for radio regulations should be based on the rendering of the best possible wireless service particularly in times of distress, and that on this basis alone could the art be made of greatest benefit to humanity.

It was also agreed that commercial vessels should be given a wide range of wave length for handling commercial business at least no less than from 400 to 800 meters.

Mr. Kolster of the Department of Commerce and Labor and an advisory delegate to the International Convention took an active part in the discussion.

Resolutions were passed regarding the death of Mr. John Phillips the chief operator of the steamer "Titanic."

The Institute expects to publish its papers and the best papers of the Wireless Institute and Institute of Wireless Telegraph Engineers.

T. M. B. A. Assessment.—Assessment No. 538 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of E. S. Briner, at Dallas, Tex.; E. E. Shawn, at Denver, Col.; Maurice Brick, at Washington, D. C., and D. D. Kennedy, at Baltimore, Md.

Telegraph and Telephone Age

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June 1, 1912.

Welcome to the Railway Telegraph Superintendents.

In coming to New York for their thirty-first annual convention, the Railway Telegraph Superintendents and their families will receive a cordial welcome. New York is a highly concentrated city, but it has a very large capacity, and the temporary addition to its vast population of a few hundred persons will not disturb the balance. There is an abundance of room for all, and there need be no fear of eating the town out.

The programme, as set forth on another page ot this issue, is well planned. The superintendents came here primarily to work, but ample recreation has been provided for them during breathing spells. There is much to see in a city like New York, and it is not an easy task to arrange a programme combining business with pleasure that will give general satisfaction, but the entertainment committee has succeeded very well indeed in its efforts to achieve this result, and we hope that all will enjoy their stay in the metropolis.

The papers to be read are of the highest quality and extremely practical. Sometimes papers presented before technical bodies are models of diction and have a pleasant ring to them, but are of little practical value; the latter charge cannot be truthfully made, however, against the papers that the superintendents are to hear and discuss. They are prepared by level-headed and practical men on practical matters and they will add much to the fund of knowledge on the subjects with which they deal. Railway telegraph superintendents are not theorists; they are extremely practical, and nothing but a diet of facts will satisfy them.

At the last moment the committee of arrangements cut out the clambake from the programme, for the alleged reason that they could not secure a sufficient number of automobiles to convey the party to the scene of action, but we suspect that the real cause was the inability to find enough clams to go around. However, be that as it may, an excellent substitute has been provided. Those who have a penchant for clams can find them in almost any restaurant in New York, but this cannot be said of Martin banquets.

Thirtieth Year of Telegraph and Telephone Age.

The present issue of Telegraph and Telephone Age marks the beginning of the thirtieth year of the journal's existence and another period of usefulness in its chosen field of activity.

Starting from a small beginning it has gained experience and strength until now it has reached a stage in its career where it stands at the head of its kind.

It is not only the success of the paper as a business enterprise that counts, however. Be it far from us to place that achievement above everything else; the moral side we consider the more important. The first care of the paper has always been one calculated to do the most good to the greatest number of its readers, and it has tried to inspire and encourage its readers to higher and nobler thoughts and deeds, and we believe that our efforts have not been amiss.

Looking back over thirty years one is profoundly impressed with what electricity has accomplished for mankind through the agency of man. Thirty years ago the telegraph occupied the electrical field largely by itself. Since that time, however, the telephone, the electric light, the electric railway, wireless telegraphy and other applications of electricity have come into existence and grown to be great industries. They all occupy distinct fields of activity, but, together with the telegraph, all depend for their existence upon one and the same mysterious force—electricity.

What the next thirty years will bring forth no man knows, but it is certain that progress and development along electrical lines will not halt, but will be as great, at least, as that of the past thirty years.

It is the ambition of the proprietors of Telegraph and Telephone Age to maintain its leading position in its chosen field, as in the past. We feel greatly encouraged in our work by the favorable conditions existing in those departments of electrical activity with which the paper is chiefly concerned. The telegraph has outgrown the limitations of former years and is taking its place among the most vital and active forces in the business realm of the world. Under organized and intelligent guidance it is becoming more and more an open book to the popular mind, and its value and utility as a means of conveying intelligence between distant points is becoming rapidly appreciated. As to the robust telephone little need be said, as everyone knows about it. The telegraph and the telephone are real necessities in present-day business and social life, and the outlook for their future is most encouraging.

We believe that our efforts in the past toward the upbuilding of these two great industries have been appreciated, judging by the generous support and encouragement extended to us. It is needless to say that such encouragement has always touched a responsive chord, and has spurred us on to greater endeavors, and we hope that the bond of relationship between the paper and its readers will become more firmly cemented as the years roll by.

The Standing of Wireless on Steamers.

It would seem that every seafaring man concerned directly or indirectly with the "Titanic" disaster was affected by an evil influence which blunted his senses and judgment, resulting in unpreparedness for emergencies.

The investigation into the disaster, which is now being conducted in London, reveals woeful neglect of duty and lack of judgment on the part of many of the principals immediately and indirectly concerned.

It appears that the steamer "Californian" was only a few miles from the "Titanic" when the latter sent out distress signals, and yet through some hypnotizing influence the officers of the former became dreamy and generally inactive

While they were speculating as to the cause of the unusual appearances, the "Titanic" sank, with hundreds of lives that might have been saved had the officers of the "Californian" been possessed of their wits and on the alert.

The point we wish to emphasize in this connection, however, is that there appears to be a feeling of resentment on the part of ship captains against the wireless service on board of their ships. They seem to labor under the impression that wireless operators, in the legitimate performance of their duties, are in some way encroaching upon their authority, and they do not take kindly to suggestions from the mere lads usually employed as wireless operators.

There was too much confusion and lack of organized effort in the wireless service in connection with the loss of the steamer. Everybody connected with the affair appeared to be unprepared and on one, even on the "Titanic," seemed to realize that the situation called for action.

But these delinquencies are not devoid of valuable lessons; they show the danger of becoming lax in duty, and the importance of harmony and coöperation between all the departments of a ship organization.

The wireless, if properly used, is an agency for great good, but if abused, can do much harm.

Mr. L. H. Korty, an old time and military telegrapher, formerly and for many years superintendent of telegraph of the Union Pacific Railway, at Omaha, Neb., now retired, writes: "It is always a great pleasure for me to renew my subscription to TELGRAPH AND TELEPHONE AGE."

An Admonition in 1902 Regarding Wireless.*

There was something prophetic, as well as admonitory, in the comment made by Rear-Admiral R. B. Bradford, U. S. N., in his annual report of 1902, as chief of the bureau of equipment, concerning wireless telegraphy. It comes up now with striking significance in view of the difficulties encountered in wireless communication concerning the disaster which sent the "Titanic" to the bottom of the sea. In 1902 the bureau of equipment was negotiating with various wireless companies in an effort to accomplish some arrangement by which there would be adequate control of this means of communication. The greatest difficulty was encountered at every turn. Rear Admiral Bradford called attention to the interference with wireless messages, then so menacing, and pointed out the importance of a governmental control of all wireless transmitting and receiving stations, adding, "It also appears important that this should be done before the vested interests in connection therewith become too great," the bureau then having "especially in mind a large wireless station recently established by a foreign company on Cape Cod."

Admiral Bradford stated, also, in his report: "The bureau is officially informed that foreign countries are exercising careful supervision over the location of wireless stations within their respective territorial limits with the view of having at all times absolute control over them. In time of war, the department will undoubtedly find it necessary to communicate by means of wireless telegraphy with certain receiving stations along the coast. Nothing should be permitted to interfere with the transmission of such messages, nor should it be possible for unauthorized persons to receive them. The only practical method of insuring this result is to secure government control over all wireless telegraph stations along the coast. It is suggested that legislation to this end be requested."

That was ten years ago and nothing has been done, although something was attempted by people who appreciate the necessity of protecting radiocommunication from the interference that would not only impair its value, but, under certain circumstances, would bring great injury and disaster to those in danger. That phase of the situation has appeared in the experience of the lost "Titanic," as it has repeatedly on other less notable occasions.

The bureau of equipment from the first made a diligent effort to obtain legislation which would effect government control of wireless communication. It sought, also, to prevent a monopoly which was a threatening aspect of the early development of the system and Rear Admiral Bradford succeeded in that plan, although he was seriously handicapped by conditions which were persistent and formidable. There has been no lack of advice and warning regarding this menace: but, as usual, it has taken a disaster of overwhelming magnitude to attract attention to the possibilities and the necessities of the situation. Perhaps the recommendation of the chief of the bureau of equipment in 1902 will now gain the attention and receive the support it deserved when Rear Admiral Bradford made it.

*From the Army and Navy Journal.

Course of Instruction in the Elements of Technical Telegraphy—XVI.

(Copyrighted.)

(Continued from page 312, May 16.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

QUESTION PAPER.

(1) What is conductivity?

(2) Why is the resistance of a derived circuit less than if one conductor only were used?

(3) Why is the conductivity of a derived circuit greater than if one conductor only were used?

(4) A derived circuit has three branches of 2, 500, and 800 ohms respectively. What is the fall of potential in the derived circuit when the current in the main circuit is .1 ampere?

(5) How would you find the joint conductivity of two wires in parallel whose resistances are unequal?

(6) How is the joint conductivity of three wires in parallel determined?

(7) (*a*) If a resistance of 150 ohms be connected between the terminals of a 150 ohm relay, what difference will it make to the resistance of the circuit?

(*b*) Would the relay receive more or less current under the above conditions?

(*c*) Why?

(8) A circuit is working between New York and Boston, with a battery of 100 volts at New York end. What is the potential at a point on the line where the resistance on either side is exactly equal?

(9) In the above circuit if the wire be of uniform resistance, and the relay resistance the same at each end, would the point necessarily be at the middle of the line?

(10) Two wires are fed from a gravity battery of 50 volts. The resistance of one wire with instruments is 500 ohms, the resistance of the other and its apparatus is 300 ohms, what is the current strength in each wire?

(11) (*a*) A circuit has a battery of 40 volts and a resistance of 1000 ohms. At a point where 450 ohms resistance has been overcome what is the potential?

(*b*) If the potential has fallen to 20 volts how much resistance has been overcome?

(12) (*a*) Referring to Fig. 3 (see May 1 issue), if the branches are 20, 40 and 60 ohms respectively, and the potential difference between A and B 20 volts, what is the current in each branch?

(*b*) What is the current in the circuit?

(*c*) What is the joint resistance of the branches?

(*d*) What is the resistance to the current between A and B?

(13) It is required to find the resistance of an unmarked relay. The current in the circuit is .02

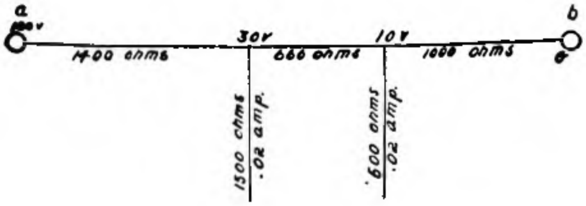

FIG. 4.—DIAGRAM OF MAIN CIRCUIT WITH TWO BRANCHES.

ampere, and the fall of potential between the terminals of the relay as shown by a volt-meter is 3 volts.

(14) Give examples of wires in parallel?

(15) Why is the earth almost a perfect conductor?

(16) In Fig. 4, AB is a main circuit with two branches of 1500 and 500 ohms resistance respectively.

The E. M. F. applied to the circuit at A is 100 volts.

The current in each branch is .02 ampere.

(*a*) If the current in the main line between D and B is .01 ampere, what is the current strength between A and C?

(*b*) Neglecting the resistance of the battery what is the resistance of the entire circuit?

(*c*) What is the resistance of the line and branches between C and B?

(*d*) Why is the potential at C only 30 volts?

(*e*) What is the resistance of the line and branch between D and B?

(*f*) Why is the current in the 1500 ohm branch .02 ampere?

(*g*) If the branch at D be open how will the potential at C be affected?

(*h*) If the branch at C be open how will the potential at D be affected?

Mr. Taft Presses a Button.—The Newark Industrial Exposition at Newark, N. J., was opened May 13 by President Taft, who "pressed a button" at a railroad station in Ohio. He was traveling on a train between Bellaire and Steubenville, Ohio, and the train was stopped in order to let him step into the telegraph office and perform his pressing duty.

Telegraph in Alaska.—The Ruby Telegraph Company, at Ruby, Alaska, has stretched a wire across the Yukon river to connect with the military telegraph line on the opposite side of that stream. Heretofore messages have been carried across the river on boats. The connecting wire is 1000 feet long.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(94) Q. Referring to the article on the KR law on page 215 of your April 1 issue, will you kindly give a reliable method by which the capacity of a wire may be ascertained, using either the new Athearn or the old Western Union quadruplex sets? In other words, how would you proceed to find the value of K in connection with the KR law?

R. S. V.

A. If no other apparatus is available, get a balance as for duplex working on a bridge set. The capacity of the line will approximately equal that of the condensers in the artificial line, when no "kick" is observed on the needle of a sensitive galvanometer, or a mil-ammeter connected across the line and artificial line terminals.

The following method may be adopted when we have not an adjustable condenser available, but have a condenser of known capacity, say K, and a ballistic galvanometer:

(1) Charge the line direct from the battery by means of a key. Then discharge it through the ballistic galvanometer—note the deflection. Call this D. [For this test the line should be insulated, or disconnected, at the point up to which the capacity test is being made.]

(2) Next, charge and discharge a standard condenser in the same manner, using the same battery or dynamo as before. Call the deflection in this case d. Then the capacity of the line equals the capacity of the condenser multiplied by D and divided by d, or,

$$\text{Capacity of line} = \frac{KD}{d}$$

This test works well when the general insulation of the line under test is good. The key should be so connected that the contact is closed, for say five seconds, to charge the line, or the condenser, in each case. The time of charge should be the same in both cases.

(95) Q. Kindly tell me (1) how many ampere-turns there are to a 300-ohm main line relay, assuming that it is working on 45 milliamperes. (2) What size wire and how many thousand feet of it would be necessary to make a relay with the same magnetic strength as a standard 300-ohm relay working on 45 milliamperes, if the new relay was to have 35,000 ohms resistance? I would also like to know (3) the approximate cost of manufacturing one hundred of these relays?

H. H. H.

A. (1) Two coils, each of 4400 turns of No. 32 = 8800 turns. Ampere turns = turns × amperes = 8800 × .045 = 396 ampere turns.

(2) Obviously, as the current is the same as in question 1, the number of turns must be the same, if the number of ampere-turns is to be alike in both cases. Therefore, with the same number of turns the resistance of and consequently the length of each turn must be much greater in the case of a 35,000-ohm instrument than with a 300-ohm one. In the 300-ohm instrument the resistance per

$$\text{turn} = \frac{300}{8800} = .0034 \text{ ohm.}$$

In the 35,000-ohm instrument the resistance per

$$\text{turn would be } \frac{35{,}000}{8800} = 4 \text{ ohms nearly.}$$

Using the same gauge wire, as in the case of the 300-ohm instrument, the length per turn would have to be increased proportionately from .0034 to 4., that is, in proportion to the resistance.

The average length per turn of a 300-ohm relay is .228 foot, therefore the length per turn, using the same gauge for a 35,000 instrument, would be nearly 268 ft., i. e.:

.228 × 35,000 divided by 300 = 266 ft.

The length of No. 35 wire required would, therefore, be 266 × 8800, that is, the length per turn multiplied by the number of turns, equal to 2,340,800 feet.

Using a thinner wire than No. 35, the length could be considerably reduced. As the resistance of three feet of No. 35 wire equals that of one foot of No. 40 wire, the length of the No. 40 wire would be only 780,266 feet. The winding space required to accommodate this amount of No. 40 wire, in 8800 turns, would, however, be so great as to preclude the use of such a design for the main line relay electromagnet.

It must not be lost sight of, too, that to maintain a current of 45 milliamperes in a 35,000-ohm relay, the voltage would have to be increased to nearly 120 times that used with 300-ohm relays.

(3) Relays of this description could be manufactured at a cost of about $5.00 each.

Telephone Train Dispatching.

In our issue dated June 16, 1911, we printed a table giving statistical information as to telephone train dispatching on railroads in the United States and Canada, which showed that at the time it was compiled there were 40,160 miles of track controlled by telephone. For the year previous the record showed a total mileage of 24,831; therefore the gain in mileage in the year 1910-11 over the previous year was 15,329, or slightly over 60 per cent.

Since June 1, 1911, we have recorded in these columns separate installations and extensions of train dispatching circuits aggregating close on to 6,000 miles, and no doubt a closer analysis would bring the actual work done to a higher figure.

Our records show that many of the small railroads throughout the country are adopting the telephone dispatching system, especially in the southern states, and the larger lines are continually making extensions. On April 1 eighteen southern railroads were using the telephone over 7,800 miles of line, on a total of fifty-six circuits equipped with over 1,500 selector way stations.

Telephone dispatching is being so rapidly adopted in every section of the country that a very close record is not possible, under the changing conditions. It is safe to assume, however, that the total railway mileage covered by telephone dispatching at the present time is 46,000.

In our issue dated October 16, 1911, we printed an article by Mr. W. W. Ryder, general superintendent of telegraph, New York Central Lines, on the subject of dispatching of trains by telephone. The author there gives a little historical sketch of the development of telephone dispatching, and then presents some figures taken from the Government report of January 1, 1911, showing the extent to which the principal railroads had adopted, up to that time, this method of dispatching trains. These figures are interesting and are reprinted herewith.

New York Central Lines	3,966
Santa Fe	3,884
Great Northern	3,881
Illinois Central	2,550
Burlington	2,383
Rock Island	2,248
Pennsylvania	2,137
Northern Pacific	1,190
Norfolk & Western	1,066
St. Paul	1,044
Total operated by telephone	24,349

Mr. Ryder sets forth the following advantages of the telephone over the telegraph in train dispatching: (1) The telephone is an aid to the dispatcher in that his work is handled more easily as well as more expeditiously; (2) promptness with which operators respond to their calls; (3) the telephone works better in wet and foggy weather than does the telegraph; (4) it provides means of communication to and from blind sidings, and (5) train and engine men favor the change because it helps them to get over the road more promptly.

The telephone, he says, is also rapidly replacing the telegraph in the handling of way-office messages, it having been found possible to handle from 50 to 75 per cent more business over a way telephone circuit in a given time than is possible with a similar telegraph circuit.

Summarized in a few words, the advantages in the use of the telephone for dispatching and other division work, are that it is quicker, safer and more reliable, more flexible, and in addition makes possible better discipline and co-operation between the dispatcher and operators, as well as providing means for officials who are not familiar with the Morse code to obtain immediate and accurate information in cases of emergency, and thus be in better shape to exercise personal supervision.

In our issues dated February 1 and 16 and March 1 and 16, this year, we published statements from the superintendents of telegraph of various railroads, reviewing their experiences with telephone dispatching on their respective roads, and in every case the record is highly favorable.

The use of the telephone as a means of dispatching and controlling trains was first brought to the attention of the railway telegraph superintendents at the Chicago convention in 1902.

The Typewriter in Press Service.

BY P. V. DE GRAW, FOURTH ASSISTANT POSTMASTER-GENERAL, WASHINGTON, D. C.

Mr. P. V. DeGraw having been requested to prepare an article giving the result of his observation on telegraphic matters during the past thirty years, writes:

"There is not much of interest upon which I might elaborate beyond the introduction within the thirty years of the typewriter as a telegraphic receiver. That innovation, you will recall, was inaugurated by Mr. Walter P. Phillips during his sojourn in Washington as resident agent of the New York Associated Press when I was assisting him.

"I recall very vividly that I had not long before that time been transferred from the telegraphic to the reportorial staff, and that my telegraphic associates were inclined to criticise my hearty support of the order, in the belief that it could not succeed, and I believed entertained a feeling that my change of work prejudiced me in its favor. However, the new departure, while embarrassing to the news service for perhaps a fortnight, proved to be a great boon thereafter, and I think every telegrapher who has accustomed himself to receiving by typewriter will sing the praises of Walter P. Phillips for the firm stand taken by him in its inauguration as a telegraphic receiver."

Mr. B. F. Thompson, telephone inspector, Baltimore & Ohio Railroad Company, Baltimore, Md., writes, "It always gives me pleasure to remit to cover my subscription to TELEGRAPH AND TELEPHONE AGE, for I get value received."

Heman Judson Pettengill.

Mr. H. J. Pettengill, recently elected president of the companies in the Southwestern Bell Telephone System, with headquarters at St. Louis, Mo., was born in Brunswick, Me. The system over which he has jurisdiction is composed of the Bell Telephone Company of Missouri, operating in the eastern half of Missouri; The Missouri and Kansas Telephone Company, operating in Western Missouri and Kansas; the Pioneer Telephone and Telegraph Company, operating in Oklahoma, and The Southwestern Telegraph and Telephone Company, operating in Arkansas and Texas.

The territory in which these companies operate has an area of more than fifty-three thousand square

H. J. PETTENGILL.
President Southwestern Bell Telephone System, St. Louis, Mo.

miles and a population of more than twelve million people, furnishing service to nine hundred and twenty-six thousand telephone subscribers.

Mr. Pettengill is one of the foremost telephone men of the day and stands high in the councils of the American Telephone and Telegraph Company. Like many other leaders in the telephone industry, Mr. Pettengill started business life in the telegraph and occupied positions of prominence while connected with it.

Mr. Pettengill entered the service of the American Telegraph Company in his native town in 1865. Two years later he became manager of the Western Union office at Lewiston, Me., and subsequently, after two or three years' service at Augusta, he entered the Boston office of the same company and remained there for eleven years. In 1881 he was appointed manager of the Boston office of the American Rapid Telegraph Company and in 1883 became superintendent of the Bankers and Merchants Telegraph Company. He later received the appointment of superintendent of the Postal Telegraph-Cable Company at Boston, which position he held until 1899, when he entered the telephone service.

He was elected vice-president of The Southwestern Telegraph and Telephone Company, the Northwestern Telephone Exchange Company, the Wisconsin Telephone Company, the Michigan Telephone Company and the Cleveland Telephone Company, June 1, 1899. December 31, 1904, he was elected president of The Southwestern and Northwestern Telephone Companies, and took up his residence at Minneapolis, Minn., where he remained for about three years, and then resigned the presidency of the Northwestern Company and established his headquarters in Dallas, Tex. While in Dallas, Mr. Pettengill gave his entire time to the Southwestern Company, which has increased its business from 94,889 subscribers' stations on March 1, 1908, to 153,147 subscribers' stations March 1, 1912.

Mr. Pettengill is a thirty-second-degree Mason, Past Commander of Hugh de Payens Commandery, Knights Templars of Melrose, Mass.; past president of the Boston Electric Club and also of the Old Time Telegraphers' Association. He has been chairman of the executive and finance committees of the Commercial Secretaries and Business Men's Association of the State of Texas, which organization is working for the upbuilding and development of the Lone Star State. He is a member of the St. Louis Club and the Noonday Club of St. Louis.

"C. Q. D." and "S. O. S."

The following official explanations of the wireless distress signals "C. Q. D." and "S. O. S." will be of general interest at this time. The signal "C. Q. D." is the Marconi signal of distress, which is only used in cases where ships are disabled and are in danger. "C. Q." is the Marconi call for all stations generally, and is immediately answered by any station receiving it.

The meaning of "C. Q. D." is "All stations danger" and the letters "S. O. S." adopted by the International Wireless Convention convey the same meaning. Rule XVI of the International Wireless Convention is as follows:

Ships in distress shall use the following signal:

" . . . — — — . . . "

repeated at brief intervals.

As soon as a station perceives the signal of distress it shall cease all correspondence and not resume it until after it has made sure that the correspondence to which the call for assistance has given rise is terminated.

In case the ship in distress adds at the end of the series of her calls the call letters of a particular station the answer to the call letters shall be incumbent upon that station alone. If the call for assistance does not specify any particular station, every station perceiving such call shall be bound to answer it.

Testing on Railroad Telephone Circuits.

BY K. W. ENDRES, NEW YORK.

(*Concluded from page* 320, *May* 16.)

TRANSMITTER BATTERY.

Three dry cells connected in series to give four volts, are required for the testing operator's transmitter battery. They need to be renewed only when the transmission becomes unsatisfactory. The zinc, or negative, pole of the transmitter battery should be connected to the "TB" terminal and the carbon or positive pole should be connected to the "TG" terminal. (Fig. 12.)

HOWLER BATTERY.

This is an auxiliary battery only, and consists of twelve dry cells connected in series to give fifteen volts. It is used only when the howler or "H" key and equipment are furnished, and may be placed with the other dry batteries if found convenient. The zinc and carbon poles of this battery are connected respectively to the terminal marked "4" on the repeating coil and the terminal of the coil winding on the buzzer.

RINGING EQUIPMENT.

If the exchange is not equipped with an interrupter or other source of ringing current, the hand generator on the switchboard may be used as a source of ringing current supply. Provision is also made so that if desired the generator may be added in the testing cabinet itself. This arrangement will be found desirable when the cabinet is located in the terminal or wire chief's room, although in such cases it will be found advisable to connect the terminals mentioned to the interrupter or ringing machine, if any is used.

TELEPHONE LINE FROM SWITCHBOARD.

When the "Tel" key and telephone line from the switchboard to the cabinet is furnished, a telephone set consisting of a ringer and condenser should be used and located near the cabinet. This set may be a No. 127 type and should be conneceted to the "Tel Line," "T" and "R" terminals in the cabinet.

WIRING.

All leads carrying talking current should be twisted pair, and it is suggested that, wherever possible, twisted pair leads be used, for convenience, for other circuits also. No. 19 or 20 B. & S. gauge braided rubber-covered wire will be found most suitable for the leads to the testing cabinet.

METHOD OF OPERATION OF TESTING CABINET.

This test box is designed for making the following tests on magneto lines and may be arranged to make the same tests also on common battery lines.

(a) Talking to subscriber.
(b) Ringing.
(c) Continuity tests.
(d) Tests for short circuits.
(e) Tests for grounds.
(f) Tests for crosses with lines carrying current.
(g) Tests for crosses with other lines.

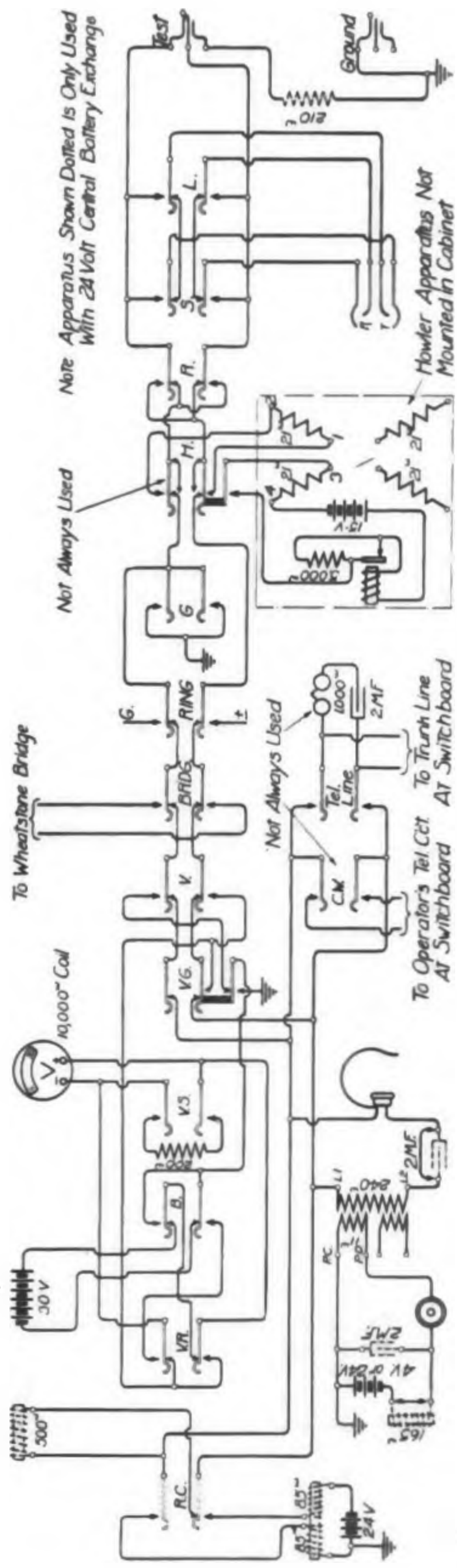

FIG. 12. CIRCUIT OF TESTING CABINET.

(h) Location of crosses or grounds by means of Wheatstone bridge.

(j) Ballistic capacity tests.

(k) Howler (when specified).

The set is arranged so that tests can be made either from the switchboard or from the distributing frame. When testing a line from the distributing frame the heat coils are removed and the No. 128 plug inserted in place of them. Key "L" is operated for testing the line and key "S" for testing the switchboard wiring. When neither key is operated the line is connected to the switchboard. When testing a line at the distributing frame the test plug must not be left in any line.

Tests are made through the switchboard by inserting the plug marked "Test" in the jack of the line to be tested. When testing a line through the switchboard, keys "S" and "L" must not be in the operated position. In cases where the whole face of the switchboard cannot be reached with the test plug, it is necessary to use test lines terminating in plugs at one end, and jacks at the other for extending the test cord to positions that cannot be reached directly.

Tests through the switchboard are in general more conveniently made than tests at the distributing frame, the latter being most frequently used when it is thought that there may be trouble in the switchboard wiring or apparatus.

(a) TALKING TO SUBSCRIBER.

(1) Magneto Line. The telephone set is normally connected to the testing circuit, so that it is not necessary to operate any keys to talk to a telephone set on a metallic line. To talk on a grounded line, the key "G" must be operated and in case the line wire is connected to the tip spring of the jack, key, "R" must also be operated. It is not necessary to operate these keys, if the tip is grounded at the distributing frame.

(2) Common Battery Line. To talk to a telephone set the "RC" key must be operated to supply talking battery to the set. This talking battery and the telephone set are completely cut off from the line when any of the test keys are operated.

(b) RINGING.

1. To ring single-party lines, operate key "Ring."

2. To ring two-party lines, operate key "Ring" for first party and keys "R" and "Ring" for second party.

3. To ring four-party lines, operate key "1," "2," "3," or "4," according to the party desired, and then while this key is in the operated position, operate the key "Ring."

4. To ring a bell bridged from the tip side of the line to ground key "R" must be in the operated position.

NOTE.—Keys "1," "2," "3" and "4" must be in their normal position when ringing single or two-party lines.

(c) CONTINUITY TESTS.

To test the continuity of the metallic line, operate key "V." If the line is continuous the voltmeter will show a deflection. There will be no deflection if the line is open. To test a grounded line, operate key "VG" instead of "V." Key "R" must also be operated if the tip of the jack is connected to the line wire. No deflection will be shown if condensers are used in series with the ringers at the subscribers' sets, which is the case with common battery sets. In this case the test is made by operating key "V" or "VG" as described and while it is in the operated position, operating key "B" several times. This will cause momentary deflections, due to the charge and discharge of the condenser.

(d) TEST FOR SHORT CIRCUITS.

Tests for short circuits are made by observing the deflection when the key "V" is operated. The smaller the resistance of the short-circuited line, the greater the deflection will be. In all cases the voltmeter reading bears the same ratio to the voltmeter resistance that the difference between this reading and the testing battery voltage bears to the line resistance. The line resistance may be found by dividing the difference between the testing battery voltage and the voltmeter reading by the voltmeter reading and multiplying the result by the resistance of the voltmeter. This resistance in the case of this set is 10,000 ohms.

For example, if the testing battery is at 30 volts and a reading of 25 volts is found on testing a line, the resistance is

$$\frac{30-25}{25} \times 10{,}000 = 2{,}000 \text{ ohms.}$$

By operating the key "VS" the voltmeter is shunted by a resistance of 200 ohms, so that the combined resistance is 196 ohms. With this key operated the deflection with any given line resistance is much smaller, and it is much easier to calculate the resistance.

For example, with a battery voltage of 30 and a reading of 10 volts on a test, the resistance is

$$\frac{30-10}{10} \times 196 = 392 \text{ ohms.}$$

By measuring the resistance in this manner it is easy to distinguish between a short circuit and the effect of one or more bells bridged across the line without condensers.

It is a convenience to short circuit an unused jack in the switchboard for measuring the voltage of the testing battery. The potential is measured by plugging into this jack with the testing cord and operating key "V." The condition of the battery may then be tested by operating both key "V" and key "VS." If the voltage reading falls more than a few volts below that noted when using key "V" only and if the voltage tends to fall while the keys are operated, the batteries are in poor condition and should be replaced.

(e) TESTS FOR GROUNDS.

To test for a ground on the ring or sleeve side of the line, operate key "VG." To test for a ground on the tip side operate keys "VG" and "R." The voltmeter should show no deflection or at most a small one if the line is clear, except in the case of grounded lines and party lines where the bells are rung with a ground return, without condensers in series with the ringers. The resistance in this case may be measured as explained under "Tests for short circuits."

(f) TESTS FOR CROSSES WITH LINES CARRYING CURRENT.

Tests for crosses with lines carrying current, such as telegraph lines or common battery telephone lines, are made in the same manner as tests for grounds except that key "B" is operated as well as "VG" and "R." If the needle moves backward when "B" is operated, operate "VR," which will reverse the voltmeter connections. Great care should be used in making this test, as there is danger of injuring the voltmeter if the potential of the foreign line is much in excess of 30 volts.

(g) TESTS FOR CROSSES WITH OTHER LINES.

To test for a cross between two lines, ground one of them by plugging into it with the plug marked "Ground," and test the other for grounds as previously explained. The line tested must be free from grounds for this test to be satisfactory.

(h) LOCATION OF CROSSES OR GROUNDS BY MEANS OF WHEATSTONE BRIDGE.

By operating the key "BRDG" the line under test is connected to the binding posts "BRDG," which should be wired to the line or "X" terminals of the bridge used. No instructions can be given here for tests of this kind, as the methods differ with different types of bridges. With the bridge the location of crosses and grounds can be accurately determined.

The resistance of a short-circuited line may be measured much more accurately by the bridge than by the voltmeter. The connection of the line to the bridge may be reversed by operating key "R."

(j) BALLISTIC CAPACITY TESTS.

A ballistic test may be used for roughly determining the capacity between the tip and ring sides of a line. Operate key "V" and then operate key "B" several times, noting the "throw" of the voltmeter needle. The greater the "throw" the greater is the capacity. If the voltmeter is not shunted the capacity is proportional to the deflection. To measure the capacity between the ring side of the line and ground proceed in a similar manner, but use key "VG" in place of key "V." To measure the capacity between the tip side of the line and ground use keys "VG" and "R" in place of key "V." This test may be used for locating the distance to a break by comparing the capacity of the line with its normal capacity which has been previously determined and recorded. In making these tests on metallic lines key "R" may be used to advantage instead of key "B" for charging and discharging the line. On operating and restoring key "B" the voltmeter deflections are in opposite directions, while with key "R" they are always in the same direction and of twice the magnitude. Key "R," however, cannot be used in this way for measuring the capacity between one side of the line and ground.

(k) HOWLER.

The howler may be connected to a line by operating the howler key if furnished. This closes both the primary and secondary circuits, starting the buzzer, which is used as an interrupter, and connecting the high-frequency alternating current produced in the secondary, to line. In cases where the subscriber has left his receiver off the switchhook and cannot, therefore, be called by ringing, the howler is employed to make a noise in his receiver to attract his attention.

SUGGESTIONS CONCERNING THE USE OF THE TESTING CABINET.

1. It is suggested that when grounded lines are used the circuits be metallic between the switchboard and the protector frame, and that the "tip" side of the line be grounded on the outside of the fuses; that is, the circuit will be metallic between the fuses and the switchboard.

The "tip and ring" methods of designating the two sides of the line is derived from the plug used on the switchboard. By examining this plug, one will find that it is composed of two conductors which are separated by an insulating strip. One of the cord conductors terminates on the tip of the plug and the other on the ring. This method of distinction is applied to the line. That side of the line which is connected to the short spring of the jack is called the "tip" side of the line; that is, the shorter spring comes in contact with the tip of the plug. That side of the line which is connected to the long spring of the jack is called the "ring" side of the line, the longer spring coming in contact with the ring of the plug. On a common battery switchboard it is customary to use a three-wire line and cord circuit, the third wire being designated as a sleeve.

2. The normal resistance and normal capacity of each line should be accurately recorded in an indexed card file. Any deviation from the recorded data may be taken as an indication of trouble.

3. It is suggested that each morning all of the line circuits be tested. In this way small troubles may be located and cleared before they develop into serious interruptions of the service.

4. In making measurements on lines having several bridged ringers it must be kept in mind that the loop resistance of any line decreases with the addition of more ringers.

5. When a lineman is working upon a line circuit, after he has located and cleared any one "piece of trouble" it is always advisable for him to call up the operator and have a test made upon

the line circuit to see if all the trouble has been removed. This co-operation between the operator and lineman will greatly facilitate the clearing of trouble and prevent making repeated trips over the line circuits.

6. When a receiver is "off the hook" at any station there is a low resistance shunt (about 70 ohms) across the line.

7. By disconnecting all of the telephone sets from the line (this may be done by temporarily disconnecting the line wire from the binding posts) and placing a "dead short circuit" at the end of the line, the loop resistance of the line can be measured; that is, the resistance of the two line wires.

By consulting the following table of resistances, it can be ascertained if faulty joints are in the circuit. Theoretically, the joints are supposed to have practically no resistance, but owing to the corrosive action of the atmosphere, the resistance may be increased. This has a tendency to unbalance the telephone line, producing noises and distorting the transmission. By changing the location of the temporary "short circuit" the approximate location of the faulty joint may be ascertained.

PROPERTIES OF HARD DRAWN BARE COPPER WIRE.

	Weight per mile in lbs.	Resistance per mile in ohms.
No. 8, B. & S.	264	3.3
No. 9, B. & S.	209	4.1
No. 10, B. & S.	166	5.2
No. 12, B. & S. (a)..	104.5	8.3

(a) No. 14, N. B. S., is practically the same size as No. 12, B. & S.

PROPERTIES OF GALVANIZED IRON WIRE OF B. B. GRADE.

	Weight per mile in lbs.	Resistance per mile of single wire in ohms.
No. 8, B. W. G.	378	14.6
No. 9, B. W. G.	305	18.1
No. 10, B. W. G.	250	22.1
No. 12, B. W. G.	165	33.3
No. 14, B. W. G.	96	57.5

NOTE.—The above calculation of weights and resistances is correct for a temperature of 68 deg. F. At a higher temperature the resistance will be higher, and a lower temperature the resistance will be lower.

The First Leased Telegraph Lines for the Transmission of Press Dispatches.

To the late James C. Hueston, an old telegrapher, aided and abetted by Walter P. Phillips, who succeeded Mr. Hueston as assistant general manager of the New York Associated Press, is due the idea of leased telegraph lines for the convenience and more rapid handling of press matter, replacing the old method of filing "copy" with the telegraph company, and insuring greater dispatch and accuracy.

It was in December, 1874, that Mr. Phillips, then one of the editors of the reports sent to New York State and the Pacific Coast, became actively interested in the exploitation of a special wire that was being leased by the New York Associated Press between New York and Washington, with branches at Philadelphia and Baltimore. To add to the efficiency of this circuit Mr. Phillips was given carte blanche by Mr. Hueston, who was the assistant general manager of the press association, to secure the finest talent in the country, and he succeeded in engaging for this exacting service Messrs. P. V. DeGraw (now fourth assistant postmaster general of the U. S.), and E. C. Boileau, who were assigned to the New York office; W. H. C. Hargrave and W. N. Gove at Philadelphia; T. J. Bishop and H. A. Wells at Baltimore, and F. N. Bassett and W. G. Jones at Washington. These men became known all over the country as the "original leased wire eight."

The speed at which this wire was worked never had been reached before, nor has it been exceeded since except through mechanical contrivances. The daily average per man before the adoption of typewriters was about 14,000 words; 28,000 words day and night, or about twenty-nine words per minute between the hours of 10 a. m. and 2 a. m. within each twenty-four hours. This was hard, exacting work, as the telegraphers in some of the offices were compelled to make eighteen to thirty manifold copies—which was bound to tell upon the men sooner or later. Mr. Phillips, after much experimentation, found relief in a system of abbreviated telegraphy, which he subsequently copyrighted, and which is in general use today, in handling press matter. It is known as the Phillips Code, or Steno-Telegraphy, and while it adds to the efficiency of a wire more than fifty per cent., being used in connection with the typewriter, at the same time relieves the strain on the operator in marked degree.

This original leased wire was the nucleus of the present extensive system employed by nearly all the larger newspapers in the country, the practice having become general rather than exceptional, and its utility and necessity firmly established.

The Telegraph in Morocco.—A system of telegraphs is being established in Morocco, and it is stated that the Sultan is about to grant a concession for the erection and working of telephone exchanges giving communication between the principal towns.

Singing Messengers in Boston.—Messenger boys at the Boston Chamber of Commerce practice a unique method of finding members on the floor when they have telegrams to deliver. The boys sing the address so that all may hear, and one little fellow with fine feeling warbles like a lark till he finds his man.

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The Progress of Wireless Telegraphy.

In his lecture before the New York Electrical Society, April 17, Mr. Guglielmo Marconi discussed the present state of the wireless art, after briefly reviewing the early work which led up to the discovery by Hertz in 1887 of the propagation of ether waves.

Referring to the capacity of aerials he said:

When the key of the transmitter is pressed the high-tension current is allowed to charge the vertical wire, or aerial, which when discharging causes a rapid succession of sparks to pass across the spark-gap. The sudden release caused by the spark discharge causes a large amount of energy to be thrown off into space in the form of a displacement wave in the ether; and, as a consequence, the vertical wire becomes a radiator of electric waves.

The rapid electrical oscillations in the wire produce two effects in external space, called respectively electric and magnetic force. In the case of a simple vertical air wire the magnetic force is distributed along certain looped lines in the plane of the wire. As the currents in the air wire reverse their direction, the magnetic and electric force in space also reverse, but not everywhere at the same moment. The magnetic and electric forces are states of the ether, and in virtue of the inertia or elasticity of the medium they are propagated from point to point with the velocity of light.

The receiver consists of an air wire connected to ground through some device which makes it possible to detect the effects of the minute currents induced in the receiver by the action of the waves transmitted to it by the sender.

Although the transmitter referred to has extraordinary efficiency, in the matter of radiation of electrical energy, it has numerous drawbacks. The electrical capacity of the system is very small, with the result that the small amount of energy in the aerial is thrown into space in an exceedingly short period of time. In other words, the energy, instead of giving rise to a train of waves is dissipated after a few oscillations, and, consequently, anything approaching good tuning between the transmitter and the receiver is found to be unobtainable in practice.

With the new disk transmitters which are utilized in long-distance stations it is possible by interrupting or quenching the spark in the condenser circuit at the right moment to open the primary circuit and thereby render it incapable of oscillating by means of energy which would otherwise be retransferred to it by the antenna of the radiating circuit, and in this manner prevent the interaction of the two circuits, which is the condition causing the production of two waves and the consequent waste of energy.

It is possible to couple to one sending conductor several differently tuned transmitters, and to a receiving wire a number of corresponding receivers, each individual receiver responding only to the radiations of the transmitter with which it is in resonance.

A result of scientific interest which was first noticed by Marconi on the steamship "Philadelphia" in 1902, and which still remains a most important factor in long-distance space telegraphy, is the detrimental effect produced by daylight on the propagation of electric waves over great distances. The generally accepted hypothesis of the cause of this absorption of electric waves in sunlight is founded on the belief that the absorption is due to the ionization of the gaseous molecules of the air by ultra-violet light obtained from the sun. It is probable that that portion of the earth's atmosphere which is facing the sun will contain more ions, or electrons, than that portion which is in darkness, and therefore the illuminated and ionized air will absorb some of the energy of the electric waves.

The wave-length of the oscillations employed has much to do with this interesting phenomenon, long waves being subject to the effect of daylight to a very much less degree than are short waves; indeed, in some transatlantic experiments, in which waves about 8000 meters were used, the energy received by day at the distant receiving station was usually greater than that obtained by night.

The fact remains, however, that for comparatively short waves such as are used for ship communication clear sunlight and blue skies, though transparent to light, act as a kind of fog to these waves. Hence the weather conditions prevailing in England, wintry fogs and dull skies, are usually suitable for wireless telegraphy.

Recent observations reveal the interesting fact that the effects vary greatly with the direction in which the transmission is taking place, the results obtained when transmitting in a northerly and southerly direction being often altogether different from those observed in an easterly and westerly one. In regard to moderate power stations such as are employed on ships, and which use wave-lengths of 300 meters and 600 meters, the distance over which communication can be effected during daytime is generally about the same whatever the bearing of the ships to each other or to the land stations, while at night interesting and apparently curious results are obtained. Ships over 1000 miles away off the south of Spain or around the coast of Italy can almost always communicate during the hours of darkness with the post office stations situated on the coasts of England and Ireland, while the same ships when at a similar distance on the Atlantic from the westward of these islands and on the usual track between England and America can hardly ever communicate with these shore stations unless by means of specially powerful instruments.

It is also to be noticed that in order to reach ships in the Mediterranean the electric waves have to pass over a large portion of Europe and in many cases the Alps. Such long stretches of land, especially when including very high mountains, constitute an insurmountable barrier to the propagation of short waves during daytime. Although no such obstacles lie between the English and Irish stations and ships in the North Atlantic en route for North America, a night transmission of 1000 miles is there of exceptionally rare occurrence.

Although high power stations are now used for communicating across the Atlantic Ocean and messages can be sent by day as well as by night, there still exist periods of almost regular daily occurrence during which the strength of the received signals is at a minimum. Thus in the morning and evening, when in consequence of the difference in longitude, daylight or darkness extends only part of the way across the ocean, the received signals are at their weakest. It would almost appear as if electric waves in passing from dark space to illuminated space and vice versa are reflected and refracted in such a manner as to be diverted from the normal path. Later results seem to indicate that it is unlikely that difficulty would be experienced in telegraphing over equal distances north and south on about the same meridian, as in this case the passage from daylight to darkness would occur more rapidly over the whole distance between the two stations.

One of the objections made against wireless telegraphy is in regard to the possbility of interference between various stations and the confusion likely to arise when a number of stations are simultaneously operated in the vicinity of each other. Although this confusion does rarely arise in practice with proper up-to-date stations and apparatus, yet even with the old instruments when it did occur it was not by any means such a serious matter as generally appeared to the imagination of the public. In most countries the operation of wireless-telegraph stations, in regard to ship and shore communication, is subject to judicious rules tending to prevent mutual interference, and America now intends to promulgate regulations which should greatly increase the effectiveness of wireless working. However, there is a danger of governments hampering the development of this new art by the imposition of too many rules and regulations. Moreover, in the case of wireless telegraphy it is often an advantage that any station should be able to pick up emergency messages.

At present one of the most practical methods of isolating any particular receiver so as to make it sensitive only to signals coming from a certain station is to make use of the principal of resonance and where possible to take advantage of directive methods. It is possible to cause a change of even less than one-half of 1 per cent. in the wave-length of the received waves to cease to actuate the receiver. This means that one can distinguish between two waves 1005 feet or 1010 feet in length respectively, and that the receiver may be tuned to respond to one and not to the other.

Improvements in Gell Perforators.

Some difficulty having been experienced with the older form of Gell perforators in consequence of the excessive current consumption, says the *Postoffice Electrical Engineers' Journal*, of London, it has been found necessary to reduce the power absorbed from 200 to 100 watts. In the newer forms Mr. Gell has effected this reduction by the use of coil and plunger electro-magnets, in place of teams of iron-cored electro-magnets with pivotted armature.

The older forms are being converted at the postoffice factory, and very efficient results are being obtained from a form of coil specially designed by Mr. Mansbridge for the special requirements. This electro-magnet is also of the coil and plunger type, but it differs from that used by Mr. Gell in that it is a single coil instead of a pair, and is iron-clad. The construction is such that the magnetic circuit contains only a single air-gap, and the plunger, which is one inch in diameter, projects into the coil in such a way that when the coil is excited the plunger is very strongly attracted downwards, so as to bridge over the air-gap and complete the magnetic circuit. The stroke of the plunger may be anything that is desired. To obtain a long stroke the electro-magnet is constructed with its interior (hollow) poles one inch or more apart, while for a shorter stroke they may be only half an inch or less apart.

An incidental advantage of this type of electro-magnet is that it affords a cushioning effect for the plunger, since when the plunger has by its movement completed the magnetic circuit, the pull upon it automatically disappears. Hence when used on the punching side the motion of the plunger has not to be checked by any buffer or stop, and in consequence a better mechanical effect is produced.

Mr. William Maver jr., the eminent electrical engineer, of New York, in renewing his subscription for another year, writes: "TELEGRAPH AND TELEPHONE AGE is one of the few papers that I always read from beginning to end, and I would not be without it for much more than the subscription price. For, besides the interesting technical information relating to telegraphy and telephony with which it abounds, it is almost the only means by which those not actively in telegraph work are kept informed as to the present whereabouts of old friends and also, alas too often, as to their departure to that bourne from which no one e'er returns."

Mr. M. W. Jones, acting train master of the Guayaquil and Quito Railroad, Huigra, Ecuador, writes: "I enclose herewith $3.00 to renew my subscription to the AGE. I could not get along without it here in this far-away country. It is the only paper which properly keeps me in touch with the doings of my many friends and old associations in the United States."

Western Union Pensions.

The pension committee of the Western Union Telegraph Company has drafted the following regulations governing pensions:

This provisional plan shall take effect on the first day of July, 1912; subject, however, to the following reservations and conditions, to wit:

That all pensions hereunder are made at the discretion of and during the pleasure of the board of directors of the executive committee only and are not to be deemed in any way continuing obligations of the company, nor shall any rights therein or to a continuance thereof vest in the recipients beyond the pleasure of the board. Power to change the same in any and all respects or to discontinue the same entirely at the discretion of the board at any time being hereby expressly reserved.

It is also provided that all pensions under this plan be made at and only upon the recommendation of the pension committee, and that no pension shall exceed the rate of $100 per month, except upon special authorization thereof by the executive committee of the board of directors.

The plan applies only to those in the service of the company or its absorbed companies and who have been in such service for twenty or more years immediately preceding the dates of applications for their retirement.

All such employes who attain or shall have attained the age of seventy years shall be retired on pension upon proper recommendations—the retirements to be effective on the dates approved by the executive committee.

All such employes who have become permanently incapacitated for service through no fault of their own may be retired on pension on proper recommendations on such dates as may be designated by the executive committee.

Continuous service shall be regarded as that within which there has been no break of greater duration than one year. If a break of more than one year has occurred the time is to be computed from the date service was resumed and previous service shall not be counted in determining the amount of the pension.

Leaves of absence, temporary lay-offs, etc., not exceeding one year shall not be considered breaks in continuity of service, but all time out of the service shall be deducted from the pension period.

Discontinuance of regular work without permission for any other reason than sickness or accident shall be deemed sufficient cause for the forfeiture of all benefits accruing under this plan.

In the case of employes originally in the service of absorbed companies the dates of employment shall be reckoned from the dates of entering the service of the absorbed companies.

Pension allowances shall be paid monthly during the life of the beneficiaries or until discontinued by order of the executive committee. No assignments of pensions shall be permitted.

No employe will be permitted to receive a pension and at the same time draw a salary or other compensation from the company.

When an application is based on the ground that the employe has become permanently incapacitated it should be accompanied by a medical certificate which must be certified to by the superintendent or head of department.

Every application for a pension must be accompanied by a letter from the superintendent or head of departments stating the facts in the case with recommendation. A copy of form 2878 properly filled out must accompany each application.

If any employe in receipt of a pension by reason of having been retired on account of illness or incapacity for work shall recover so as to be competent to resume the discharge of the duties of the office or position held by him at the time of his retirement the company may require him to again take up the same and during the period of such further service no payment shall be made to the employe by way of pension. If any employe shall decline to re-enter the service when thus required his right to a pension shall cease.

Any employe in receipt of a pension shall be at liberty to engage in any outside occupation, but if he shall enter upon any employment or engage in any business or undertaking which in the opinion of the executive committee is or may become prejudicial to the interests of the company he shall thereupon cease to have any rights or claim to any pension or in respect thereof.

The right of the company to discharge any employe shall not be in any way influenced by these provisions and all claim to or interest in the pension plan may be forfeited by such discharge.

Applications for pensions should be addressed to the superintendents or heads of departments and should be referred for consideration through the regular channels.

[The rates of pensions were given in our issue dated April 16.]

Liége Electrical Show.—An electrical exhibition is to be held in Liege. Belgium, in 1914, under the auspices of the Association of Electrical Engineers and the Montefiore Institute of Technology. Prizes will be awarded for the most meritorious electrical inventions. Mr. G. L'Hoest, 31 rue Saint Gilles, Liege, is general secretary.

Mr. W. A. Neill, district plant superintendent, Western Union Telegraph Company, at Atlanta, Ga., in renewing his subscription for another year, writes: "I always take great pleasure in recommending your publication, not only for its interesting reading matter, but as being a medium of instruction relating to telegraph and telephone matters, and take pleasure in advancing your interests and encouraging possible subscribers."

Multiplex Telegraphy in the Past Thirty Years.

BY PATRICK B. DELANY, NANTUCKET, MASS.

To my view the most important happenings in telegraphy since your paper began are a disposition to realize the full capacity of a wire for delivering telegraph signals, and that there is at last a scopeful mind managing electrical communication.

Until recently the telegraph was thought to have been finished where it was born, "over on the Jersey side," but a descendant of one of the dot-and-dash designers seems to have taken a different view.

Not much has been done to improve Morse telegraphy in these thirty years. Synchronous multiplexes have come and gone, mainly on account of underground wires and induction between overhead ones.

The quadruplex is not as useful as it was thirty years ago. Polar duplex with typewriting machines and auto-dot transmitters mark the real advances in Morse telegraphy. Printers of great ingenuity and some utility have been and are still being tried out, but the highest development in this line thus far gives me no warrant for changing my opinion, always held and frequently expressed, that the most efficient Morse or printing telegraph is the polar duplex manned with first-class operators, and now, with auto-dot keys, this belief is better grounded than ever.

The change of title for your paper to TELEGRAPH AND TELEPHONE AGE marked the new era of appreciation of what the telegraph should be. The old ten-word message idea for stocks or death was dropped as the aim and limitation of the telegraph. All kinds of communication and correspondence was opened up to the public in the night letter and day letter telegrams and thousands of branch telegraph offices established telephonically, all over the country. The old branch telegraph office idea, typical of stagnation, except in contending for circuit, is being brushed away for the ever ready and accessible telephone dictation service.

People are wondering why these things were not done long ago, as they might have been? The reason is simple. No one in authority appreciated the necessity for progress in telegraphy. They were told thirty years ago and often enough since, the Lord knows, but small minds were in control, and a suggestion of improvement was *lèse majesté*.

There is much more in store for telegraphy in the next five years than shown in developments of the past sixty. Even your paper, since the era of enlightenment has manifested itself in high places, seems to have caught a spirit of broader vigilance for improvements in telegraphy and telephony than was possible in the atmosphere of the old regime.

The telegraph letters of the future will wind up with "Haven't time to write."

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What is a standard cell of battery?

What is such a cell used for?

Is it necessary that a standard cell should deliver a large current?

Why is a thermometer included in the containing case of a standard cell?

Under what circumstances may a Daniell or copper-sulphate cell be used as a standard?

For very accurate work what two makes of cells are necessary?

What are the elements of the Clark cell, and of what metal are the electrodes made?

What is the electromotive force of this cell at a temperature of 15 deg. C.?

Of what substances are the electrodes of the Weston cell composed?

What is the electromotive force of the Weston cell?

What is a voltmeter?

How is a voltmeter connected to the circuit to be measured?

Is the resistance of a voltmeter high or low?

Is the resistance of a voltmeter fixed or variable?

How is the current flowing through a voltmeter varied?

What would be the effect on a current of increasing the e. m. f.?

What would be the effect of decreasing the e. m. f.?

How do these variations in the e. m. f. affect the voltmeter indicating-pointer?

How are the scale divisions of a voltmeter calibrated?

What is an ammeter?

How many classes of ammeters are there? Name them.

In the series ammeter what proportion of the entire current passes through its coils?

What effect upon an ammeter will a change of e. m. f. produce?

Are series ammeters used to any great extent?

What is the objection to them?

What is the difference between a shunt ammeter and a voltmeter?

In a circuit of a definite resistance how can the current be increased or decreased?

What is the principle of the Weston voltmeter?

How is the moving coil mounted?

Mr. Van Devender's First Experience with Beautiful Snow.

Mr. H. Van Devender, commercial superintendent of the Western Union Telegraph Company in New Orleans, loves the climate of New Orleans in the summer time. He fairly dotes on the delightful heat that permeates the atmosphere on a sultry evening, when there is not a breeze stirring, and a concert of mosquitoes makes music in his ears.

'Twas not ever thus with Mr. Van Devender, however, says the *New Orleans Daily States.* He has not always been such a strenuous champion of our summer climate. He has not always extolled the exquisite joy of the sun's rays, nor has he always luxuriated in perspiration at the boiling point. In fact, it was only quite recently that he became a convert to this climate, in which he now hopes to dwell on and on forever.

Mr. Van Devenders' transformation from the state of one who endures the climate of New Orleans to the state of one who hopes he may never be separated from it again took place while he was en route to a recent convention of Western Union traffic chiefs in Denver, Col. It happened in this wise. He heard some fellow passengers remark that it was snowing heavily. Snow has always been so scarce in New Orleans that it melted before Mr. Van Devender arose from his slumbers, and he was therefore very anxious to see what it looked like. In fact, his desire was so strong that he encased himself in his bath robe and a pair of slippers and stepped out quietly and unobtrusively on the rear vestibule of his car. There he remained for some time—and a great deal longer than he had intended to remain.

The reason Mr. Van Devender remained on the rear vestibule longer than he had anticipated, and certainly longer than his light vesture warranted, was due entirely to the perversity of the vestibule door, which he found locked when he was ready to go back inside. It was a very disagreeable thing for the door to do—in view of the fact that the snow had chilled the atmosphere and that Mr. Van Devender was not prepared for the occasion. Had he known that the door would be locked behind him, he would at least have brought along an extra blanket or a little something to warm him up—inside. He was not at all accustomed to such climate as that through which he passed while trying to effect an entrance into the car from the vestibule. They never have anything like it in New Orleans, and Mr. Van Devender felt justified in indulging in a few remarks that would have warmed up his immediate vicinity, but for the fact that the train was traveling too fast. He regretted more than anything else that he did not have on two bath robes instead of one.

There was an electric doorbell, and Mr. Van Devender got a little satisfaction out of that, in the hope that it would attract the porter's attention. But the porter failed to respond to Mr. Van Devender's particular code. It continued to snow, and Mr. Van Devender began to suspect that there was an iceberg tied up somewhere in the neighborhood. He had never heard of so much snow in all his life, except when Dr. Cook returned without the North Pole. He got so cold that he made very little impression on the electric button, and finally gave it up. In about an hour they rescued him from the platform. He was almost delirious, and wanted to know when he would get back to New Orleans. Now that he is back, he hopes to remain here for some time to come. There is nothing like the climate of New Orleans for keeps, he says.

A Damper for the Prevention of Telephone Disturbances.—A Swedish engineer, Mr. Saxenberg, has invented an apparatus to reduce or prevent buzzing and all extraneous noises in the telephone. The apparatus consists of a kind of adjustable leak resistance for extra currents on the line in the shape of two columns of water, which are connected with each other and the earth at one end, while the other ends are coupled to the telephone wires. One of these devices is to be inserted at each end of the line, near the telephone apparatus, so as to enable the user of the telephone to reach it, and, by adjusting the one or the other electrode up or down, to cause the buzzing to disappear. By means of its resistance, which is non-inductive, the damper conducts to earth all static charges or induced currents, which take this path in preference to the inductive circuit through the telephone. At the same time, it gives an excellent protection against discharges of electricity from the atmosphere. As both the electrodes can be regulated and the resistances at the poles can thus be varied quite independently of each other, it also becomes possible to compensate for various leakages which may occur in the line. The leakage and the induction vary according to the weather and the atmospheric conditions, and a readjustment of the apparatus accordingly is often necessary so as to obtain the greatest possible "buzz-damping" effect. The apparatus has been tested on the Vesteraas-Traangfors line, which was previously nearly useless, and the improvement was astonishing. The apparatus has been brought into the market by the Allmäna Svenska Elektriska.

Alternating Current Telegraphy.—The *Elektrotechnik und Maschinenbau*, a German electrical and mechanical paper, recently published a long illustrated article by Mr. Béla Gáti, manager Royal Hungarian Telegraph and Telephone Experiment Station, Budapest, Hungary, entitled "Will the Signal be Lengthened in Alternating-Current Telegraphy?" Mr. Gáti has given this subject much attention and investigation.

Mr. W. I. Capen, fourth vice-president of the Postal Telegraph-Cable Company, New York, in renewing his subscription, writes: "I have had the pleasure of paying you for a good many years' subscription to the Age and do not now propose to give up reading your excellent publication just because you stamped the issue received today 'subscription expired.' The enclosed check is forwarded with all the old-time pleasure mentioned."

CONSERVATION TALKS—VIII.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLAHOMA.

Functional Organization.

The writer has always been in favor of the idea and purpose of the functional organization, as applied to public utilities, more especially in the telephone business. It has therefore been a pleasure to study its development and see how fully it would meet the demands of the hour. So far as the writer has observed, very few faults can be found with the scheme.

When central energy systems first came into use, everyone tried his best to find fault with it, and among other criticisms was the one that it enforced a higher maintenance cost and more expert help. This criticism was true, but proved to be an argument in its favor, rather than against it.

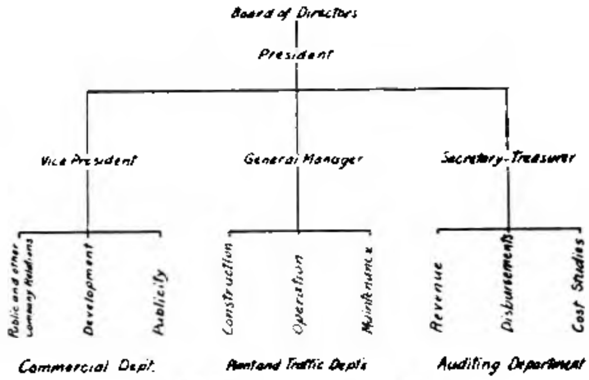
When the territorial scheme of organization was abandoned to be replaced by the functional or three-column plan the same thing happened, and the latter was everywhere criticised because it was built on a foundation of coöperation and coördination, and that only those familiar with these methods could survive its introduction. This very criticism has been the one thing which would justify its continuation. Necessity is the mother of new effort, and so employes finding they must work with and for each other, have not been slow to cultivate the new essential coöperation. As a result we find that the disposition of our best employes is undergoing a change for the better, and since they are not now required to follow the details of every phase of the telephone business, they are becoming more and more expert along the special line of their choice, hence the efficiency along all lines is gradually being advanced and employes are much more contented with their every-day duties than before.

In the course of the writer's observation and study along these lines it occurred to him that there was one link in the organization which did not seem to fit well into the rest of the chain.

It seemed as though the commercial department was called upon to do work which in reality did not belong to it. I refer to the billing of tolls, etc., and the collection of revenue of all kinds. With this in mind I have sketched the rough organization-outline shown in the accompanying illustration, in which I have shown the commercial department reporting to the vice-president as at present, but have defined the principal duties as (1) Public and other company relations, (2) Development, (3) Publicity. In other words, it would do all that is now assigned it except that the accounting and collecting end of the business would be transferred to the secretary and treasurer through the auditor (accountant). I have shown the secretary and treasurer responsible for (1) Revenue collection of all kinds, (2) Disbursements, (3) Cost studies.

Under this scheme the auditor and his entire force would report direct to the secretary and treasurer instead of to the president. This plan would eliminate much lost motion and duplication, hence be less expensive and promote efficiency. The present plan is confusing, as the lines between commercial and accounting are not clearly drawn; hence we find cashiers being employed by the commercial department and proving unsatisfactory to the auditing department, etc.

As a result of this confusion, the commercial department often neglects its most important duties, such as public relations and development. If greater attention could be paid to such matters much adverse legislation could be avoided, and rates and other means of producing revenue would also receive better attention. The work of the plant, traffic and auditing departments is well defined and understood, the major portion of it being routine, but with the commercial department only the smallest and least important duties are routine work. Every case presents new char-



ORGANIZATION CHART.

acteristics, new features, and requires careful individual attention along constantly changing lines. Believing that many of the more important commercial duties have been neglected in the past, this new plan is proposed as a means of eliminating many excuses on the part of managers, etc. The writer believes that cost studies, when necessary, should be in the hands of disinterested experts and can be handled to better advantage and with better results by being made a part of the duties of the accounting department.

The Municipal Electricians' Convention.

Intending exhibitors at the annual convention of the International Association of Municipal Electricians, which is to be held at Peoria, Ill., August 26 to 30, will be interested to know that there will be no charge for space. The exhibits will be located in a room adjoining the convention hall at the Jefferson Hotel. Mr. W. E. Wolgamott, city electrician, Peoria, Ill., will be glad to hear from anyone expecting to make an exhibit, and will give all the information at his command.

Members intending to attend the convention should also notify Mr. Wolgamott, so that he may be enabled to make proper arrangements.

The meeting promises to be of unusual interest to the members. Several valuable papers will be read and discussed, and a programme attractive in every respect will be prepared.

The Use of the Telephone in Railroad Service*.

BY G. K. HEYER, NEW YORK.

For the past four years a great deal of attention has been given by the progressive railroads to the improved method of handling train movements known as telephone train dispatching. There are, at the present time, approximately 285,000 miles of railroads in the United States and Canada, and the 55,000 miles of road which has been equipped for this new method of handling traffic stands as a monument to the success of the undertaking.

It is thought that a brief outline of the history of train dispatching would be interesting before going further into the subject.

Previous to the time of the introduction of the telegraph, trains were run on what was called the "time interval" system. With this system the ruling train had the right of one hour against an opposing train of the same class. Under this method of operation a great deal of time was lost if trains were late, and it was through the foresight of superintendent Charles Minot, of the Erie Railroad, that the telegraph, in 1850, made possible the abolition of the old "time interval" and "flag" system of advancing trains and the adoption of the telegraph dispatching system, which it was thought, for many years, possessed sufficient advantages to allow other branches of railroads to be developed to the greatest possible efficiency.

In recognition of the marked advance made by the use of the telegraph in 1850, the Association of Railway Telegraph Superintendents and the Old Time Telegraphers and Historical Association, are having erected at Turners, N. Y., a monument to the memory of Charles Minot, who gave the first telegraphic train order from that point. [The monument was unveiled on May 2, as reported in the May 16 issue.—Ed.]

After the telegraph was first used by the Erie, there was begun, in 1851, a systematic attempt to telegraph orders from a central point to trainmen and conductors, and from that time up to the latter part of 1907 all train movements were directed by the telegraph.

While October, 1907, marks the first successful installation of telephone and selector equipment for train dispatching, there were previous to that time a number of roads which used the telephone equipment for handling train movements. As early as 1883 the New Orleans and Northeastern Railroad used the telephone for this purpose. The service was rendered over a grounded iron wire about 100 miles long, with the ordinary magneto telephone, as used at that time, and without the aid of the selector, which mechanism has made possible selective calling on long and heavily loaded railway telephone lines.

The telephone equipment used on all of these installations was far inferior to that in service at the present time, and the great improvements which have been made in the last two or three years in the telephone and selective apparatus, together with the new apparatus designed to meet the special requirements of the service, indicate that there are few, if any, requirements for communication to meet the conditions of railway service which cannot be met by the use of the telephone.

The New York Central was the first to install and actually operate trains by means of the telephone and selector equipment. Its first installation was completed in October, 1907, on a section of the main line between Albany and Fonda, with sixteen way-stations. The installation on the New York Central was closely followed by a number of installations on the Chicago, Burlington & Quincy, where in December, 1907, the main line between Aurora and Mendota, Illinois—a distance of forty-six miles, with eleven stations—was equipped. After this, a section from Aurora to Galesburg, Ill.—a distance of 125 miles, with sixteen stations—and another between Aurora and Clyde (the end of the Chicago Terminal), a distance of twenty-eight miles. These circuits all covered double track where reverse movements were made.

Within a short time after the completion of these circuits, and convinced from the results obtained that single track operations presented no problem which could not be solved by the use of the telephone, the Burlington equipped a single track section between Aurora and Savannah, Ill.,—a distance of 106 miles, with twenty-three way-stations.

These installations on the New York Central and Chicago, Burlington & Quincy produced the proof for which many had been waiting, and these roads can justly be called the pioneers in telephone train dispatching. The proof was so conclusive and the results obtained so satisfying that the subject became at once one of world-wide interest. This interest, however, until very recently, did not take the form of installations on railroad systems, except on railroad systems of the United States and Canada, and there are in these countries about twenty railroads which have over 1,000 miles of road equipped with telephones and selectors, the aggregate mileage for these twenty roads being approximately 40,000.

In spite of the success attending the early installations on the New York Central and Chicago, Burlington & Quincy Railroads, there were many things to be overcome before the adoption of the telephone and selector system could be made general. It is a well-known fact that a great many of the officials of railroads in this country have come up through the operating departments, and as these men had expressed themselves by means of the Morse key, they had come to consider the telegraph as much a part of the regular operation of the system as to believe it synonomous with quick, safe and efficient operation.

They were disposed to let well enough alone and could not feel themselves free to advocate the

* Proceedings of Railway Club of Pittsburgh.

use of a system which, to them, was comparatively new and untried. The attitude of the operators themselves also had a somewhat deterring effect on the adoption of the new system. There was a feeling among the dispatchers and operators that the passing of the telegraph would seriously affect their positions. Thus far, however, this has not been borne out, 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 railroad makes necessary the employment of men who know the railroad business, and in a few cases, if any, have operators lost their positions due to the adoption of the telephone, except as a result of some act of their own.

There were many who believed that the telephone would be satisfactory on double and multi-track operation, but there was much skepticism with regard to its use on single track roads. When carefully considered, however, it is believed that any means which would allow the dispatcher to more clearly express himself and thus relieve the traffic problem on double-track roads, would lend themselves with added benefits to the solving of more complex operations on single-track systems. This has been borne out by subsequent events and the single-track divisions are the ones in which the advantages of the telephone system are most apparent.

The early prejudices of the dispatchers and operators have been entirely overcome, particularly on divisions where the telephone system has been installed and not one out of the great number of dispatchers with whom I have talked would care to go back to the telegraph method of handling train movements. There are many dispatchers who, through the continual operation of the telegraph key, have developed operator's paralysis in a greater or lesser degree, and these men cannot speak too highly in praise of this system which, as some of them have expressed it, have given them a new lease on life.

(To be continued.)

An Interesting Bridge.

Before the days of the ocean cable the Western Union Telegraph Company had started to build a telegraph line from America to Asia, by way of the Behring Strait. Construction on the line was in progress, on both continents, says the *Railway and Engineering Review*, when the successful laying and working of the Atlantic cable caused the project to be abandoned. The line had been built well into British Columbia and in time the wires were pulled down by the Indians and appropriated for various uses. One use made of some of it was to build a suspension bridge across the canyon of the Bulkley river, but the structure wavered and teetered, and the Indians had misgivings as to the reliability of such material—they could put better confidence in timber, a material of construction with which they were more familiar. Accordingly, the present structure was erected, with logs and poles firmly lashed together.

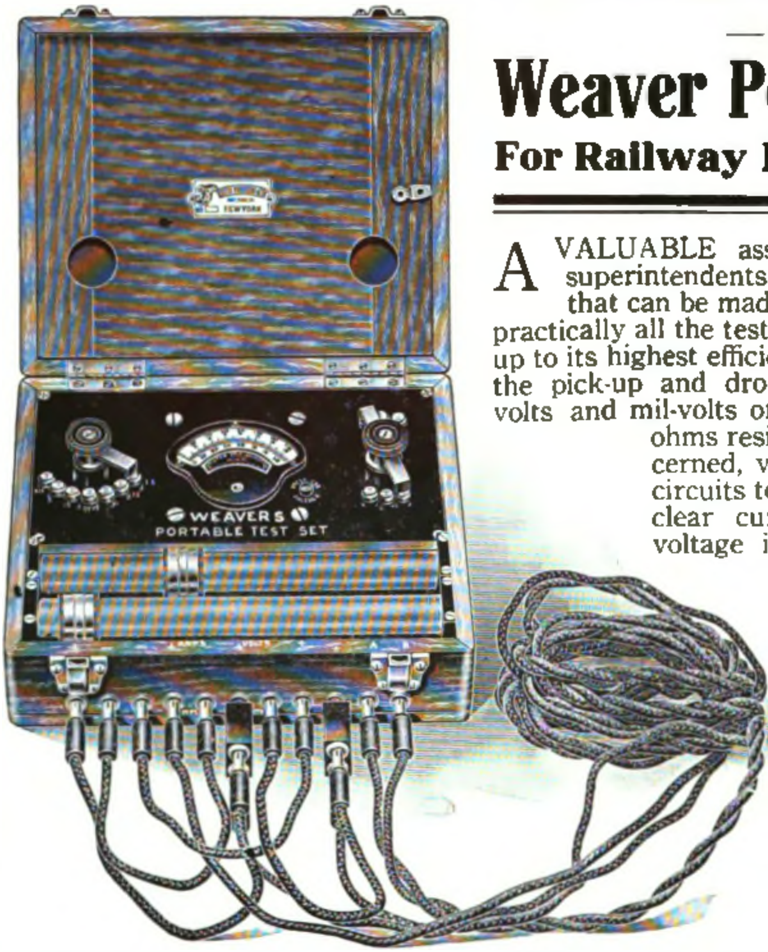
The method of testing the strength of the structure was peculiar, or, at all events, something different from recognized practice with civilized engineers. According to Indian accounts, after the bridge was completed twenty squaws were selected as the "live" load and required to go to the center of the span, in a bunch, and execute a pot-latch dance. The bridge, having successfully withstood such a performance, the intrepid bucks confidently reasoned that a proper factor of safety for the passage of a man and a pack horse was assured.

We have taken pains to verify, officially, the source from which the Indians obtained the wire used in the original suspension bridge, says the *Review*, and here submit a statement from Mr. A. R. Brewer, treasurer of the Western Union Telegraph Company, New York:

"Our general manager has handed me yours of March 6 relating to the wires in a suspension bridge over the Bulkley river, in British Columbia, built by the Siwash Indians a number of years ago. The information you quote is correct. Even the river you mention was named after Colonel Charles S. Bulkley, engineer in charge of the Russian-American telegraph lines, and if you should chance to see a map of North America made, say, in the early seventies, you will find that there were in British Columbia and in Alaska forts (or depots) named after the Western Union directors which marked the route of the line. I distinctly remember seeing on such maps Fort Mumford and Fort Stager, which were named after Western Union directors of that day.

"The Western Union not only built or surveyed a line from New Westminster, B. C., to Alaska, but it built extensively in Asia and bought in Europe a cable to be laid at Behring Sea. The American end of the line was in charge of Colonel Charles S. Bulkley, and George Kennan, the Russian traveler, was connected with the Asiatic work and made his first literary success in the account which he wrote of his experiences entitled 'Tent Life in Siberia.'

"The first cable laid across the Atlantic Ocean, in 1865, failed after one or two messages, and its failure encouraged the Western Union Company to go on with the Siberian project. This failure was regarded as a demonstration of the impracticability of an Atlantic cable, but the remarkable persistency of Cyrus W. Field triumphed. He raised in England money to lay the second cable. The 'Great Eastern' was employed to lay it, and not only laid it successfully, but went back and repaired the 1865 cable. Soon after that happened the Western Union abandoned the Siberian project and all the money invested in it was lost."



— THE —

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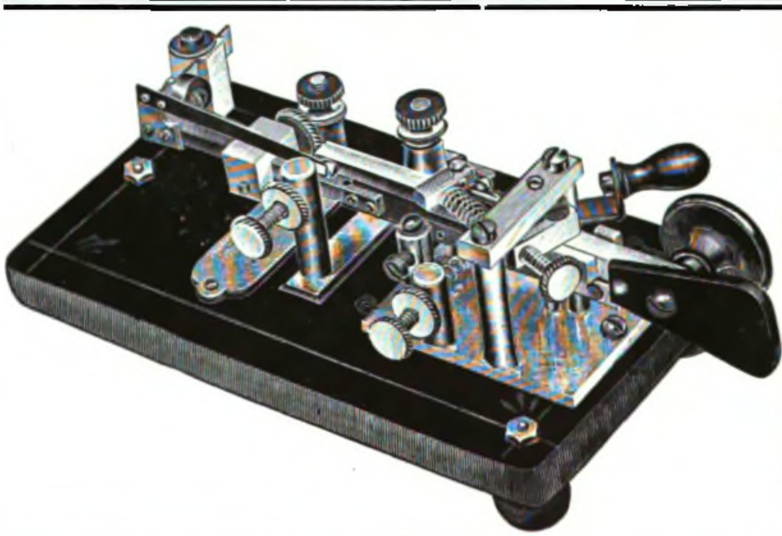

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Historical Sketch of Association of Railway Telegraph Superintendents.

A brief history of the Association of Railway Telegraph Superintendents will be of interest at this time.

The association was organized at Chicago, Ill., November 20, 1882. At this meeting officers were elected as follows: W. K. Morley, president; William Kline, vice-president, and C. S. Jones, secretary and treasurer.

At the second meeting also held in Chicago, June 13 and 14, 1883, there were thirty railroads represented. Mr. Morley was re-elected president; Charles Selden, vice-president, and P. W. Drew, secretary and treasurer. Mr. Drew has filled this position with credit to himself and the association ever since that time, being re-elected at each recurring meeting of the association.

At the third meeting, held September 17, 1884, in Philadelphia, Charles Selden was elevated to the presidency, and E. C. Bradley was elected vice-president.

The fourth meeting at Cleveland, Ohio, June 17 and 18, 1885, chose C. W. Hammond to succeed Mr. Selden, and elected as vice-president, George L. Lang.

The dates of the fifth meeting, which was held in St. Paul, Minn., were June 16, 17 and 18, 1886. At this meeting thirty-four railroads were represented, and the social feature of these conventions came into prominence, the guests being entertained by an excursion to Duluth and the Apostle Islands by rail and boat. A. R. Swift was elected president, and George L. Lang was re-elected vice-president.

The sixth convention was held at Boston, July 13 and 14, 1887. It was at this meeting that the practice of showing exhibits of telegraphic and other electrical devices was first introduced. George L. Lang was here elected to the presidency, and G. C. Kinsman was elected vice-president.

New York was the scene of the seventh meeting which met July 11, 1888. Edison's phonoplex system was shown in operation at this time and Mr. Kinsman was made president, C. A. Darlton succeeding him as vice-president.

Washington, D. C., entertained the eighth annual convention, which met October 16 and 17, 1889. Benjamin Harrison, who was then president, received the members of the convention in the White House. C. A. Darlton being elected to the presidency, George T. Williams was elected vice-president to succeed him.

The ninth annual gathering assembled at Niagara Falls, June 18 and 19, 1890. This convention was notable for the large number of papers read and the exhibition of the long distance telephone by which conversation was held with parties in Albany and New York. George T. Williams was elected to the presidency and George M. Dugan was elected vice-president.

At the tenth annual convention held at Cincinnati, Ohio, June 17 and 18, 1891, the number of railroads represented had increased to thirty-seven. This meeting elected C. S. Jones as president and L. H. Korty vice-president.

The eleventh in the series of conventions assembled at Denver, June 15 and 16, 1892. This meeting was largely attended, and was made notable by a paper by Thomas A. Edison. L. H. Korty being advanced to the presidency, U. J. Fry was elected to succeed him as vice-president.

The twelfth on the list convened at Milwaukee, June 20 and 21, 1893. The World's Fair at Chicago being then in progress, most of the members included a visit to this great exposition in their convention trip. U. J. Fry was elected president and O. C. Greene vice-president.

On June 13 and 14, 1894, the thirteenth annual convention met at Detroit. Following the usual custom, at this convention O. C. Greene was made president, and E. R. Adams was elected vice-president.

At the fourteenth annual convention held in Montreal, June 12, 1895, M. B. Leonard was elected president, and J. W. Fortune vice-president.

Old Point Comfort, Va., was the scene of the fifteenth convention which met June 17 and 18, 1896. Among other papers presented at this meeting was one by W. W. Ryder upon "The Telephone in Railway Practice." G. M. Dugan was elected president and J. W. Lattig, vice-president.

For the second time Niagara Falls was chosen as the place of gathering, the sixteenth annual convention meeting there June 16, 1897. J. W. Lattig being made president, W. W. Ryder was elected vice-president.

The most notable feature of the seventeenth annual convention which met June 15, 1898, at Omaha, Neb., was the report of a special committee upon low resistance relay experiments. W. W. Ryder was elected president and L. B. Foley, vice-president.

For a meeting place for the eighteenth annual convention the superintendents turned toward the South, gathering at Wilmington, N. C., May 17 and 18, 1899. L. B. Foley being elected to the presidency, W. F. Williams succeeded him as vice-president.

Detroit was then for the second time chosen as the convention city, the nineteenth annual convention meeting there June 20, 21 and 22, 1900. W. F. Williams was naturally elected to the presidency, and C. F. Annett was elected vice-president.

Buffalo was the scene of the twentieth annual convention which met in that city, June 19, 20 and 21, 1901. C. F. Annett being made president, F. P. Valentine was elected vice-president. This being the year of the Pan-American Exposition, an unusually large number were in attendance at this meeting.

For the third time Chicago became the scene of the convention, the twenty-first annual meeting being held there June 18, 19 and 20, 1902. Among the important subjects which came up for discussion at this convention were the questions of typewritten train orders and the use of the telephone in connection with railroad operation. J. H. Jacoby was elected president and W. J. Holton, vice-president.

The far South claimed the twenty-second annual convention, which met in New Orleans, May 13, 14 and 15, 1903. The use of the telephone in connection with railway work again took a large part in the discussion. Mr. F. F. Fowle, of the engineering department of the American Telephone and Telegraph Company, presenting a lengthly illustrated paper upon "The Transposition of Telephone Lines to Prevent Cross Talk and Induction." At this time C. S. Rhoads was honored with the presidency and C. P. Adams became vice-president.

Indianapolis was the scene of the twenty-third convention in the series, which met in that city June 15 and 16, 1904. After the adjournment a side trip was made to the St. Louis Exposition. Henry C. Hope was elected president at this time and E. E. Torrey, vice-president.

The twenty-fourth annual convention met at Chattanooga, Tenn., May 17 and 18, 1905. The increasing use of high-tension transmission made very timely the paper of W. J. Camp upon "High Tension Wires on Railway Right of Way," which he presented at this meeting. E. E. Torrey was advanced to the presidency, and E. A. Chenery was elected vice-president.

The superintendents again turned their faces toward Denver, the twenty-fifth annual convention meeting there June 20 and 21, 1906. The question of high-tension wires again came up and occupied a large place in the discussion. E. A. Chenery was elected to the presidency and E. P. Griffith was elected vice-president.

Atlantic City, N. J., the popular waterside resort, entertained the twenty-sixth annual convention, which met June 19, 20 and 21, 1907. An unusually large number of interesting papers were read at this meeting, and some most interesting discussions developed. E. P. Griffith was advanced to the presidency and W. J. Camp succeeded him as vice-president.

The twenty-seventh annual convention met in Montreal June 24, 25 and 26, 1908. W. J. Camp was elected president and G. W. Dailey vice-president. Upon Mr. Dailey's promotion from the position of telegraph superintendent of the Chicago and Northwestern to the superintendency of the Wisconsin division of that road, J. B. Fisher was elected by the executive committee as vice-president.

The 1909 convention was held at Detroit June 23, 24 and 25, with about seventy-five active members present. J. L. Davis of Chicago was selected to head the organization for the ensuing year and Los Angeles was selected as the place of meeting for the 1910 convention.

The twenty-ninth annual convention met at Los Angeles, Cal., June 20-24, 1910, and notwithstanding the great distance for most of the members to travel, there was a large and enthusiastic attendance. Isaac T. Dyer of Los Angeles, Cal., was elected president. At this meeting the movement to erect a monument at Turner, N. Y., to commemorate the sending of the first telegraph train order (in 1851) was officially sanctioned and a committee appointed to carry the proposition into effect.

Boston was the meeting place of the thirtieth convention, which was held June 26-28, 1911. The meeting was largely attended, and many valuable and practical papers were presented and discussed. In the absence of president I. T. Dyer, on account of illness, vice-president J. B. Sheldon presided at the meetings. G. A. Cellar was elected president and Wm. Bennett vice-president.

It was decided to hold the 1912 convention in New York June 24, but on account of the fact that the national political conventions were to be held about the same time the executive committee of the association changed the date of the meeting to June 4.

Pioneer Telephone Train Dispatching.

The following article taken from the *Mountain States Monitor* will be of interest at this time in connection with the convention of Railway Telegraph Superintendents.

Mr. C. F. Annett, an old-timer and formerly assistant superintendent of telegraph of the Illinois Central Railroad, Chicago, is the author of the article.

He says: The Utah & Nevada Railway Company was one of the first railroads to adopt the telephone exclusively for dispatching and operating its trains. This was in 1884. The railroad extended forty miles from Salt Lake City to Stockton, Utah. At that time Garfield Beach, on this railroad, was the only bathing resort on the Great Salt Lake, and the traffic between the city and the resort was very heavy in the bathing season.

I was general manager of the Rocky Mountain Bell Telephone Company at the time the telephone line was put in. We built it along the railroad right of way. E. G. Holding was foreman of construction and John Bellamy was a lineman on the work. Both of them are still living at Salt Lake City. They were very competent construction men and are the only members of the construction force that I recall now.

Captain Dorris was manager of Garfield Beach and also acted as toll agent for the telephone company there.

Telephones were located at two passing stations between Salt Lake City and the beach, where conductors received their orders. Many trains were handled during the afternoons and evenings in the resort season and not a single accident occurred during the several years that the telephone train dispatching was in use.

The second railroad in the West to adopt telephone train dispatching was also a Utah road.

Hawthorne on Post Cards.—A series of views of the Hawthorne works of the Western Electric Company has recently been arranged for post card use and is intended to give the company's friends a better idea of what the "Electrical Capital of America" really is and what is being done there, industrially and socially. The series consists of twelve views showing a general view of the works and some of the principal departments. The post cards are actual photographs and are remarkable for their clearness and fine detail.

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EQUIPMENT FOR EVERY ELECTRICAL NEED

Programme of Convention of Railway Telegraph Superintendents.

The entertainment committee has decided to abandon the proposed clambake at Traver's Island on Friday, June 7, and have a banquet in the city instead.

Following is the complete programme of the convention.

Monday, June 3, 8 p. m., informal reception in the East Room of the Waldorf-Astoria.

Tuesday, June 4, 10 a. m., business session. Two p. m. paper on "Construction Material and

G. A. CELLAR, PRESIDENT.

Methods," by Mr. R. E. Chetwood, engineer of construction, Western Union Telegraph Company, New York; 3 p. m., paper on "Some Facts Regarding the Handling and Recording of Supplies," by

P. W. DREW, SECRETARY.

Mr. W. G. Higgins, superintendent of supplies, Western Union Telegraph Company, New York; 4 p. m., paper on "Some Notes on Polarized Sounders in Telegraphy," by Mr. Wm. Maver, Jr., New York. The ladies will be taken on a sightseeing tour in automobiles in the afternoon and at night there will be a theatre party given by the New York Telephone Company. The play will be the "Two Little Brides," at the Lyric Theatre, 231 West 42nd street.

Wednesday, June 5, 10 a. m., paper on "The Use of the Main Line Relay in Telephone Selector Operation," by Mr. W. W. Ryder, general superintendent of telegraph, New York Central Lines West, Chicago, Ill.; 11 a. m., paper on "Telegraph Traffic," by Mr. W. N. Fashbaugh, traffic engineer, Western Union Telegraph Company, New York; 12 o'clock, noon, paper on "St. Louis Terminal Telegraph and Telephone Facilities," by Mr. F. E. Bentley, superintendent of telegraph, Terminal Railroad Association, St. Louis, Mo. In the morning there will be a shopping tour for the ladies. At 2 p. m., the men will

WALDORF-ASTORIA—HEADQUARTERS OF ASSOCIATION.

take stages at the Waldorf and be conveyed to the Spring Exchange of the New York Telephone Company which they will inspect, and at 3.15 p. m. they will be conveyed by the same means to the Western Union Building at 195 Broadway. They will inspect the telegraph headquarters for an hour and at 5 o'clock the entire party will reunite at Pier 1 North River and board a steamboat for Coney Island where the visitors will be entertained in the usual Coney Island manner. The party will then be free to return to the city by rail at their pleasure.

Thursday, June 6, 10 a. m., paper on "What the Telephone Has Done for the Santa Fe Railroad," by Mr. L. M. Jones, superintendent of telegraph, Atchison, Topeka and Santa Fe Railway, Topeka, Kan.; 11 a. m., paper on "The Maintenance of Telegraph Lines," by Mr. G. M. Yorke, engineer, Western Union Telegraph Company, New York; 12 o'clock noon, paper on "The Use of Portable Telephones in Railroad Service," by Mr. J. F. Caskey, superintendent of telegraph, Lehigh Valley Railroad, South Bethlehem, Pa. Adjournment will then be taken for lunch, and at 2 p. m., a paper will be read on "Telegraph Line Maintenance," by Mr. W. S. Melton, superintendent of telegraph, Queen & Crescent Route, Danville, Ky. At 3 p. m. the election of officers will take place. The ladies will be taken on a trip around Manhattan Island by boat and at 8 p. m. the entire party will attend a performance at the Winter Garden, Broadway and Fiftieth Street.

On Friday the entire party will board a special train on the Erie Railroad at 9:30 a. m. and be conveyed to West Orange, N. J., where they will inspect the Edison works. The visitors will be entertained at luncheon at the Edison plant at West Orange as the guests of Mr. Edison, after which they will return to New York over the same route. In the evening at 7:00 o'clock there will be a banquet at Martin's, Forty-second Street and Broadway.

The Railroad.

Mr. L. G. Jackson, trainmaster in charge of transportation and telephone service, Philippine Railway Company, Iloilo, P. I., arrived in New York, May 21 from the Philippines by way of Europe on the steamer "Kaiser Wilhelm II." Mr. Jackson expects to attend the Convention of Railway Telegraph Superintendents in New York on June 4.

Mr. Joseph P. Church whose appointment as superintendent of telegraph of the Wabash Railroad, with headquarters at Decatur, Ill., was announced in the May 16 issue, was born in Toledo, Ohio, December 13, 1856, and took up telegraph work July 5, 1870, as messenger at Toledo. He subsequently became delivery clerk and then an operator, and between 1877 and 1893 filled the position of assistant chief operator and electrician. January 1, 1893, he was appointed manager of the Wabash telegraph office at Decatur, and on October 1, 1898, became chief clerk to the superintendent of telegraph of that road.

Except temporary service with the Great Northern Railway at Minot, N. D., from August, 1905, to January, 1906, as Western Union manager and division operator and a few months during 1905 as foreman on the Wabash railroad, Mr. Church has been in the continuous service of the Western Union Company since 1870. He received his present appointment as superintendent on May 1.

O. R. T. Convention.—The Order of Railway Telegraphers, Dispatchers, Agents and Signalmen, held its annual convention in Reading, Pa., May 13, 14 and 15. Mr. J. R. T. Auston was reelected president; Adam Reed, grand secretary and treasurer and J. F. Tatlow, first vice-president. The next convention will be held in Harrisburg, Pa.

The Turner Monument Fund.—Since the dedication of the telegraph monument at Harriman, N. Y., on May 2, an additional subscription toward the fund has been received. The fund now stands as follows: Previously acknowledged, $2,331.09. H. F. Merriman, New York, $1.00; refund on insurance on bronze tablet, $7.50. Total, $2,339.59.

Baltimore & Ohio to Install More Telephones.

The Baltimore and Ohio Railroad, of which Mr. Charles Selden is superintendent of telegraph, has recently placed another order with the Western Electric Company for selector equipment to be used in extending its facilities for dispatching trains by telephone. The division to be equipped extends from Cincinnati, Ohio, to Montgomery, Ind., and, branching off at Seymour, Ind., to go to Louisville, Ky., and Jeffersonville, Ind. There will be three parallel circuits, a train wire, a message wire and a block wire. A feature of the message wire is that it is arranged for "inter-calling," or, in other words, way-stations can call one another. The apparatus to be used is the Western Electric No. 102-B type selector set, containing the No. 50 type selector. There will be one hundred selector stations so equipped, covering a stretch of approximately 250 miles. In all there will be over 800 miles of circuit for train, message and block service.

The Lehigh Valley Installs Additional Telephone Dispatching Apparatus.—With the installation of the additional apparatus recently ordered from the Western Electric Company, the Lehigh Valley Railroad will have equipped all except about 150 miles of its entire system, including main lines and branches, with telephones for train dispatching. A further extension is now being planned. The division to be equipped is the Elmira and Camden Branch, extending over approximately 140 miles of road, wholly within New York State. The dispatcher is to be located in the middle of the line at Cortland, N. Y., and will handle both dispatching circuits, one of which goes to Elmira and the other to Camden. So that two calls may be placed simultaneously on either end of the line, individual calling apparatus is used for each circuit. Thirty-five way stations are to be equipped with Western Electric standard selectors and auxiliary apparatus. Signaling and talking current will be furnished from the dispatcher's office by storage batteries charged by a 1 k.w. motor-generator set. A feature of the Lehigh Valley's circuits is an automatic switching or inter-connecting arrangement which enables the dispatcher on any one division to communicate with the dispatcher on another. This furnishes a means of obtaining information about trains on other divisions before they arrive at divisional terminals. Mr. J. F. Caskey, South Bethlehem, Pa., is superintendent of telegraph.

Concrete Poles.

Mr. P. H. Burns, who has charge of the electrical department of the Bahamas, with headquarters at Nassau, in a recent letter to this publication states that he has constructed some 400 reinforced concrete poles, which are now in service, and has yet 200 more to make to take the place of wooden poles now in use. "These poles," he says, "are great, and have so far laughed at our hurricanes."

Mr. Burns contemplates the construction of a wireless telegraph station for the Government. Bahamas is up-to-date on all electrical matters. The island is connected with Florida by a submarine cable, the telephone and electric-light systems are modern and the contemplated wireless telegraph plant will make the island complete in its up-to-date methods of communication and lighting.

Mr. Michael Fitzgerald, of East Brewster, Cape Cod, Mass., a well-known old-time cable operator, who is now engaged in literary work, in renewing his subscription to our paper writes: "TELEGRAPH AND TELEPHONE AGE is surely a boon to the fraternity. I study it with great interest and I often wonder if members of the craft are appreciative of its invaluable aid to all who aspire to attain something more than a dot-and-dash knowledge of the business. I hear very little from others of what is going on in the service. Indeed, the AGE is my sole informant."

Obituary.

Col. A. C. Waterhouse, aged 80 years, a former telegrapher, died in Chicago, May 13.

R. M. Ford, aged 58 years, manager of the Western Union Telegraph office at Jeffersonville, Ind., died at that place May 14.

A. J. Clarke, aged 44 years, for many years an operator for the Western Union Telegraph Company and a clerk in the city engineer's office, Baltimore, Md., died in that city May 10.

R. H. Orton, son of the late William Orton, former president of the Western Union Telegraph Company, died at Irvington-on-the-Hudson, May 22. Mr. Orton was in the insurance business.

Judge Mabec, chief commissioner of the Canadian Board of Railway Commissioners, who was mentioned in our issue for May 16 in connection with the investigation of press rates in the Dominion as being ill, has since died.

Telephone Pioneers.

The membership of the Telephone Pioneers of America is rapidly increasing, largely through the activity of the recording secretaries in different sections of the country. It now numbers about 800, including thirty-five ladies. Many of new members are from the Pacific Coast.

Mr. W. B. T. Belt, general superintendent of plant, Nebraska Telephone Company, Omaha, Neb., has been appointed recording secretary for the jurisdiction of the Nebraska group of companies.

Secretary Henry W. Pope, of New York, has received a supply of membership pins and watch charms of solid gold and gold plate. They represent the association's well-known triangular emblem, the lettering, etc., being inlaid with enamel. They are for sale to the members.

Annual Meeting of the A. I. E. E.

The annual meeting of the American Institute of Electrical Engineers was held May 21 and officers were elected as follows: Ralph D. Mershon, president; William S. Murray, A. T. Beresford and S. D. Sprong, vice-presidents; Professor Comfort A. Adams, William B. Jackson, William McClellan and J. F. Stevens, managers; George A. Hamilton, treasurer, and F. L. Hutchinson, secretary.

A bronze bust of Joseph Henry, by Mr. Herbert Adams, was presented to the Associazione Elettrotecnica Italiana as a token of appreciation of its gift to the Institute, some years ago, of a bronze bust of Galileo Ferraris and in partial recognition of the courtesies to the president and members of the Institute at the international congress at Turin.

Prof. M. I. Pupin, of Columbia University, New York, made an address on "The Debt We Owe to Henry as a Scientist." Mr. John C. Barclay, formerly assistant general manager and electrical engineer of the Western Union Telegraph Company, New York, spoke on "Henry as the Inventor of the Telegraph."

Employes as Stockholders; The Benefits to Accrue.

BY J. FRANK HOWELL, NEW YORK.

Did you ever stop to think what it would mean to own one or more shares in the company employing you? A voting proxy—small—yes, but not without its effect.

It has always been my contention that every employe, especially telegraphers, regardless of the employing corporation, should strive to be a stockholder in it; that is, of course, if it is a creditable institution, and no one knows this better than the employes. To some this may not seem easy, but like opening a saving bank account, the start is the greatest obstacle. When this is once overcome the rest is comparatively easy to those having steady employment, providing they do not undertake to do too much.

Facts and figures prove that it is to the interest of every one having a little money to invest it in a well-managed property where it will reap the benefits of good association. Moreover the standing of the small property owner in a community is on a higher plane than that of the individual similarly employed, but with no property of any kind. It is the same with the employe-stockholder; his importance towers above the non-

J. FRANK HOWELL,
A Governor of the Consolidated Stock Exchange, New York.

stockholder until it is noticed at home and abroad. Besides this his financial standing is gradually yet continually strengthening.

Earnest, energetic people who desire to make money can never expect to make it, without some deprivation on their part. There is no secret to money-making; the principle is the same in every line of business. Successful saving is based on judgment and patience coupled with a sufficient force of character to control the same. After this the rest is limited only by one's own effort.

A promising sign of the times is the growing appreciation of employes of the advantages attaching to ownership of stock in the companies for which they are working. Such ownership establishes a mutuality of interest that operates to the benefit of both the employer and employe. It makes for stability and good feeling. It gives to the wage-earner a sense of proprietorship that makes him a little more careful of his time, which increases his efficiency and contributes to the strength of the corporate structure.

During the past twelve years there has been a steady increase in the number of small shareholders in our railroad and industrial corporations. A very considerable percentage of these small holders are workingmen who have fallen into the habit of putting their savings into the properties with which they are identified. In a sense it is a development of the profit-sharing plan in force in many manufacturing concerns in this country and the old world. It brings capital and labor into closer and friendlier relationship. It is an insurance against strikes and other forms of waste, loss and violence, always incident to methods of settling disputes under conditions now happily passing into merited disfavor.

More than that, it is practical patriotism. The greater the extent of associated ownership in the business of the country the stronger the guarantee against the assaults upon our institutions by the dangerous elements of society. Every man who becomes financially interested in the success of the business in which he is engaged is a vote for the permanency of the home.

Investment of savings in the stocks of well managed business enterprises will not altogether supersede the practice of depositing in savings banks or investing in building and loan associations, but it is along the same lines and should be encouraged. It is what has made the humbler classes of France the greatest money power in the richest nation (per capita) on earth. In the course of time the American small investor will bulk stronger and have greater influence than the so-called money power or money trust. Things are working that way rapidly and with inexorable certainty.

Decorating the Morse Statue.—The Morse statue in Central Park, New York, was decorated this year as usual by Mr. M. H. Kerner of 195 Broadway. The work was done under the auspices of the Morse Electric Club.

Sudden Deaths of Operators.

Harry C. Stough, aged 49 years, a telegrapher, committed suicide in Toledo, Ohio, May 22.

Samuel I. Herschberger, aged 59 years, an operator for the Western Union Telegraph Company at Albany, N. Y., committed suicide by shooting, on May 25. He had been in the employ of the company for forty years.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL.

A message of sympathy from this office, in the form of a floral wreath, was sent to the home of M. A. Baker, wire chief, whose father died May 23.

Mr. D. McNicol, of the engineer's office, New York, was a recent visitor.

The strawberry season is now at its height and the early morning force has been increased accordingly.

M. Frankel went to Rose Tree May 25 to take care of newspaper file during the races.

NEW YORK WESTERN UNION.

Thomas J. Floyd, aged 60 years, an old-timer and a "shining light" in the telegraph profession some years ago, died in New York May 14.

An order has been posted in this office requiring office girls to "wear plain shirtwaists with moderate high adjustable collars and sleeves that extend below the elbows."

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 $1,650,000, at an average annual cost per $1000 of about four cents a day, and has also accumulated $328,000 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.

Telegraph and Telephone Age

No. 12. NEW YORK, JUNE 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Concerning the Adjustment of Contact Points.

The question of how much play a lever should have between its contact points for best results, is frequently asked and discussed by attendants handling telegraph apparatus, yet opinions differ so widely that a little information concerning the factors which should govern the width of the air gap may help bring about a better understanding.

To begin with, there can be no fixed degree of play for any given instrument, except for circuits in which it is used for a specified purpose and where the current and other conditions are also a fixed or known value. In other words, the "play" varies as the conditions vary.

The general understanding is that the adjustment of a relay is to be made solely by means of the magnet control and the retractile spring. Of course this constitutes the fundamental principle of adjusting, but with a given current the degree of play allowed between contact points makes a marked difference in the distance to which the magnet must be withdrawn, or in the spring tension. For illustration: if we take a four-ohm relay and adjust it so that the air-gap between the magnet and the armature is equal to the thickness of a sheet of tissue paper and then give the lever an almost imperceptible play between the contact points, it is possible to operate it by the key with so feeble a current as two milliamperes. Yet, should the play be then widened in the slightest degree, it may not operate on less than ten or twenty milliamperes. By further widening the play to a maximum of ⅛ of an inch, or a little more, the volume of current necessary to operate it will increase to probably 150 milliamperes, or more, thus demonstrating the fact that with a given magnet and tension adjustment the degree of play governs the range of current values the instrument will respond to without other attention.

Again, the proper amount of play to give the lever of a relay depends upon the condition of the circuit and what is required of it. If the current flowing is weak, and rapid signals are to be made, obviously a minimum play should be given, but if intended for a signal lamp relay where it is expected to be non-operative on a given volume of current, but to close with an excess of current, the rear contact point if moved back slightly will alone make it non-operative to the normal current in the local circuit and responsive to the excess only.

There is one point that should be remembered particularly, and that is, when the lever falls to the back contact point the effect is the same as though the magnet had been withdrawn slightly, hence it requires more current to start the armature forward than is required to hold it there after being restored. The wider the gap the more current required.

Another point is that with a fixed volume of current flowing through the coils it requires a smaller excess of current to close the relay than it could be operated with by key had there been no original current, and also, under these conditions the lever points once closed will remain closed after the excess current has by means of a rheostat been decreased considerably below the volume that would otherwise be required to hold the armature. This phenomenon explains the tendency of relay points to "stick" during wet weather, which, owing to escapes, causes operation to be affected by the increase and decrease method instead of a clean removal of magnetizing energy when a key is opened. It would appear, therefore, that such an adjustment of contact points that prevents undue alterations in the width of the air gap between the magnet and the armature tends to prolong the life of the adjustment. Hence, for current in external Morse circuits the contact points of electromagnets should be maintained as close as is practical. Wet weather demands this adjustment, although dry weather is not so exacting and offers practically the only excuse for wide points.

For local circuits the same instrument demands wide contact points when used for one purpose and close points for another. Take, for example, a repeating sounder. When the points are used as a shunt to supply a substitute current or shift a circuit it must be done as quickly as possible, hence the points should be very close, as in the case of some types of single line repeaters using them. This adjustment applies particularly to relays and transmitters used in connection with Toye repeaters and modifications thereof. On the other hand when a repeating sounder is used as a "bug catcher" on the common side of a quadruplex the contact-point gap should be wider, in order to increase the distance between the front and back contact points so that the armature cannot be attracted during the very brief period of no magnetism, hence the multiplex relay which controls it loses temporary control of its armature.

In the automatic printing telegraph system the contact points of one of the relays are given so wide a play that a small lever is enabled to make five or six contacts successively during the period occupied by the relay lever in reaching its front stop.

In the case of "buzzers" wide contact points admit of fewer strokes per second than do closer adjustments, for a given strength of current, all of which goes to show that contact-point adjustment, like everything else, is a subject for special study in individual cases, as it is governed by existing conditions and not by any set rule.

Recent Telegraph and Telephone Patents.

ISSUED MAY 21.

1,026,850. Telephone Trunking System. To F. M. Davis, Chicago, Ill.

1,027,053. Combined Automatic Telephone-Exchange and Fire-Alarm System. To J. W. Lattig and C. L. Goodrum, Rochester, N. Y.

1,027,238. Receiver for Electromagnetic Waves. To E. R. Carlson, Brooklyn, N. Y.

1,027,239. Telephone-Exchange System. To E. E. Clement, Washington, D. C.

1,027,376. Telegraph Transmitting Machine. To E. d. A. d. V. Atiles, San Juan, Porto Rico.

1,027,392. Telephone-Exchange System. To J. L. Wright, Cleveland, Ohio.

ISSUED MAY 28.

1,027,485. Telephone System. To O. M. Leich, Genoa, Ill.

1,027,494. Telephone Receiver. To S. G. McMeen, Chicago, Ill.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange June 11:

American Telephone and Telegraph Co.	145¾
Mackay Companies	84
Mackay Companies, preferred	68⅝
Western Union Telegraph Co.	83

Tests of Cross Arms.—The Department of Agriculture has issued a pamphlet on "Strength Tests of Cross Arms," by T. R. C. Wilson, assistant engineer in forest products.

Personal.

Mr. S. D. Field, the electrical engineer of Stockbridge, Mass., was a recent New York visitor.

Mr. L. F. Philo has been appointed sales manager at Buffalo for the Western Electric Company.

Mr. Harry E. Dunham, former assistant editor of TELEGRAPH AND TELEPHONE AGE, will be married on June 26 to Miss Julia Louise Reynolds, at Baldwinsville, N. Y.

Miss Ruth Hough, daughter of Mr. I. D. Hough, of Omaha, Neb., a well-known telegrapher in the west, was married May 15 to Mr. J. O. Butler, of Olivet, Mich.

Mr. Edward Connett, commissioner of public utilities in New York, who recently was made vice-president of the National Utilities Company, Buffalo, N. Y., was at one time a telegraph operator.

Lieutenant G. R. Guild of Washington, D. C., will read a paper at the annual meeting of the American Institute of Electrical Engineers in Boston on June 24 on the subject of "Polarized Sounders."

Mr. Geo. M. Myers, an old-time telegrapher of Kansas City, Mo., has just returned home from a trip around the world. He was accompanied by his wife and daughter and reports enjoying every minute of the time he was absent.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, New York, received the congratulations of his many friends on the fifteenth anniversary of his wedding June 10.

Mr. J. G. Blake, general superintendent, San Francisco, Cal., is in New York on company business, and will not return to the Pacific Coast until about June 20.

Mr. W. J. Camp, assistant manager Canadian Pacific Railway Company's Telegraph, Montreal, Que., and Mm. Marshall, superintendent, Canadian Pacific Railway Company's Telegraph, Toronto, Ont., were recent executive office visitors.

Mr. D. McNicol of the electrical engineer's office, has returned from a trip to Philadelphia, Buffalo and other points in New York State on company business.

Messrs. F. F. Norton, superintendent of traffic, and P. J. O'Donohue, division electrical engineer, New York, have gone to Chicago in connection with the Republican national convention.

Miss Thalia N. Brown, chief clerk to Mr. E. J. Nally, vice-president and general manager, New York, will sail for Europe on the steamer "Adriatic" of the White Star Line, June 27. Miss Brown will visit England and the principal continental countries and will be gone two months.

On Decoration Day the employes of the supply department placed a floral wreath upon the grave of the late W. D. Francis.

Mr. H. R. Cook, manager of the Postal Telegraph-Cable Company at Pittston, Pa., has resigned on account of ill health. Mr. Cook has been appointed district grand deputy for the Heralds of Liberty, a fraternal insurance company, for several counties in Pennsylvania.

The arrangements for handling the heavy traffic incident to the National conventions at Chicago and Baltimore are very complete, and were carried out under the direction of Mr. M. M. Davis, New York, electrical engineer and superintendent of telephones. Mr. H. C. Shaw will be in charge of the electrical equipment at Chicago and Mr. J. P. O'Donohue, of electrical engineer's office New York, will be in charge at Baltimore.

The library of the employes of the Postal and of the Commercial Cable companies, New York, has been moved into larger quarters on the tenth floor. There are now 1200 volumes in the library. Miss Elizabeth Allen is the librarian.

Postal Conference in Atlanta.

A conference of managers in the Southern division of the Postal Telegraph-Cable Company was held at Atlanta, Ga., May 23, 24 and 25, in the offices of general superintendent G. H. Usher. Mr. A. M. Beatty, manager, Atlanta, read a paper on "Pick-up-Telephone and Delivery Service," and one on "Business Getting," was read by Mr. A. P. Martin, manager, Nashville, Tenn. "Office Organization" was discussed by Mr. T. D. Jackson, manager, Birmingham, Ala.

On May 23 the party attended the theatre in a body and in the evening of May 24 a banquet was held at the Capital City Club, Mr. G. H. Usher, acting as "chef." Jesse Hargrave, division superintendent, Atlanta, responded to the "roast" "Electric Currents and Other Shocks;" superintendent G. W. Ribble, "The Visiting Managers, the Boosters' Club;" superintendent W. C. Daviet, "Postal Telegraph Club, Just a Few Splinters;" superintendent W. C. Lloyd, "Postal Spirits, Intoxicating but Non-Alcoholic," and superintendent C. H. Ashburn, "The Absent Managers, On the Job and Not Forgotten." The banquet concluded with a standing toast to president Clarence H. Mackay.

Among those present, in addition to those already mentioned, were the following managers: J. C. Dolive, Tampa, Fla.; H. R. Waterbury, Jacksonville, Fla.; W. T. Austin, Savannah, Ga.; C. M. Grier, Macon, Ga.; Fred L. Wood, Augusta, Ga.; C. H. Johnson, Memphis, Tenn.; L. W. Janes, Louisville, Ky.; J. S. Greever, Chattanooga, Tenn.; J. J. Barnett, Knoxville, Tenn.; N. E. Church, New Orleans, La.; W. B. Cole, Pensacola, Fla.; W. R. Hurst, Mobile, Ala.; F. A. Bivins, Montgomery, Ala.; R. C. Hackett, Vicksburg, Miss.; H. A. Lanier, Norfolk, Va.; W. O. Gaffney, Charlotte, N. C.; C. T. Snydor, Richmond, Va.; W. B. Stuart, Columbia, S. C.; W. E. Harrington, Atlanta, Ga.

The following members of the Postal Telegraph Club of Atlanta attended the banquet: C. H. Ashburn, Jr., J. E. Arnold, William Boles, J. Bartlett, '. L. Cameron, C. Cowan, D. C. DeLaney, J. D. Ewing, F. H. Floyd, R. D. Guinn, F. H. Howell, J. F. Heard, C. E. Harrison, W. H. Jackson, C. G. Knapp, J. H. McKerley, L. A. Minor, G. W. Oliver, H. W. Pearce, F. F. Pursley, E. E. Roberson, W. E. Sitton, J. A. Spurlock, R. L. Strong, H. P. Thornton and R. F. Williamson.

J. Nering, Manager Postal Telegraph-Cable Company, Chicago.

Mr. John Nering, whose appointment as manager of the Chicago office of the Postal Telegraph-Cable Company was announced in our May 16 issue, is a native of Chicago, having been born there on December 5, 1871. He entered the telegraph service as messenger for the Western Union Company in Chicago in June, 1884, and his entire business career has been spent in that city.

J. NERING,
Manager Postal Telegraph-Cable Company, Chicago.

While in the Western Union service he advanced from messenger through the positions of clerk and operator in branch offices and in September, 1889, entered the employment of the Postal Telegraph-Cable Company as operator in the sugar and coffee district branch office, of which he became chief operator in May, 1893, and on December 5, 1900, he was appointed manager. He was transferred to the main office August 25, 1904, as assistant manager in charge of branches, and on May 1 of this year was advanced to the managership.

May Destroy Messages.—The interstate commerce commission has granted telegraph and cable companies permission to destroy all original messages sent by the public after being preserved for one year.

Mr. H. A. Tuttle, president and general manager of the North American Telegraph Company, Minneapolis, Minn., writes: "If you had not renewed my subscription to TELEGRAPH AND TELEPHONE AGE there would have been trouble. In it I always find more than the money's worth."

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company arrived from Europe June 12 on the steamer "Olympic."

Mr. L. H. Beck, division plant superintendent, Atlanta, Ga., Mr. R. W. Whitehead, division plant superintendent, Chicago, and B. P. Hancock and J. P. Edwards, special agents, Atlanta, Ga., were recent New York visitors on company business.

Messrs. B. P. Hancock and J. P. Edwards, special agents, Atlanta, Ga., were recent business visitors to New York.

Mr. J. F. Nathan, commercial superintendent; Mr. S. M. Williams, manager of press service; John Simmonds, district commercial manager, and L. Wingate of the *World* office, New York, have gone to Chicago in connection with the work of the national Republican convention.

Mr. William McD. Milne, formerly of Denver, Col., is now division auditor with headquarters at Chicago, Ill.

Mr. J. W. Gaffney has been appointed district commercial manager of the first district, Eastern Division, with headquarters at New Haven, Conn.

Mr. J. B. Dillon of the Dallas, Tex., office has been promoted to be district wire chief and supervisor of equipment with headquarters at the same point. Mr. Dillon has had a wide experience in the telegraph service and is well fitted for his new duties.

Mr. W. H. Peterson, manager at Scranton, Pa., has been appointed assistant traffic supervisor at the same point. Mr. S. G. Smith, formerly manager at Williamsport, Pa., succeeds Mr. Peterson as manager at Scranton, and Mr. H. W. Eberly succeeds Mr. Smith at Williamsport.

At the annual meeting of the American Union Telegraph Company, held May 29, Messrs. G. W. E. Atkins, A. R. Brewer, B. Brooks, Newcomb Carlton, Geo. H. Fearons, A. G. Saylor and J. B. Van Every, were elected directors. Mr. Theo. N. Vail was elected president, Thos. F. Clark vice-president, Wm. H. Baker, secretary and A. R. Brewer treasurer.

The second meeting of the commercial managers of the sixth district, Western Division, was held at Indianapolis, Ind., May 24. The purpose of the meeting was for the exploitation of universal service, development of revenues, etc. Mr. A. A. Montgomery, district traffic superintendent, of Cincinnati, Ohio, was present and gave an instructive talk upon the subject of "Moving the Business." Telegrams were received from Mr. M. T. Cook, division commercial superintendent, and Mr. W. J. Lloyd, division traffic superintendent, Chicago, expressing regrets of their inability to attend and congratulating the field forces upon the splendid results attained. Among the managers present were: J. W. Miles, Lawrenceville, Ill.; F. B. Bradley, Mattoon, Ill.; J. S. Meador, Mt. Vernon, Ill.; H. K. Armstrong, Anderson, Ind.; J. R. Sample, Bedford, Ind.; J. E. Riley, Bloomington, Ind.; J. J. Lash, Columbus, Ind.; H. A. Hutton, Crawfordsville, Ind.; A. A. Burr, Evansville, Ind.; R. J. Hammond, Frankfort, Ind.; Z. M. Apple, French Lick, Ind.; P. L. Mounce, Indianapolis, Ind.; M. H. Hutton, Kokomo, Ind.; E. L. Dyer, Lafayette, Ind.; Chas. Massena, Logansport, Ind.; F. J. Rhorer, Marion, Ind.; W. E. Jarvis, Muncie, Ind.; W. A. Mossman, New Albany, Ind.; F. W. Booher, New Castle, Ind.; F. M. Andres, Peru, Ind.; J. P. Freeman, Richmond, Ind.; R. E. Scorah, Terre Haute, Ind.; R. H. Underwood, West Baden, Ind.; S. A. Rhodes, Bellefontaine, Ohio; J. H. Jarvis, Greenville, Ohio; W. W. Born, Kenton, Ohio; C. W. Mason, Marion, Ohio; C. E. Machir, Piqua, Ohio; G. W. Morton, Sidney, Ohio; Miss E. E. Martin, Tiffin, Ohio; M. A. Ryan, Urbana, Ohio.

Mr. J. S. Calvert, district superintendent, Richmond, Va., announces the following appointments of managers: J. L. Duffell at Abbeville, S. C., vice T. C. Greer; H. M. Armistead, former manager at Salisbury, N. C., at Raleigh, N. C., vice C. B. Wade, who leaves the service; E. C. Seagle at Rutherfordton, N. C., vice L. W. Bowden; C. N. Martin at Winston-Salem, N. C., vice D. F. Cason, resigned; Miss Alyce H. Alexander at Lexington, N. C., vice O. L. Patterson; Miss Lessie Snipes at Kershaw, S. C., vice G. P. McMillan, transferred to Newberry, S. C.; Miss E. P. Wood at Rocky Mount, N. C., vice Miss M. E. Riley; A. H. Nowell at Greensboro, N. C., vice John Shinberger, transferred to Roanoke, Va., vice J. F. Terrell appointed second district manager for the State of Virginia, with headquarters at Roanoke; W. A. Wentz at Chester, S. C., vice T. H. Chancellor; Miss Genevieve Moore at Monroe, N. C., vice Miss M. M. Pyron; Jerome Farmer at Gaffney, S. C., vice T. C. Parker; G. P. McMillan at Newberry, S. C., vice C. A. Murphy, transferred to Salisbury, N. C.; vice C. N. Martin, transferred to Winston-Salem as manager; Samuel Cain at Clinton, N. C., vice J. H. Carpenter, transferred to the managership at Washington, N. C., vice W. R. Staples; E. M. Canada, night chief operator at Norfolk, Va., has been promoted to the position of second district manager for the state of North Carolina, with headquarters at Raleigh, N. C.

The quarterly meeting of the Western Union Telegraph Company was held June 12. The statement for the quarter shows net earnings of $1,139,980, against $1,982,493 in the same quarter of 1911, and $1,950,000 for the same three months in 1910. After the payment of bond interest, amounting to $347,633, against $433,953 in 1911, dividends of $748,005, against $747,887 in the same quarter of the previous year, there remained a surplus for the quarter of $44,342, which compares with $800,653 in 1911. The gross earnings for the quarter amounted to $10,901,850 and total operating expenses, including depreciation and taxes, $9,761,870.

The Telephone.

Mr. P. H. Hopkins, commercial superintendent of the Mountain States Telephone and Telegraph Company, Salt Lake City, Utah, has resigned to accept the position of special agent in the office of F. L. Gilman, general manager of the Missouri, Kansas and Texas Railroad, at Kansas City, Mo.

Mr. D. H. Fitch, electrician of the Cazenovia, N. Y., telephone exchange, has resigned that position. Mr. Fitch, who is an old-time telegrapher and a member of the Society of the United States Military Telegraph Corps, established the Cazenovia exchange in 1894. He is a member of the Telephone Pioneers of America.

The New England Telephone and Telegraph Company has announced a new pension system which will go into effect on July 1. The minimum amount is $25 per month and the maximum $100 per month. After twenty years of service an employe of the company may be pensioned for disability at sixty; at sixty-five he may retire upon a pension at his own volition, and at seventy retirement is compulsory unless the board of directors decides to make an exception.

Ants Destroy Telephone Cables.—The lead covering and insulation of telephone cables in Austria are being attacked and destroyed by white ants. This trouble has been reported before from other countries.

Value of National Telephone Company's Property.—It is stated that the claim of the National Telephone Company against the British Post Office for the purchase of the telephone system amounts to $104,625,000.

Telephone Service in England.—The British Postmaster General stated, at the annual dinner of the London Chamber of Commerce, that in 50,000 telephone calls during the preceding six months, the average time between the ring and the answer was 5.1 seconds, and the average time used in making the desired connection was 28.6 seconds. This time compares very favorably with the American service as indicated in a recent statement by the New York Public Service Commission.

Telephone Herald.—Another trial of the plan for news distribution by telephone will soon be made in Philadelphia by a company which has been organized for this purpose. It is purposed to charge $1.50 a month to subscribers who will be supplied with all kinds of news through the day on a regular schedule, and with musical entertainments in the evening.

The New Jersey "Telephone Herald" which conducted a similar business in Newark, N. J., and failed last February, owing to lack of capital, has resumed business, having secured new capital.

Radio-Telegraphy.

Wireless in Constantinople.—The Turkish government has decided to prohibit the use of wireless telegraphy by ships in the port of Constantinople.

Wireless at Carnegie Schools.—Students at the Carnegie Institute of Technology at Pittsburgh, Pa., have established a wireless station which it is stated, has an operating radius of 200 miles.

Telephone Extension in Fort Smith.—The Southwestern Telegraph and Telephone Company, has appropriated $45,000 for extensions and improvements to its plant in Ft. Smith, Ark.

Two Wireless Operators on Allan Steamers.—The Allan Royal Mail Line has arranged with the Marconi Wireless Telegraph Company, to carry two wireless operators on every ship of the Allan fleet.

Wireless Telephony.—It is stated that the Italian naval and military authorities have established wireless telephone communication between Monte Mario and Becco di Vela, on Madalena Island, a distance of about 160 miles.

German Wireless Regulations.—New official regulations, according to which all German passenger steamers carrying seventy-five or more persons, inclusive of the crew, must be equipped with wireless apparatus with a radius of 100 sea miles, will go into effect on October 1.

Wireless Telephones on Danish Steamers.—All Danish passenger steamers and ferryboats on the route between Sweden and Germany are to be equipped with wireless telephones. No operator is necessary. Twenty wireless telephone stations will be erected on the Danish, German, and Swedish coasts.

Wireless Telephony in France.—It is reported from Toulon, France, that remarkable success has attended the experiments in wireless telephony being conducted on the yacht "Hirondelle," belonging to Prince Albert of Monaco. It is said that the "Marsellaise" played at Algiers was registered and definitely heard aboard the "Hirondelle" lying off Toulon. M. de Lepel is the inventor of the apparatus used.

Wireless from Aeroplanes.—Wireless messages were successfully transmitted from an aeroplane in flight in tests recently made at Chartres, France. Mr. Rouzet of the Société Radio-Electricite, the inventor of the apparatus accompanied M. Frantz in his biplane on an extended flight and sent messages which were clearly recorded at a distance of thirty miles. The wireless apparatus complete weighs only seventy pounds.

Deferred Rate for Wireless Messages.—The Marconi Wireless Telegraph Company has instituted a deferred transatlantic service at eight cents per word. The rate for immediate service will hereafter be sixteen cents per word. All telegraph offices in the United Kingdom will co-operate with the Marconi system is this schedule, and the Western Union Company will be the receiver and distributer in the United States and Canada.

Poulsen System of High-Speed Wireless Transmission.—An illustrated description of the stations and appliances for experimental high speed wireless transmission (Poulsen system) between Lyngby, Denmark, and Cullercoats, England, is given in the *Post Office Electrical Engineers' Journal* of London. A demonstration of the system at speeds of upwards of 200 words per minute was recently given across the 550 miles separating the two stations.

Wireless to French Possessions.—The French Government is considering a scheme for the establishment of a system of wireless telegraphy connecting with all the French Colonial possessions. The system would extend from Paris to Timbuctoo in the Sahara, to the Marquises Islands and to Martinique. All the French war vessels are to be equipped with outfits, and it is expected that all the large French steamship companies will follow the example.

Wireless Telephony for Russian Police.—Mr. Keller, an electrical engineer of Warsaw, Russia, has invented a system of wireless telephony whereby policemen on duty in the town can communicate with their stations without leaving their posts. The policeman carries the apparatus in his pocket and hangs it onto the wall of the nearest house when wanted. He then presses a button, which gives the signal at the nearest station. It is stated that the voice is very distinct.

Credit for Operator Cottam of the "Carpathia."—Inasmuch as Captain Rostron of the steamer "Carpathia," who rescued over 700 of the "Titanic's" passengers from life-boats, has been receiving honors and encomiums for his valor, it has been pointed out that wireless operator H. T. Cottam of that steamer is deserving of equal credit for his part in the rescue work. Had it not been for his attention to duty the results of the disaster probably would have been very different to what they were.

Connecting North and South America by Wireless.—The Marconi Wireless Telegraph Company of America has arranged to equip stations at New Orleans, at Swan Island in the Caribbean sea and at Santa Marta, Colombia, thus providing a direct wireless service between North and South America. The new stations are to be erected for the United Fruit Company. The Santa Marta station is well advanced and work on the other stations will be started in a few weeks. Mr. M. Musgrave, New Orleans, La., is superintendent of the electrical department of the Fruit Company.

Wireless at Sea.—Mr. H. Samuels, postmaster general of Great Britain states that all wireless telegraph installations on board British ships are capable of being used for inter-communication with other systems, and they are worked in accordance with licenses issued by the Post Office. The Radio-Telegraph Convention he said does not provide for the compulsory interchange of messages between ships for other than distress purposes, and the Marconi Company declined to intercommunicate, except in cases of distress, with ships fitted with other systems unless the matter had been arranged by agreement.

Wireless Telegraphy in Spain.—Some of the difficulties of obtaining a reliable ground connection for a wireless telegraph station may be obtained from the experience had at Santa Cruz, on the Island of Teneriffe. The ground there is practically volcanic lava and the climate very dry and in order to obtain good earth connection it was necessary to dig a trench 495 feet long and 6½ feet deep in which were buried sheets of galvanized iron. The guaranteed range of this station as well as that of the other three stations at Cadiz, Las Palmas and Barcelona, is about 110 miles.

Wireless During Eclipse of Sun.—Mr. W. H. Eccles of London, England, made some interesting wireless experiments during the eclipse of the sun on April 17. It has always been observed that the electric waves used in wireless telegraphy travel better during the times of darkness than in daylight; also that stray atmospheric discharges are propagated better in darkness than in light. Mr. Eccles' observations on the strength of signals and "strays" showed that the usual effect was produced, the signals and stray currents being intensified during the eclipse. Another feature brought out was the fact that during portions of time in the period of greatest darkness propagation was hindered.

New Marconi Stations on the New Jersey Coast.—The Marconi Wireless Telegraph Company of America has purchased 550 acres of land near Belmar, N. J., which it intends to use as a site for the erection of a high-power wireless station from which communication can be held direct with London. The price paid for the land was between $125,000 and $140,000 and it is expected that the cost of erecting the plant will reach $750,000. The company has also obtained an option on land at Tom's River on which it is planned to build a duplex station from which sending and receiving messages can be carried on at the same time. The new plant will be completed in June, 1913, and it will then be possible, it is claimed, to transmit a message to London by wireless in as short a time as by cable. Mr. Marconi will come to New York in September and will personally supervise the work of construction.

Mr. E. Reynolds, vice-president and auditor of the Postal Telegraph-Cable Company, of New York, writes: "It is with much pleasure that I renew my subscription for your excellent publication for another year. Without it I do not know how I should keep posted with regard to many matters of interest affecting our business."

Annual Convention of Association of Railway Telegraph Superintendents.

[The next convention will be held at St. Louis, Mo., May 20, 1913. Mr. J. B. Sheldon, of Omaha, Neb., is the new president.]

The thirty-first annual convention of the Association of Railway Telegraph Superintendents was called to order at 10:20 a. m., June 4, at the Waldorf-Astoria Hotel, New York, by President G. A. Cellar of Pittsburg, Pa. There was a large attendance of members at the opening exercises, and many ladies, the wives and daughters of the members.

Secretary P. W. Drew of Chicago read a letter from the American Telephone and Telegraph Company extending the courtesies of free telephone service, both local and long distance.

The following new members were then elected:

Active—C. G. Baird, manager telegraphs and telephones, Pennsylvania Railroad, New York; C. P. Dugan, superintendent of transportation, Norfolk and Southern, Norfolk, Va.; C. A. Worst, assistant superintendent of telegraph, Chicago, Burlington & Quincy, Chicago, Ill.; E. E. Backus, superintendent telegraph, El Paso and Southwestern, El Paso, Tex.; Robert H. Corson, telephone inspector, Erie Railroad, Jersey City, N. J.; C. H. Hubbell, superintendent telegraph, Chicago, Rock Island and Pacific, Chicago, Ill.; D. J. Kavanaugh, assistant general foreman, Illinois Central, Memphis, Tenn.; C. E. Marsh, chief clerk to general superintendent, Kansas City Terminal, Kansas City, Mo., and B. S. Jenkins, general superintendent telegraph, Western Lines, Canadian Pacific Railway, Winnipeg, Man.

Associate—B. S. Stewart and R. E. Green, Standard Underground Cable Company, Chicago, Ill.; C. S. Pflasterer, National Carbon Company, Cleveland, Ohio; H. T. Vaille, railroad agent, Mountain States Telephone and Telegraph Company, Denver, Col.; F. J. Lepreau, salesman, Thos. A. Edison, Inc., Chicago, Ill.; Wm. Henry Jaques, vice-president and general manager, United Telephone Company, Boston, Mass.; J. W. Young, Kerite Insulated Wire and Cable Company, New York; C. S. Rhoads, Jr., General Railway Equipment Company, New York; Claude L. Matthews, vice-president; W. N. Matthews and Bros., St. Louis Mo.; R. E. Chetwood, engineer of construction, Western Union Telegraph Company, New York.

President G. A. Cellar then read his annual address.

Mr. Cellar gave a comprehensive review of the affairs of the association in the past year and predicted a prosperity during the coming year beyond anything previously experienced by the association. He suggested the desirability of selecting a more favorable time for the annual meetings than the month of June, and the Reid memorial was referred to. "The railway telegraph superintendents," he said, "have a peculiar interest in anything connected with the memory of practically the first telegraph superintendent." He offered a warning as to the relations between the association and the Railway Telegraph and Telephone Appliance Association, and commended to the members the deep and careful study of the association's responsibilities in the matter of affiliation with the appliance association. A plan for conducting missionary work in an effort to encourage the membership of the association was suggested, and in closing, president Cellar extended his thanks to the various committees for their work in the interest of the association.

The reports of the secretary-treasurer, auditors and executive committee were then read. They showed the Association to be in a sound financial condition, and increasing in membership. There are 105 active members and 64 associate members of the association.

Mr. E. C. Keenan, chairman, read the report of the committee on wire crossings. The committee reported having held several meetings and drafted part of the specifications, but was unable to get them completed for submission at this meeting. It was suggested therefore that the committee continue the work. The proposed specifications refer to the

J. B. SHELDON, PRESIDENT.

construction and maintenance of aerial wires or cables of telephone, telegraph, signal and all other wires of similar character, crossing railroad rights of way, etc. The wires to be covered by the specifications are not to carry more than 550 volts.

The report of the committee on high tension wire crossings was read and on the recommendation of president Cellar, section 18 was amended with respect to the insulation of guy wires.

Mr. E. P. Griffith, chairman of the committee on the delivery of telegrams on trains, reported progress, and the committee was continued. Mr. Griffith also made the final report of the Turner Monument Fund Committee. He briefly reviewed the history of the movement and referred to the dedication on May 2, as reported in TELEGRAPH AND TELEPHONE AGE of May 16, closing with a financial statement of the disposition of the fund, which showed a balance of $735.15 on hand. Of this it was agreed to pay the sculptor, Mr. Charles Keck, of New York, an additional $500 for extra work on the tablet and monument, and the balance of $235 was appropriated to cover the expense of producing a pamphlet giving a history of the movement which was so successfully terminated on May 2 in the dedication services at Harriman, N. Y.

The report of the committee on miscellaneous matters was next read by Mr. E. A. Chenery of St. Louis, chairman, on the subject of protection of poles against grass fires. The committee recommended clearing the ground of grass within a radius of five feet or more around the poles. Remarks on the subject were made by Messrs. W. W. Ryder, G. A. Dornberg and W. J. Camp. The raising of wires to escape moving buildings, etc., and the protection of linemen in handling wires were also subjects which received the committee's consideration.

Mr. L. M. Jones, chairman of the committee on standardization of rules governing the handling of train orders by telephone, stated that on account of the difficulty in securing a quorum, the committee had not been able to take any definite action. He therefore reported progress, and the committee was continued. Mr. L. B. Foley, representing the association on the James D. Reid Memorial Committee, made a few remarks on the subject.

At the afternoon session, secretary Drew read a letter from Mr. Belvidere Brooks, general manager of the Western Union Telegraph Company, extending the free use of that company's wires to the members and their families during the convention for social correspondence.

The paper of Mr. R. E. Chetwood, engineer of construction of the Western Union Telegraph Company, New York, on "Construction Materials and Methods," was read in abstract by the author, printed copies having been in the hands of the members for two weeks.

The paper brought out a very lengthy and interesting discussion which was participated in by Messrs. W. J. Camp, M. H. Clapp, J. C. Hubbard, Charles Selden, G. A. Dornberg, C. S. Rhoads, M. C. Allen and others.

Mr. Camp described in detail the practice and experience of the Canadian Pacific Railway's Telegraph in regard to the size of poles, spacing of wires on cross arms, insulators, underground service, etc. His road, he said, favored porcelain insulators, and he exhibited some samples of such insulators used on his company's lines. The Canadian Pacific Telegraph uses nothing but tile conduit for underground service. Double cross-arms, he stated, were required by the Canadian Pacific Railway Commission at crossings.

Mr. Drew called attention to some of the possible dangers of using short poles. The insulators made excellent targets for small boys with baseball proclivities, and he cited instances of much trouble on his lines from this cause.

A paper on "The Handling of Supplies" by Mr. W. G. Higgins, superintendent of supplies of the Western Union Telegraph Company, New York, having been previously distributed among the members, was read in abstract by the author and discussed by Messrs. E. A. Chenery, W. F. Williams and others.

Mr. Wm. Maver, Jr., of New York, closed the afternoon session with an interesting paper on "Some Notes on the Polarized Sounder in Telegraphy," and showed the instrument in actual operation.

WEDNESDAY'S SESSION.

The meeting was called to order at 10 a. m. by President Cellar, who introduced Mr. Belvidere Brooks, general manager of the Western Union Telegraph Company. Mr. Brooks greeted the members of the association and spoke of the amicable relations existing between the telegraph and railroad companies.

Mr. Angus S. Hibbard, executive department of the American Telephone and Telegraph Company, New York, was next introduced. He described the relations of the telephone and the telegraph in their practical operation. He stated that there were now over 300 joint telegraph and telephone offices in small towns, and very satisfactory service was being rendered. By this arrangement twenty-four-hour telegraph service was given where it would not pay to keep telegraph offices open continuously. He referred in detail to the methods of handling the service between the telegraph and the telephone, and pointed out the many advantages to the public therefrom.

A paper entitled "Telegraph and Telephone Facilities of the St. Louis Terminal" was then read by Mr. F. E. Bentley, superintendent of telegraph of the Terminal Railroad Association, St. Louis, Mo., and this was followed by a paper on "The Use of the Main Line Relay in Telephone Selector Operation," by W. W. Ryder, general superintendent of telegraph of the New York Central Lines, Chicago. A lengthy discussion took place on Mr. Ryder's paper, and was participated in by Mr. W. E. Harkness, V. T. Kissinger, Wm. Bennett, G. K. Heyer, W. L. Cook, W. J. Camp and L. M. Jones. These gentlemen related their experiences with main line relays in connection with the operation of selectors, and pointed out the advantages and disadvantages of this method of selector control.

The next paper read was one by Mr. W. N. Fashbaugh, traffic engineer of the Western Union Telegraph Company, New York, entitled "Telegraph Traffic." In the discussion, Mr. Charles Selden explained the method of handling traffic on his lines. Mr. E. C. Keenan referred to the traffic arrangements on his road. The telephone, he said, gave much quicker service than the telegraph and was in every way much more satisfactory. Mr. S. B. Haig referred to the work of the Western Union Telegraph Company in carrying out its plans for the improvement of traffic facilities, and pointed out that the personal interest of the operator was of the utmost importance. Mr. H. T. Vaille complimented the association on its telephone work.

THURSDAY'S SESSION.

President Cellar called the meeting to order promptly, and made a statement with reference to the proposed Reid memorial. For the enlightenment of the members as to the plan of the project, he distributed some copies of the pamphlet issued by the memorial general committee.

Mr. W. W. Ryder suggested the desirability of starting a campaign for the enlargement of the membership of the association, and moved that a membership committee of five be appointed. The motion was carried.

A paper entitled "What the Telephone Has Done for the Santa Fe Railway" was then read by Mr. L. M. Jones, of the Atchison, Topeka and Santa Fe Railway, Topeka, Kan. The paper was discussed by Messrs. Chas. Selden, F. T. Wilbur, W. J. Camp, W. W. Ryder and S. L. Van Akin, Jr.

The next paper was one by Mr. G. M. Yorke, engineer of the Western Union Telegraph Company, New York, on "The Maintenance of Telegraph Lines," and it was discussed by Messrs. E. A. Chenery, L. H. Beck, V. T. Kissinger, M. H. Clapp, G. A. Dornberg, M. C. Allen, W. J. Camp, E. C. Keenan and J. J. Ross.

Mr. J. F. Caskey of the Lehigh Valley Railroad, South Bethlehem, Pa., then presented a paper entitled "The Use of the Portable Telephone in Railroad Service."

At the afternoon session Messrs. G. C. Kinsman and J. S. Stevens, former superintendents of telegraph of the Wabash and of the Chesapeake and Ohio railroads, respectively, were elected honorary members of the association, in accordance with the rules.

The discussion of Mr. Caskey's paper read at the morning session was then taken up. Messrs. J. B. Sheldon, W. W. Ryder, W. J. Camp, S. L. Van Akin, Jr., W. C. Walstrum, J. J. Ross, C. A. Parker, Chas. Selden and E. A. Chenery gave some interesting facts regarding the use of portable telephones on their respective lines, and much information of value was brought out. Following the discussion on Mr. Caskey's paper. a paper on "Telegraph Line Maintenance" was read by Mr. W. S. Melton of the "Queen and Crescent Route," Danville, Ky., and discussed by Messrs. J. J. Ross and F. J. Howe.

The committee on resolutions then made its report tendering the thanks of the association for courtesies extended by the New York Telephone Company, the Railway Telegraph and Telephone Appliance Association, the Western Union Telegraph Company, Mr. Belvidere Brooks personally and others who contributed toward the entertainment of the association.

Memorial resolutions were also passed on the deaths of the late I. T. Dyer of the San Pedro, Los Angeles and Salt Lake Railroad, Los Angeles, Cal., former president of the association, and J. G. Jennings of the Chicago, Rock Island and Pacific Railroad, Chicago.

A communication was read from Mr. James Kent, manager of the Canadian Pacific Railway's Telegraph. Montreal, Que., giving an account of an interesting experience in the use of dry batteries at Sudbury, Ont., during a flood which submerged the storage battery. Dry batteries were pressed into service to supply energy for the operation of several circuits, including duplexes and quadruplexes, with very satisfactory results.

A meeting of the executive committee was then held, after which the following named officers were elected: President, J. B. Sheldon, Union Pacific Railway, Omaha, Neb.; vice-president, Wm. Bennett, Chicago and North Western Railroad, Chicago; second vice-president, A. B. Taylor, New York Central Lines, New York; secretary and treasurer, P. W. Drew, Minneapolis, St. Paul and Sault Ste. Marie Railway, Chicago. The new officers were then duly installed, after which St. Louis, Mo., was selected as the place of the next annual convention, May 20, 1913, being fixed as the date.

A resolution was passed thanking the committee on topics for their work in securing so many excellent papers, and then at 5:20 p. m. the convention adjourned.

ENTERTAINMENT.

On Monday evening an informal reception was held in the East Room at the Waldorf-Astoria Hotel.

Tuesday morning the ladies spent in shopping and sightseeing, and in the afternoon they were taken on an automobile sight-seeing ride around the city. In the evening the entire party, through the courtesy of the New York Telephone Company, attended the Comedy Theatre, where they witnessed the play, "When Bunty Pulls the Strings."

Wednesday morning the ladies were free to spend the time as suited their fancy, and were kept busy shopping, sightseeing and indulging in other forms of entertainment.

Mr. Angus S. Hibbard, of the executive department of the American Telephone and Telegraph Company, entertained about 50 of the members at luncheon in the café of the Waldorf-Astoria after adjournment on Wednesday. It was entirely informal and a very enjoyable affair.

At 2 o'clock the men left the hotel in Fifth Avenue motor buses, and were conveyed to the Spring exchange of the New York Telephone Company, where they spent an hour inspecting this modern telephone establishment. At 3 p. m. they resumed the bus trip and were taken to the Western Union headquarters at 195 Broadway, which they also inspected, and at 4.30 o'clock they were conveyed to Pier 1, North River, where they boarded a steamboat for Coney Island. At this famous resort they were tendered a shore dinner at Feltman's, after which they were let loose to enjoy themselves. Most of the party returned to New York by rail.

Owing to the rain on Thursday afternoon, the scheduled trip around Manhattan Island on a sightseeing yacht for the ladies was abandoned. A theatre party was made up instead, and the ladies attended the Lyceum Theatre on Forty-fifth Street. In the evening, the entire party attended the Winter Garden at Broadway and Fiftieth Street.

On Friday, the party visited the Edison Works at West Orange, N. J., and after an inspection of the plant, luncheon was served through the courtesy of Mr. T. A. Edison. Everyone was delighted with the hearty reception accorded by Mr. Edison. A moving picture of the 275 visitors was taken, and shortly afterward shown on the screen to the amusement of all. A group picture of the entire party was also taken, and copies will be distributed among the members, with compliments of Mr. Edison. An up-to-date phonograph entertainment and picture show was enjoyed by the visitors for about two hours in Mr. Edison's spacious library. The trip was made to West Orange over the Erie Railroad by special train, and the visitors returned in the afternoon.

The Banquet.

The banquet on Friday night at Martin's, Broadway and Forty-second street, was a fitting conclusion to the highly successful convention, and was an event that will long linger in the memory of those who participated. The large banquet hall was brilliant and fascinating in its illumination and decorations and the charm of the scene was greatly enhanced by the presence of the wives and daughters of many of the members.

It was 7:30 when toastmaster G. A. Cellar rapped for all to be seated, and a good deal of merriment was indulged in during the meal. The dinner was an excellent one and was favorably commented upon, and the service was all that could be desired, notwithstanding the general strike disturbances among the waiters in New York. An orchestra rendered superior music, and the more enthusiastic spirits joined in singing the popular airs in accompaniment. Mr. Cellar made an excellent toastmaster and his remarks in introducing the various speakers were happy and well chosen.

Mr. W. J. Dealy responded to the toast "The Ladies," and Mr. Charles Selden spoke for "The Association." Mr. Selden told the story of the origin of the association, its development and its work.

Mr. F. H. Bethell spoke for "The Telephone" and Mr. Belvidere Brooks for "The Telegraph." Mr. Brooks gave some interesting statistics, and in closing proposed a toast to president Theo. N. Vail, which was drunk by all present.

Mr. P. W. Drew, secretary of the association, stated that while he had been secretary he had served the interest of the association with thirty different presidents.

At the close of the exercises the musicians moved to the small ball room adjoining the banquet hall and dancing was enjoyed by a number of the guests.

The entertainment committee deserve great credit for the excellent manner in which they planned and carried out the entertainment features of the convention. The committee consisted of L. S. Wells, Long Island Railroad; L. B. Foley, Lackawanna Railroad; E. P. Griffith, Erie Railroad; J. C. Johnson, Pennsylvania Railroad; A. P. Eckert, National India Rubber Company; W. E. Harkness, General Railway Equipment Company; E. E. Hudson, Thomas A. Edison, Inc.; A. D. Walters, New York Telephone Company; and R. A. Patterson, C. F. Massey Company.

These gentlemen gave much time and thought to the arrangements and as a recompense they have the satisfaction of knowing that their efforts were highly successful and fully appreciated by all concerned.

NOTES.

In place of the time-honored convention badges a neat lapel button was substituted. The central portion was white enamel across which was shown a pole-line in gilt, and around this was a blue band, also of enamel, containing the name of the association in gilt letters.

The following-named ladies constituted the ladies' reception committee and they performed their duties in a very satisfactory manner: Mrs. C. H. Bristol, Mrs. J. F. Caskey, Mrs. A. P. Eckert, Miss M. Eckert, Mrs. K. W. Endres, Mrs. L. B. Foley, Mrs. J. J. Ghegan, Mrs. E. P. Griffith, Mrs. W. E. Harkness, Mrs. G. K. Heyer, Mrs. B. A. Kaiser, Miss T. Kaiser, Mrs. Wm. Maver, Jr., Mrs. L. S. Wells, Mrs. R. A. Patterson, Mrs. Charles Selden, Mrs. N. E. Smith, Mrs. J. B. Taltavall, Mrs. A. B. Taylor, Mrs. A. D. Walters.

Mr. J. J. Ghegan, president of J. H. Bunnell and Company, New York, exhibited one of the new "C Q A" relays and called attention to the new features of the instrument. In the magnet adjustment the magnets are instantly moved any desired distance from the armature. The armature tension spring adjustment is also simplified and improved. The relay is mounted on slate instead of wood, and is furnished with the Western Union clamp connections. Mr. Ghegan also distributed souvenirs in the shape of memorandum books with celluloid covers.

The General Railway Equipment Company, the consolidation of several important electrical manufacturing concerns which was announced recently in these pages, had a limited exhibit of specialties in its rooms in the Waldorf-Astoria. The principal feature was the dictograph and the Turner interior telephone. The dictograph installation was arranged in much the same manner as used by detective William J. Burns in the grafting and dynamite cases throughout the country in securing evidence. The Turner interior telephone permits of instant communication with the desired office without the interposition of a switchboard operator. Besides these there were shown the Egry train order register as used on the Chicago Great Western Railway; a newly designed operator's desk telephone set with jointed arm and a transmitter head box remarkable for simplicity of design and accessibility for renewal of cord connections. This is designed to be used with the head-band receiver, leaving both hands free. A three-drop blocking set in metallic case was also exhibited.

The following named manufacturing and operating concerns were represented at the convention. Some of these representives also hold membership in the associate list of the Association of Railway Telegraph Superintendents: American Telephone & Telegraph Company—Angus S. Hibbard, Henry Homer, B. A. Kaiser, Elam Miller, G. W. Peck. L. S. Brach Supply Company.

New York—Leon S. Brach, A. G. Brach, H. E. Gifford, Jr. J. H. Bunnell & Company, New York—John J. Ghegan. Central Electric Company, Chicago—J. M. Lorenz. Chicago Telephone Company—A. G. Francis.

Thomas A. Edison, Inc., West Orange, N. J.—E. W. Brown, A. J. Langhorn. Duplex Metals Company, Chester, Pa.—Jesse P. Brundage, G. P. Fondersmith, W. T. Kyle, A. D. Morrow. Edison Storage Battery Company, West Orange, N. J.—G. W. Daves, E. E. Hudson, F. V. McGuinness, H. G. Thompson. F. M. Ferrin—F P. Brennan.

General Railway Equipment Company, New York—John W. Barney, W. L. Cook, Edwin R. Gill, Charles N. Sigison, H. E. Merrell, W. E. Harkness, J. G. Moore, E. C. Hennis, E. R. Kleinschmidt, C. S. Rhoads, Jr.

General Railway Signal Company, Rochester, N. Y.—M. F. Geer, Kellogg Switchboard & Supply Company, Chicago—G. A. Joy, Archibald Wray. Kerite Insulated Wire & Cable Company, New York—R. D. Brixey, P. N. Miller, Joseph A. Renten, B. L. Winchell, Jr., J. W. Young. Lutz-Lockwood Manufacturing Company—W. Dodd, W. M. Kinch, William Lutz. Manhattan Electric Supply Company, New York—D. C. Keefe, J. W. McDowell, E. Whitmore, William Marshall. C. F. Massey Co.—R. A. Patterson. W. N. Matthews & Brother, St. Louis, Mo.—Claude L. Matthews. Mountain States Telephone Company—H. T. Vaille. National Carbon Company—E. L. Marshall. National India Rubber Company, New York—A. P. Eckert, S. B. Rockwell, Rudolph R. Rosa. New England Telephone Company—A. A. Bullens. New York Telephone Company—W. F. Crowell, H. B. Fenn, R. S. Scarburgh, A. D. Walters. Northern Electric & Manufacturing Company—A. Dwight Smith. Northwestern Telephone Exchange Company—L. H. Merrill. Okonite Company, New York—N. G. Hovey, L. G. Martin, J. Delman Underhill, Francis J. White. John A. Roebling's Sons Company—G. W. Swan. Standard Underground Cable Company—R. G. Harris, H. P. Kimball. TELEGRAPH AND TELEPHONE AGE—J. B. Taltavall, Thomas R. Taltavall, R. J. Weeks. Telephony Publishing Company—John R. Hastie. Union Switch & Signal Company—J. W. White. Western Electric Company—E. V. Adams, John Hume Bell, Gregory Brown, J. C. Endres, John H. Finley, G. K. Heyer, E. A. Hankins, John B. Harlow, J. G. Hackley, R. M. Hill, C. L. Howk, D. D. Miller, P. M. Rainey, Robert E. Rich, R. F. Spamer. Wright Typewriting Telegraph Company—George Groce.

ATTENDANCE.

Among those present were:

Altoona, Pa.—J. H. Ditch, chief telephone inspector, Pennsylvania, and wife.

Atlanta, Ga.—L. H. Beck, division plant superintendent, Western Union Telegraph Company.

Aurora, Ill.—C. A. Worst, assistant superintendent telegraph, Chicago, Burlington & Quincy.

Baltimore, Md.—Chas. Selden, superintendent telegraph and general inspector transportation, Baltimore & Ohio, wife, and Miss Imogen Selden.

Boston, Mass.—A. C. O'Brien, telephone inspector, Boston & Maine; S. A. D. Forristall, superintendent telegraph, Boston & Maine, and wife; A. A. Bullens; T. P. Brennan.

Battle Creek, Mich.—E. D. Hubbard, general foreman telegraph, Grand Trunk, and wife.

Bloomington, Ill.—T. M. Haston, superintendent telegraph, Chicago and Alton.

Bradford, Pa.—J. E. Golden, superintendent telegraph, The Tide Water Pipe Company, Ltd.

Buffalo, N. Y.—G. W. Swan.

Chicago, Ill.—G. O. Perkins, superintendent telegraph, Chicago Great Western; P. W. Drew, superintendent telegraph, Minneapolis, St. Paul and Sault Ste Marie, and wife; Wm. Bennett, superintendent telegraph, Chicago and Northwestern Railway, and wife; Miss Margaret Bennett; C. H. Hubbell, superintendent telegraph, Chicago, Rock Island and Pacific, and wife; F. H. Van Etten, superintendent telegraph, Chicago, Terre Haute & Southern, and wife; W. W. Ryder, general superintendent telegraph, New York Central Lines, and wife; W. W. Ryder, Jr.; V. T. Kissinger, superintendent telegraph, Chicago, Burlington & Quincy, wife, and Mrs. Cornish; F. T. Wilbur, superintendent telegraph, Illinois Central, and wife; A. G. Francis; Archibald Wray; G. A. Jorg; John R. Hastie; W. L. Cook and wife; W. T. Kyle; B. K. Winchell, Jr.; G. H. Groce; E. V. Adams; John H. Finley and wife; R. W. Whitehead and wife.

Chester, Pa.—G. P. Fondersmith; Jesse P. Brundage.

Cleveland, Ohio.—E. C. Keenan, superintendent telegraph, Lake Shore & Michigan Southern, and wife.

Columbus, Ohio—G. A. Dornberg, chief lineman, Pennsylvania Lines West.

Denver, Col.—C. A. Parker, superintendent telegraph, Denver, Northwestern & Pacific, wife, and Miss Irene Parker; Howard T. Vaille.

Detroit, Mich.—J. J. Ross, superntendent telegraph, Michigan Central.

Denison, Tex.—W. H. Hall, superintendent telegraph, Missouri, Kansas and Texas.

Danville, Ky.—W. S. Melton, superintendent telegraph, Queen and Crescent.

Fremont, Ohio—E. L. Marshall.

Gibson, Ind.—W. L Connelly, superintendent telegraph, Chicago, Indiana and Southern.

Indianapolis, Ind.—C. S. Rhoads, superintendent telegraph, Big Four.

Kansas City, Mo.—C. E. Marsh, chief clerk to general superintendent Kansas City Terminal Railway, and wife.

Lincoln, Neb.—H. A. Vaughan, assistant superintendent telegraph, Chicago, Burlington & Quincy, and wife.

Louisville, Ky.—R. R. Hobbs, Louisville and Nashville.

Montreal, Canada—Thos. Rodger, inspector telephones, Grand Trunk, and wife; W. J. Camp, assistant manager, telegraphs, Canadian Pacific; A. Dwight Smith.

Memphis, Tenn.—B. Weeks, superintendent telegraph, Illinois Central; D. J. Kavanaugh, assistant general foreman, Illinois Central; J. B. Weitz.

Minneapolis, Minn.—L. H. Merrill and wife.

New Haven, Conn.—N. E. Smith, superintendent telegraph, New York, New Haven and Hartford, and wife; H. A. Shepard, assistant superintendent telegraph, New York, New Haven and Hartford.

Newark, N. J.—H. B. Fenn.

New York—Frank H. Bethell; T. W. Carroll; W. J. Dealy; Miss Lita Dealy; E. Y. Gallaher; H. E. Roberts; Miss Leone Roberts; J. C. Willever and wife; C. G. Baird, manager telegraphs and telephones, Pennsylvania Railroad, and wife; R. H. Corson, telephone inspector, Erie Railroad; L. B. Foley, superintendent of telegraph, Lackawanna, and wife; E. P. Griffith, superintendent of telegraph, Erie, and wife; Miss Gertrude M. Griffith, Miss Lura H. Griffith; A. B. Taylor, superintendent telegraph, New York Central and Hudson River, and wife; L. S. Wells, superintendent of telegraph, Long Island, and wife; C. H. Gaffney; C. H. Bristol and wife; Mrs. Clara Bristol Drakeford; Wm. Maver, Jr., and wife; Miss Effie Maver, Miss Jessie Maver; J. B. Taltavall and wife; Miss Florence J. Taltavall; Thos. R. Taltavall; J. J. Ghegan and wife; Miss Helen Ghegan; C. K. Heyer and wife; W. E. Harkness and wife; E. E. Hudson and wife; D. C. Keefe and wife; B. A. Kaiser and wife; Miss T. Kaiser, Percy N. Miller and wife; R. J. Murphy and wife; John F. Skirrow and wife; Minor M. Davis; R. J. Weeks and wife; Belvidere Brooks and wife; A. G. Saylor and wife; C. E. Kleinschmidt; A. G. Brach and wife; Leon H. C. Brach and wife; H. E. Gifford, Jr.; H. P. Kimball; R. G. Harris; E. W. Brown; F. V. McGinnesse; H. G. Thompson; W. F. Crowell and wife; A. D. Walters; R. S. Scarburgh; Henry Homer; E. Miller; R. E. Chetwood; M. C. Allen; W. N. Fashbaugh and wife; G. M. Yorke; J. F. Nathan; E. R. Harris; E. Whitmare and wife; A. D. Morrow; J. W. Young; Joseph A. Reator; R. D. Brixey; L. G. Martin; Francis J. White; J. Delmar Underhill; W. G. Hovey; D. D. Miller; P. M. Rainey; R. F. Spanier and wife; Robert G. Rish; J. E. Enders; Gregory Brown; John H. Bell; E. A. Hankins; R. N. Hill; John B. Harlow; J. G. Hackley; Rudolph R. Rosa; S. N. Rockwell; A. P. Eckert and wife; Miss H. Eckert; Miss M. Eckert; J. W. McDowell; Chas. N. Sigison; J. W. Barney and wife; E. R. Gill and wife; J. G. Moore; H. E. Merrell and wife; R. A. Paterson and wife; J. W. White; Chas. V. Drew and wife; W. Dodd and wife; W. M. Kinel; Wm. Marshall; C. O. Fountain; W. I. Capen; E. M. Mulford and wife; Miss Marjorie S. Mulford; J. A. Hill.

Omaha, Neb.—J. B. Sheldon, superintendent telegraph, Union Pacific, and wife.

Philadelphia, Pa.—J. H. McDonald, chief clerk, Pennsylvania.

Pittsburg, Pa.—L. A. Lee, superintendent telegraph, Pittsburg and Lake Erie; G. A. Cellar, superintendent telegraph, Pennsylvania Lines, West.

Portsmouth, Va.—W. F. Williams, superintendent telegraph, Seaboard Air Line, and wife; Miss Emma W. Williams and Miss Irma Falgham.

Richmond, Va.—Chas. W. Bradley, superintendent telegraph, Chesapeake and Ohio; T. R. Gooch, chief operator, Richmond, Fredericksburg and Potomac, and wife.

Reading, Pa.—C. M. Lewis, superintendent telegraph, Philadelphia & Reading.

Roanoke, Va.—W. C. Walstrum, superintendent telegraph, Norfolk and Western; Miss Margaret Walstrum.

Rochester, N. Y.—M. F. Geer; R. C. Leake.

St. Albans, Vt.—M. Magiff, superintendent telegraph, Central Vermont, and wife.

San Francisco, Cal.—E. F. Raymond, assistant superintendent telegraph, Southern Pacific Co.

St. Louis, Mo.—E. A. Chenery, superintendent telegraph, Missouri Pacific, and wife; F. E. Bentley, superintendent telegraph, Terminal Railroad Association of St. Louis, and wife; Claude L. Matthews.

South Bethlehem, Pa.—J. F. Caskey, superintendent telegraph, Lehigh Valley, and wife.

Springfield, Mo.—J. H. Brennan, assistant superintendent telegraph, St. Louis & Santa Fe.; H. D. Teed, superintendent telegraph, 'Frisco; Miss Mable Smith.

Syracuse, N. Y.—S. L. Van Akin, Jr., assistant superintendent telegraph, New York Central & Hudson River, wife and son.

St. Paul, Minn.—M. H. Clapp, superintendent telegraph, Northern Pacific, and wife; Mrs. Nelly J. Tidby, official stenographer.

Sandwich, Ills.—C. S. Rhoads, Jr.; E. C. Hennis.

Topeka, Kan.—L. M. Jones, superintendent telegraph, Atchison, Topeka and Santa Fe, and wife.

Toronto, Canada.—W. Marshall, superintendent, Canadian Pacific and wife; G. T. Rooke, inspector of transportation, Canadian Pacific, and wife.

Warwick, N. Y.—F. S. Work, chief dispatcher, Lehigh & Hudson River, and wife.

Washington, D. C.—W. H. Potter, superintendent telegraph, Southern Railway Co.

Wilmington, N. C.—W. P. Cline, superintendent telegraph, Atlantic Coast Line.

Railway Telegraph and Telephone Appliance Association.

At a meeting of the Railway Telegraph and Telephone Appliance Association held in New York during the convention of the Association of Railway Telegraph Superintendents, Mr. J. J. Ghegan, president J. H. Bunnell & Company, New York, was elected chairman; E. E. Hudson, of Thomas A. Edison Inc., West Orange, N. J., vice chairman, and W. E. Harkness, of the General Railway Equipment Company, New York, secretary and treasurer.

Mr. Charles Keck, sculptor, of New York City, in remitting to cover his subscription for another year, writes: "I am very much interested in following up the news of the telegraph and your paper gives me the latest information on these points."

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June 16, 1912.

The Railway Telegraph Superintendents' Convention.

All concerned agree that the convention of the Association of Railway Telegraph Superintendents in New York, June 4, 5, 6 and 7, was in every respect the most successful ever held by the association. The attendance was the largest; the business sessions of the most profitable character and the entertainment was perfect as far as the combined wisdom of the entertainment committee could make it. Only once was it necessary to depart from the programme on acount of circumstances over which the committee had no control. Rain compelled the substitution of an indoor entertainment for an outdoor trip for the ladies one afternoon; otherwise the weather was delightful.

It was gratifying to the officers of the association to be able to announce that in point of attendance it was the largest convention ever held by the association, two hundred and eighty persons being registered.

The entertainment was of a varied character and highly enjoyed by all, and the entertainment committee is to be congratulated on the success of its work. The banquet of course was the crowning feature of this highly enjoyable meeting and it is difficult to express in words the charm and success of this function. The arrangements were perfect and nothing occurred to mar the harmony and enjoyment of the occasion.

The papers read at the convention were of an unusually high class and on most appropriate subjects. The central thought in all was system, standardization, co-operation and intelligence, and it is safe to assert that everyone present at the meetings received some new ideas and many suggestions that will express themselves in concrete form when the superintendents have had time to formulate their plans for the improvement of the telephone (or telegraph) service along their respective lines.

The interest taken in the various papers by the members was evidenced by the extended discussions that took place, and the sum total of the proceedings will form a valuable text book on the art of telegraph and telephone construction and equipment for railroad service. A most important effect of the papers will be the promotion of harmony between the telegraph and railroads through these contributions. Such a meeting as this was cannot fail to lead to a better understanding between the two allied interests and draw them closer together.

The success of any enterprise is measured by the resulting benefits and it is safe to state that this meeting will, in this respect, establish a high standard.

The Telegraph and the Telephone.

Although the telegraph and the telephone are so closely related as to their nature and the service rendered there is a sharp line of distinction between them in their operation and management. When a person desires to send a telephone message he does the transmitting himself, the company merely supplies him with the facilities for carrying on his conversation; whereas in the case of a telegram he places the burden of the work upon the telegraph company, which maintains a large force of expert operators, clerks and bookkeepers for the purpose. Therein lies the chief point of difference in the character of the two services.

When a telegram is handed over to a telegraph company for transmission it is in many cases handled by twenty different persons before it reaches the person to whom it is addressed. It is interesting to trace the course of such a message. Let us assume that a business man in New York wishes to send a telegram to a person in a small town in Indiana. He rings the call box for a messenger, who carries the message to a branch office. From there it is transmitted to the main office, there passing through five hands before it reaches the Chicago wire for retransmission. At Chicago it is transferred to a local wire, after passing through five other hands and sent to, say, Lafayette, Ind., where it is again retransmitted over, say, a railroad wire to its destination. There it passes through the final stages of its progress and after being received by the operator, it is turned over to a clerk who in turn passes it over to a messenger for delivery. This is not an exaggerated case; it happens thousands of times every day, and it is presented simply to show the vast extent of the facilities a telegraph company must provide to handle public business. It must maintain this large force of employes whether a message passes through two hands or twenty. All of this means great expense to the telegraph companies, and the high degree of accuracy of the service is a splendid tribute to the care exercised by the companies in handling public's business.

A telephone dispatch between the same points is not handled at all by any of the company's employes; the duties of the latter are simply to provide a path for the message.

A curious fact in this connection is that when a person uses the long distance telephone service he in one sense does the work himself and at the same time pays more money for the privilege; whereas, when he sends a telegram he makes the telegraph company do the work and pays less money.

From the foregoing, therefore, it can readily be seen that in respect to operation it is not so easy to compare the telegraph and the telephone as it would seem. The object of both services is the conveying of intelligence at a distance by electricity, but the methods employed are vastly different.

Senate Report on "Titanic" Disaster.

The report of the United States Senate Committee which investigated the circumstances attending the loss of the steamer "Titanic," on April 15, has reported its findings. It makes several observations and recommendations in regard to the wireless service and refers in pointed language to the failure of the operator on the steamer "Carpathia" to transmit a message of the disaster filed soon after the rescue of the survivors. The committee does not believe that the wireless operator on the "Carpathia" was duly vigilant in handling his messages after the accident. The recommendation is made, with Mr. Marconi's concurrence, that the practice of permitting the private sale of news stories by wireless operators be discontinued. Captain Smith of the "Titanic," who lost his life, is severely censured for not giving the proper alarm to the endangered passengers before he ordered the wireless operator to send out a distress message.

The report states that the steamer "Californian" was less than nineteen miles distant from the "Titanic," and that her officers and crew saw the distress signals of the latter steamer but failed to respond. It characterizes the conduct of those on the "Californian" as reprehensible and places upon the commander of that steamer a grave responsibility.

Tributes to the valor of J. G. Phillips, and Harold Bride, the wireless operators on the "Titanic" are paid by Senator Smith. The report says that "had not the under-paid wireless operator on the 'Carpathia' prepared for bed with his receiver still on his head, the 'Titanic' distress signals never would have been received by the rescuing ship.

Among the provisions of the bill introduced by Senator Smith are that after July 1, 1912, every vessel carrying more than fifty passengers must be equipped with wireless apparatus capable of transmitting and receiving messages at a distance of at least 100 miles day or night. Auxiliary power must be supplied independent of the main electrical power plant and two skilled operators are required.

A resolution giving the thanks of Congress to Captain Rostron of the "Carpathia" and his officers and crew for their courageous and effective rescue was adopted. It also provides $1,000 for a gold medal for Captain Rostron. Captain Rostron was also presented with a gold watch by some of the survivors of the "Titanic" whom he rescued.

Western Union Shirt Waists.—The recent order posted on the bulletin board at Western Union headquarters, New York, respecting the wearing of shirt waists, collars and sleeves of a certain style by the office girls has greatly excited the funny men and cartoonists of the daily newspapers. Their imagination is running wild, and what was intended to be an inoffensive requirement has been magnified and distorted by these alleged jesters to the proportions of an international episode. Some of the papers have gone so far as to illustrate fancy costumes of a great variety which the office girls are supposed to be required to wear. Evidently the newspaper clowns are having the time of their lives.

Society of the U. S. Military Telegraph Corps.

Following is a copy of a letter sent by David Homer Bates, New York Secretary of the Society of the United States Military Telegraph Corps, to each member of the legislative committee of the society:

"New York, May 24, 1912.

"Honorable Porter J. McCumber,
Chairman Pensions Committee, U. S. Senate,
Washington, D. C.

"Dear Sir:—Now that the Sherwood-Smoot bill has become a law, the members of the United States Telegraph Corps greatly hope your Committee will report favorably without further delay above bill for our relief.

"The official reports of Secretary Stanton, Generals Grant, Sherman, Rosecrans, and others, certify to the unique and valuable service of our corps. In fact the history of the civil war was largely recorded by the telegraph, which Stanton called his 'right arm.' Senator Scott of West Virginia, in a speech to the Senate, February 8, 1906, said: 'The military telegraph came under the immediate direction of President Lincoln as commander-in-chief through the secretary of war. The movements of the armies, the secrets of the nation, were entrusted to them, and yet not one was ever known to betray that knowledge and confidence in the most remote degree.'

"For forty years we have been appealing to Congress for the honor and justice so generously accorded to millions of soldiers in the United States Army, of which we formed an integral part, as established by the provisions of the Act of Congress approved by Grover Cleveland, January 26, 1897.

"Less than 250 of our corps survive. Pray do not let us die without this long-delayed recognition of our rights.

"Yours very truly,
"D. H. BATES, Secretary."

Course of Instruction in the Elements of Technical Telegraphy—XVII.

(*Copyrighted.*)

(*Continued from page* 341, *June* 1.)

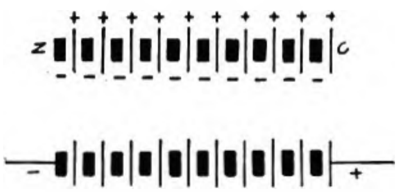
[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order. The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Battery Arrangement.

In drawings the positive pole of a battery is represented by the sign +, the negative pole by the sign —, and the battery itself by thin and thick strokes as in Fig. 5, where the thin strokes represent the coppers, and the thick ones the zincs.

The cells of a battery may be joined in series or parallel.

A battery in series means that the copper of one cell is joined to the zinc of the adjacent one



FIGS. 5 AND 6.—CONVENTIONAL REPRESENTATIONS OF BATTERIES.

throughout the length of the battery, as in Fig. 6.

A battery connected in parallel means that it is divided into two or more sets, the cells in each set being in series, but the end coppers and zincs of each set joined together. Fig. 7 shows a battery of two sets connected in parallel.

Now let us see how these different arrangements affect the current strength.

In the series method each copper being joined to its adjacent zinc the electromotive force (written E. M. F.) of one cell is added to that of the next, the total E. M. F. being the E. M. F. of all the cells added together.

In the same way, as each cell offers a certain amount of resistance to the current, the total internal resistance of the battery is the sum of the separate cell resistances.

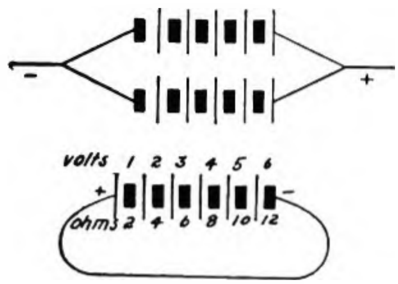
Take six gravity cells (Fig. 8), each with a resistance of 2 ohms, and E. M. F. of 1 volt. Place the battery on short circuit by joining the two end leads, as in the drawing, then the only resistance in circuit is the internal resistance of the battery, the resistance of the connecting wires being neglected.

To find the current, $\frac{E}{R} = I$, or $\frac{6}{12}$ .5 ampere.

Double the number of cells and there will be no increase of current, for the internal resistance will also be doubled, and $\frac{E}{R} = \frac{12}{24} = .5$ ampere as before. You might have 1000 cells and the current would still be the same as from 1 cell, as long as there is no external resistance.

Now divide the six cells into 2 sets of 3 cells each and connect them in parallel, as in Fig. 9.

As each cell has 2 ohms resistance, each set has a resistance of 6 ohms; but as the two sets are in

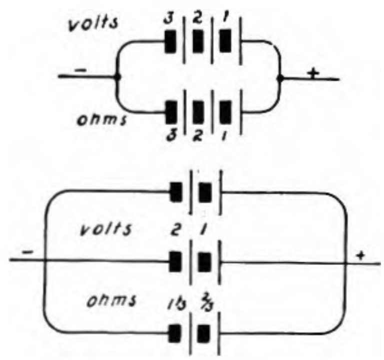


FIGS. 7 AND 8.—BATTERIES IN MULTIPLE AND SERIES.

parallel, the joint resistance is one-half of one set, or 3 ohms.

The E. M. F. is 3 volts, the circuit resistance 3 ohms, the current is therefore $\frac{E}{R}$ or $\frac{3}{3} = 1$ ampere.

In this arrangement of cells the E. M. F. is one-half the E. M. F. in series, but the resistance is



FIGS. 9 AND 10.—SERIES-PARALLEL ARRANGEMENTS OF BATTERIES.

only one-fourth; consequently the current strength is doubled.

Now divide the six cells into 3 sets of 2 cells. Since there are only two cells in each set the E. M. F. is only 2 volts. The resistance in each set is 4 ohms, and the joint resistance 1⅓ ohms. The current is therefore 2 ÷ 1⅓ = 1.5 ampere.

Here the E. M. F. is one-third the E. M. F. in series, but the resistance is only one-ninth; the current is consequently three times stronger.

(*To be continued.*)

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What is the advantage of mounting the coil on pivots?

Name the various types of Weston voltmeters.

What is the sensibility of the Weston portable voltmeter?

How is the sensibility of the Weston portable direct-current voltmeter increased?

How much resistance per volt is added for sensibility in the other types of switchboard voltmeters?

What percentage of the total energy is necessary to operate the Weston switchboard voltmeter?

What temperatures are most switchboard instruments calibrated for?

For a change of temperature between 100 deg. and 80 deg. F., what does the instrument error amount to?

What is the effect on the coil of the instrument of an increase or decrease in the temperature?

What are duplex indicating instruments?

For what classes of work are duplex instruments suitable, and why?

What is the effect on indicating instruments of poor connections?

What is a potential indicator?

How is the scale reading of a potential indicator kept within limits?

Does the needle move at once when the circuit is closed?

Referring to Fig. 38, in the book, how are the two scales read?

What is a differential voltmeter and how is it used?

When connected to two generators what do the readings of the differential voltmeter indicate?

Why are indicating instruments provided with double scales?

What is a multiplier?

What are multipliers used for and how are they connected in circuit?

Why is the adjustment of a multiplier not suitable for all voltmeters?

With a six-volt voltmeter of 521 ohms resistance and a multiplier with a value of ten, what resistance would it measure?

Why are multipliers of great utility?

What is the meaning of the prefix "milli"?

What is a millivolt?

What is a milliampere?

What are millivoltmeters and milliammeters principally used for?

The Phillips' Memorial.

In our issue for May 16 we referred to the appointment of a committee by the Maritime Exchange of the Port of New York to receive subscriptions not only for a memorial to the late "Jack" Phillips, the wireless operator on the "Titanic," but for a permanent fund for the benefit of wireless operators in the future. It is known as the "Marine Wireless Operators' Fund" and subscriptions are solicited for the purposes outlined. Contributions are rapidly coming in and the total amount so far received is close on to $2,000. Through the information published in these columns May 16 considerable interest has been taken in this project by the telegraph fraternity in general.

Mr. R. W. A. Horner, chief operator of the Western Union Telegraph Company at Lynchburg, Va., has forwarded to us $3.15 contributed by the operating staff of that office toward the fund. Mr. Horner writes:

"We have all read with interest, and satisfaction, Mr. Harold Bride's thrilling narrative of Phillips' great work of saving others on the ill-fated 'Titanic,' but did not save himself. The proposed monument to Phillips' memory should undoubtedly be built strong and enduring, noting well the heroic actions of the daring young telegrapher. At one time in my career, I somewhat regretted that I did not quit the telegraph business when young, and embark in other lines, but now I am very thankful that I did not, and am becoming more in love and pleased with my profession as the years roll by. Yea, I am profoundly proud of it, seeing the wonderful achievements of the telegraph upon land and sea, adding blessings to mankind and promoting commerce and good-will among the nations of the earth. The telegraph operator has a noble calling, worthy of all acceptation. 'They are poor, yet making many rich.'

"The operator is 'unknown, and yet well known,' 'having nothing, yet possessing all things.' Since Morse invented the telegraph, and gave God the first honor, or first fruits; or, the first message: 'What Hath God Wrought,' the telegraph has been a blessing of the highest order to mankind."

The check has been forwarded to Mr. C. C. Galbraith, general manager United Wireless Telegraph Company, New York, who is chairman of the fund committee.

Two chimpanzees in the Central Park Zoological Garden, New York, which were formerly boon companions but are now in separate cages, telegraph to one another by knocking on an old iron pipe which runs along the rear of the cages.

CONSERVATION TALKS—IX.

BY P. KERR HIGGINS, OKLAHOMA CITY, OKLA.

(*Concluded.*)

One of the largest leaks in telegraph and telephone systems is in the plant department, that portion of it which maintains the toll or long distance lines. Not only does this waste involve loss of time, hence increased cost of maintenance, but also loss of revenue, during the period covered by the time the line or lines are out of service. It is surprising what little effort is made by district and local wire chiefs to keep in close touch with their toll sub-stations and very little care is taken in making tests on the lines in order to locate as near as possible the nature and place of trouble. Even in companies who boast of their fine system of supervision, the writer has found many violations of the rules.

It is true that in such companies, definite instructions are from time to time issued and excellent apparatus provided, but here the company stops; it utterly fails to see to it that the employes placed in charge fully understand the methods and faithfully apply them. Frequently the instructions issued are of the most complicated character and few if any fully understand them.

In many cases the employe is shown how to manipulate the keys or buttons and he does so automatically, but if any deviation takes place or any combination other than that known to him automatically takes place, he is lost; he does not want to expose his ignorance and takes chances.

In other companies no effort whatever is made to locate trouble and they go after such trouble on the "hit and miss" principle. Mostly miss. To the companies having wire chief instructions and apparatus I can only say that much money could be saved and a better knowledge might be had of such employes by a closer supervision of trip reports on toll and farmer lines. To those not having such instructions nor special apparatus, an examination of such trip reports and the lost circuit time due to "line out of order" (OD) conditions will probably prove in the necessity for having a central point to which all the small stations of that group would report every morning, so that the conditions of the lines and station apparatus may become a matter of record. Many telegrams and telephone mesages are lost due to failure "to raise" some small station or joint office. At such central points a daily log should be kept as shown in Fig. 1.

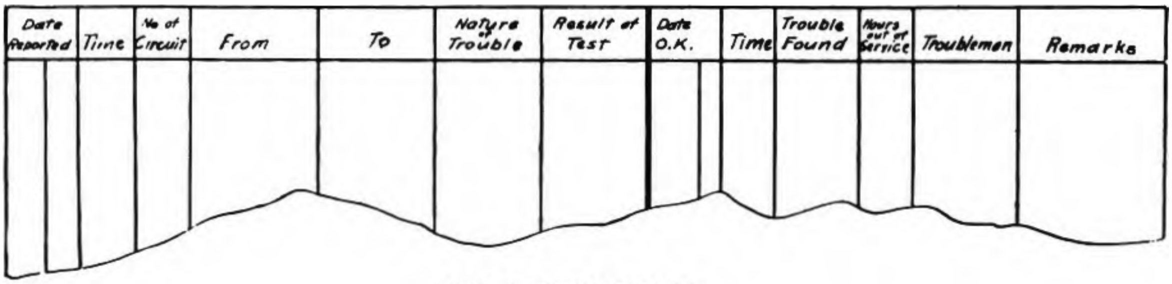


FIG. 1.—FORM OF LOG.

The Western Electric Company issue a bulletin known as No. 1012, which gives some very valuable information along this line in connection with a testing cabinet which it furnishes and which the writer has found extremely reliable and very simple in operation. There are many others on the market, but this bulletin is so clear, concise and simple that it is referred to as meeting many of the evils of the present "hit and miss" method.

To those who cannot afford to buy equipment of any kind, the following information may be valuable.

I desire to emphasize the fact that no matter how good the method is, no matter how efficient the equipment may be, or how simple it may be in construction it is absolutely of no value unless it is put in operation by brains. Do not forget this important fact.

The apparatus may be located either at or near the switchboard, or in the terminal room. No complicated mathematics are used and the reader is referred to the articles appearing in this magazine under the title "Course of Instruction in Elements of Technical Telegraphy," and which were begun October 16, 1911. The first articles deal with mathematics in simple, clear, concise form, and will apply to telephony as well as telegraphy, hence if the reader has any difficulty in following the rules and formulas used, he is urged to consult these articles, in fact it would be of great value to him to study these articles if for no other purpose than that of review.

I also desire to draw special attention to an explanation of "Ohm's law" as given on page 107 in the February 16 issue. The proper understanding of this law is absolutely necessary to all telephone and telegraph men who have to deal with plant questions, and it will certainly pay anyone to devote enough time to the study of this law as to make it fully understood.

The following material is necessary to fit up a testing outfit:

1. Dry battery of thirty volts (about 25 cells of good battery).

2. One Weston (10,000-ohm) or other good voltmeter; this must be of the very best type, otherwise results will be unsatisfactory.

3. Keys (lever or button), as shown in diagram. (Fig. 2.)

4. Testing and grounding cord.

5. Telephone set complete, including receiver and transmitter (desk, breast or wall type).
6. One hand generator (5-bar).
7. One test plug or shoe.
8. Two Frankel clips.
9. Punchings for terminals of wire.
10. One ringer (1000 or 1600 ohms).
11. One 600-ohm telegraph relay (not always necessary), but is found convenient in central battery systems to notify you when your trouble-man is on line; a lamp can also be used for this purpose.
12. One two-microfarad condenser.
13. One cabinet.
14. Screws, etc.

In local battery systems a talking battery (three cells) will be required in addition to the testing battery. The testing battery should be connected in series to give thirty volts, and this voltage should be kept as constant as possible, so as to make the voltmeter readings correct. Always try the voltage of your battery before making any tests; this can be done by connecting (short circuiting) the tip and ring of the test plug together in any convenient manner and operate the voltmeter key, also the VS (voltmeter shunt) key when such is used. If in doing so the needle falls backs more than five points or begins to move back slowly after the keys are used a few seconds, your battery needs attention. This is done by testing each cell with a voltmeter and replacing the spent ones with good ones. Each cell should give one-and-a-quarter volts or more. Be careful not to place your testing battery too far—not over 20 feet—from the test cabinet and do not use smaller wire than No. 19 B. & S. rubber covered copper properly insulated. The zinc of the battery is the negative (—) and the carbon is the positive (+) pole of the battery. The following tests are possible with such a set.

1. Talking on lines.
2. Ringing.
3. Test for continuity on closed circuits.
4. Test for ground.
5. Test for crosses with lines carrying current.
6. Test for crosses with lines not carrying current.
7. Test for short circuit.

key B the "kicks" can be repeated.

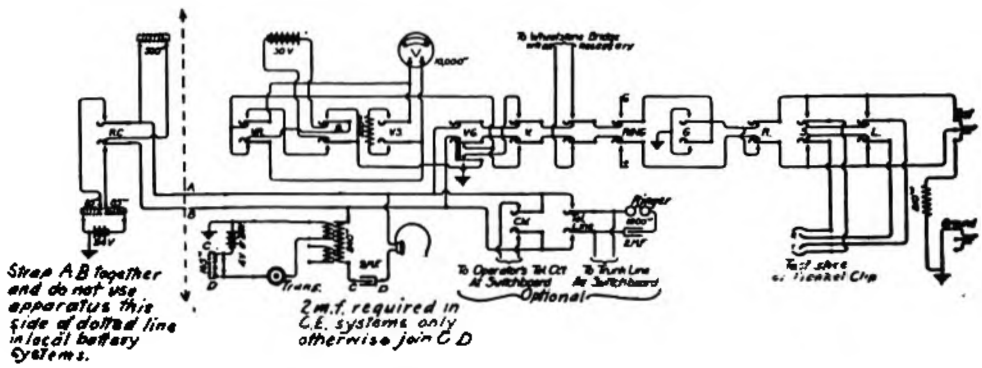


FIG. 2.—WIRE CHIEF'S TEST CIRCUIT.

8. Test for open lines.

Whenever possible test direct to line, that is, with protector and exchange apparatus cut out; this simplifies the operation. Terminal apparatus should be so arranged as to permit the use of a two-way shoe being inserted, thus separating the outside and inside circuit and enabling the wire chief to test the outside or inside without taking out the test shoe. A 200-ohm non-inductive resistance coil is used as a shunt for the voltmeter and the operating of the (VS) voltmeter shunt key bridges this resistance around the voltmeter, thus reducing the deflection. When high resistance is tested the shunt need not be used, but should be used on low resistance.

The circuit shown in Fig. 2 is for a magneto, or local battery exchange, but can be modified to suit a central-battery system with very little change by adding a twenty-four-volt circuit, as shown at key RC, this supplies battery to the line for talking purposes; the manipulation of the keys for talking is not necessary in the local battery system. The circuit can easily be made suitable for selective party line ringing by duplicating the ringing keys of the switchboard on the test cabinet.

CONTINUITY SETS. To ascertain if a metallic line (two wires clear of ground and forming one circuit) is continuous, that is not open, operate key V and if it is all right the needle will be deflected. If a previous test has been made, and the deflection noted with the line in good order, this deflection should now be shown; if less than the proper deflection some trouble exists, probably the resistance of a partial break, poor joint or connection. If the line is open, no deflection is shown. If testing a grounded line (single wire grounded at both ends) use key VG and not V, and if tip of the jack is connected to line, as it should be, use R with VG. In the case of central energy when condensers are used in conjunction with the sub-set, the deflection will be caused by what is known as the "condenser kick," that is needle is deflected momentarily and flies back.

This information is convenient in advising the wire chief that not only is the line clear, but the circuits as well up to and through the condenser at the telephone. In making such central energy tests use either V or VG and B. By working the key B the "kicks" can be repeated.

SHORT CIRCUITS. The test for a short circuit is similar to that for continuity, noting that the lower the resistance, the higher the deflection. Here we have to do a little figuring. The line resistance is found by dividing the difference between the test battery voltage and the voltmeter reading by the voltmeter reading and multiplying the result by 10.000 ohms = the resistance of the voltmeter.

Example: Battery reading, 30 volts.
Line test reading, 20 volts.
Then resistance of line equals

$$\frac{30-20}{20} \times 10{,}000 \text{ ohms} = 5000 \text{ ohms.}$$

By operating the VS key (shunt) the combined resistance (VM and shunt) is 196 ohms, instead of 10,000, hence the reading is smaller, but the same formula is applied, but using 196 instead of 10,000. The average wire chief will find it easier to test by using the voltmeter shunt key.

Great care must be exercised in testing lines to see that they are clear; that is, no other telephones thereon. If condensers are used in the telephones, then to all intents and purposes it may be considered a clear line.

GROUNDED LINE. Tests for grounds may be made on either side of the line (tip or sleeve) using VG and R for tip side only, VG tests the sleeve side. As in the short circuit tests, a clear line shows no deflection, or a very small one; the same applies to testing party lines as in testing metallic lines. When grounded party lines are being tested, use the same test as for short circuits, using the VS key.

CROSSES. These are of two kinds, one where the line is crossed with a "dead wire," that is one carrying no current, and the other a "live" wire, one carrying current, such for example as a cross with central energy lines, telegraph and electric light wires. In the latter case test as for a ground only use key B as well as VG and R. If the needle moves backward when B is used, operate VR; this is the voltmeter reverse key. Be careful in using the voltmeter on such tests and never use the shunt. It is always well to observe first what the voltage on such a line is before testing; if in excess of thirty volts do not attempt to test with the voltmeter as you may injure it.

TESTING TWO LINES CROSSED BUT NOT CARRYING CURRENT. Ground one line, in jack marked ground, and proceed to test the other line as though grounded. Be sure both lines are clear of ground before making this test. To get very accurate tests, a Wheatstone bridge must be used, but this is a subject in itself and will probably be taken up at another time. If needed now I am sure TELEGRAPH AND TELEPHONE AGE will be glad to sell a book devoted to this subject, by T. D. Lockwood, price $1.50, or one by N. H. Schneider at $1.00—both are good.

OPEN WIRES. These troubles are the most difficult to locate and even at best the test is only a guess and largely depends on the care and judgment of the tester. Operate key V then key B several times, noting the "throw" of the voltmeter needle. The greater the "throw," the greater the capacity. If VS is not used the capacity is proportional to the deflection. To determine the capacity between the ring side of the line and the ground, operate key B as before, but use VG instead of V, and to test the tip side use VG and R instead of V.

The capacity is then compared with the normal capacity of the line, or with another (clear) line of similar length. In testing MC lines use R instead of B; this makes the two readings in the same direction and twice the amount.

PRACTICE with such a set will enable the test clerk to make many other equally important tests. The tip is the farthest point, or ball, of the plug and the part coming in contact with the short spring of the jack; the ring of the plug is the second portion and connects with the long spring. Some plugs are divided into three parts, tip, ring, and sleeve and make contact in the jack in positions 1-2-3, 1 being farthest in the jack.

IMPORTANT. No wire chief can make successful tests who has not obtained conductivity, insulation and capacity tests of all lines under his care and supervision, when these lines are in good working order, and the records must be kept on file and checked up frequently. In this way not only can he scent trouble, but he can locate it more easily. Any deviation from such data means trouble. Note also that the loop (MC) resistance of any line decreases with the addition of more bridging telephones, hence the necessity for constantly reviewing data on such lines. Linemen should be required to report in on all cases of trouble and have the same properly tested out before returning to the office.

CONDUCTIVITY. Telephone companies suffer much from poor transmission, which can be avoided by keeping lines as near as possible up to the following standards, by watching for poor connections and poor joints by means of the test set.

Copper Wire (Hard Drawn).

	Weight per mile in lbs.	Resistance per mile in ohms
No. 8	264	3.31
No. 9	209.3	4.173
No. 10	166	5.264
No. 12	104.5	8.37

DIFFERENCE IN GAUGES USED. The N. B. S. is about two gauges smaller than B. & S. Only one gauge—B. W. G.—is used for iron wire.

Galvanized Iron Wire B. B. Grade.

	Lbs. per mile	Ohms resist. per mile
No. 9 B. W. G.	320	17.19
No. 10 B. W. G.	260	21.15
No. 12 B. W. G.	165	33.33
No. 14 B. W. G.	96	57.29

The resistance may be slightly lower in winter and slightly higher in summer.

Telegraph and Telephone Age Thirty Years Ago.

BY E. W. COLLINS, GENERAL SUPERINTENDENT POSTAL TELEGRAPH-CABLE COMPANY, CHICAGO, ILL.

Taltavall and Mitchell, thirty years ago, at a thrilling period in telegraph history launched upon a waiting world a very modest chronicler of events, known as THE TELEGRAPHER'S ADVOCATE, and while it was a precocious youngster, its most ardent admirers did not predict for it a long and happy life. After having passed safely through the measles, mumps and scarlet fever periods, however, it became strong and sturdy, and on June 1, 1912, it will celebrate its thirtieth birthday, after having changed its name twice and its clothes several times, to conform to new conditions, as they arose. The times were turbulent at its birth, and THE TELEGRAPHER'S ADVOCATE seemed to be an appropriate name. The craft, at that time, needed an advocate. Later, a long period of peace and contentment was ushered in, employer and employe became better acquainted, prosperity was everywhere, and a period of great telegraph development was the result. For some years during this period of development the name of the ADVOCATE was changed to TELEGRAPH AGE, and that cognomen was apropos for some years, until the telephone was developed from a toy to one of the greatest commercial and domestic requirements of the world, when the name was again changed from TELEGRAPH AGE to TELEGRAPH AND TELEPHONE AGE, which covers two of the giant industries of the world.

Thirty years is a long time! What wonderful advancement has been made, telegraphically and telephonically! What an era of achievement! Being absent from home and memoranda, I can only draw on my memory for events, and that is not very reliable. The first step forward—and one of the greatest—was the advent of the typewriter, which was a veritable boon to the public, but since the adoption of the typewriter, where are the beautiful chirographies of the past? Methinks I hear Tom Wheeler, Charlie Ganson, John Cronenberg, Ed. Hinman, and a great host of others, say: "Here is mine, unimpaired by time." Poor Cronenberg has gone to his long home, but think of the copies he used to make! When I was in St. Louis recently, I had the pleasure of seeing Tom Wheeler's copy, for the first time in thirty-eight years, and, although the old gentleman is struggling under a burden of years, his copy has not deteriorated a particle. It is the same "thing of beauty" it was when life was young and nerves were steel. In Detroit, recently, I found Charlie Ganson making those picture copies of his while his gray hairs smiled down upon his hand. Ed. Hinman? I don't know where he is, but I am ready to swear that he can still put the Lord's Prayer on a postal card so legibly that you would rather have it than a typewritten copy to transmit. We do not find the beautiful handwriting to be characteristic of the modern operator, because conditions have changed.

The perfection of quadruplex apparatus was the next great advance in telegraphy, followed closely by the use of the dynamo in telegraphic work as a substitute for the old Callaud battery, which was non-elastic, occupied valuable space, was never "on the job" when wanted, and had no reserve power.

Next was the wedding of the two systems, the telegraph and the telephone, both willing to live together and travel together on one wire and defy anybody to say which is the "better half." How wonderful are our electrical engineers, and how uncanny are some of the wonderful things they give to the world!

The wireless was the next step forward, and, while that system of signalling is still in its infancy, it is making a loud noise. Recent events on lakes and oceans have demonstrated its usefulness to mankind whether it finally becomes a dividend earner or not, and our hats should be taken off to Marconi and others whose perseverance in the face of discouraging obstacles has been wonderful.

You have confined me to 500 words with which to cover a period of thirty years, and because of the short time allotted me for the preparation of statistics, I have simply gone back in memory over the "path," stopped here and there to drop a tear over the grave of a boon companion who fell by the wayside, tired of his burden, and I come back from the fresh faces and sprightly forms of youth to clasp the hands of the dear old friends of today, friends who have labored with me, side by side, for over thirty years; friends whose grief was as poignant as my own when the hands of mutual friends ceased to copy and were folded forever.

We limp a little when we count up our years, and our hands cramp a little when we think of the Eitemillers and the "Patsy" Ayres who made it so interesting for us in the old days with that wonderful Morse of theirs; yea, even before the days of bonus, when there was no other incentive to speed than a desire to render a good day's work and—I nearly forgot to add—make the "other fellow" stay awake. How limber they were, and how they did like to keep things moving!

Before closing I wish to congratulate most heartily the editor and proprietor of TELEGRAPH AND TELEPHONE AGE, who has been on the alert for thirty years. He has kept pace with the best thought of the interests he has aimed to serve. He has given us an organ, the semi-monthly study of which has enabled us to keep in the front ranks of our profession, and, if we have failed, the responsibility for failure rests with us, for we must remember that:

"Every forehead which has been bathed
in glory was first bathed in sweat."

Wise Bank Robbers.—After taking the precaution to cut the telephone wires in order to prevent the spread of an alarm, robbers blew open the vault of a bank in Camden, Tenn., and secured about \$7,000.

Mr. J. C. Browne, general supervisor of telegraph, Missouri Pacific Railway Company, St. Louis, Mo., writes: "In order to keep up to date in two ways, I am herewith renewing my subscription to TELEGRAPH AND TELEPHONE AGE."

The Morkrum Telegraph Printer.

As the Morkrum telegraph printers are now being introduced and through their performance attracting general attention, a description of the system will be of interest. The inventions involved in this system are the joint work of Mr. Chas. L. Krum, a mechanical engineer, and Mr. Howard L. Krum an electrical engineer, and the development of the system is due to Mr. Joy Morton, a capitalist of Chicago, the name Morkrum being a contraction of Morton-Krum.

The Morkrum printing telegraph is a direct acting keyboard system; that is, the operation of the keyboard at the sending end actuates the printing mechanism at the receiving end directly without any intermediate operations.

It is a page printer, using on the receiver all the ordinary telegraph forms without any special preparations, and on the home recorder a record of messages transmitted is recorded on a page-wide roll, both receiver and recorder giving visible writing.

Very early in the development of the system it was determined that upon the simplicity of the line currents used would depend the ability of a printer to operate successfully under the varying conditions of weather and line interference and that to meet these requirements it was essential that the current should be of a single strength and with no zero position. Accordingly it was made identical with the Morse polar duplex, securing all the reliability of that system, with its ability to work duplex successfully over long lines, and also making it possible to repeat through direct point repeaters.

The transmitted signal is divided into six time intervals. The negative pole of the battery is normally connected to the line between signals, and it is accordingly necessary that a signal be started by connecting the positive pole to the line.

Fig. 1 shows a signal in which current of positive polarity is sent to the line during all of the

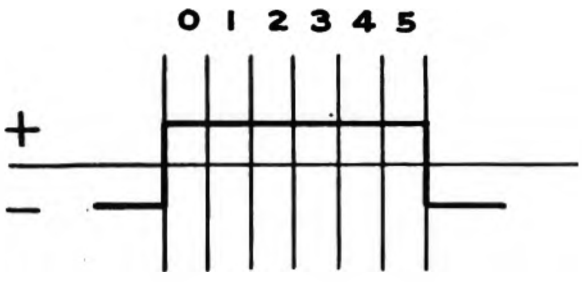


FIG. 1.—REPRESENTATION OF ONE SIGNAL.

six time intervals. The first interval is designated as O in the diagram, and is known as the starting interval. The selective signaling is accomplished by combinations of reversals of polarity of the current sent to the line during the five succeeding time intervals. This allows thirty-two selections to be made over the line, and by using a shift of the type wheel, fifty-three letters, figures and characters are printed.

This system of selective signaling is illustrated by Fig. 2, which shows the signals sent over the line for the word "The." The letter T is formed

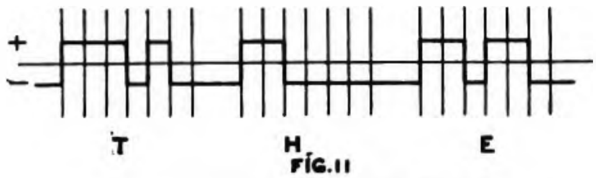


FIG. 2.—SIGNALS OF WORD "THE."

by reversing the polarity of the current sent to the line during the third and fifth intervals. In letter H the current is reversed during the second, third, fourth and fifth intervals, while in letter E the reversal takes place during the second and fifth intervals.

As in this system there is never to exceed three and an average of only two signaling currents sent to the line, for each letter, it is not necessary to transmit the signals at a high rate of speed, in order to obtain a free transmitting keyboard.

Fig. 3 shows the theory of the action of the receiver in selecting the different signals. The receiving mechanism is arranged to connect the

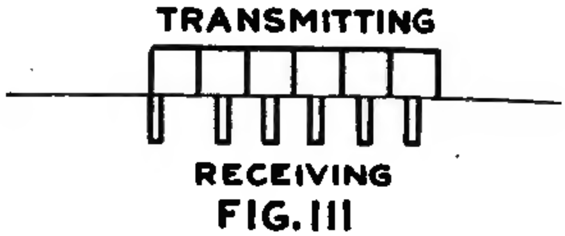


FIG. 3.—THEORY OF ACTION OF RECEIVER.

selective locks to the line relay for only a short portion of the duration of each time interval of the transmitting signal.

The system is not synchronous in the ordinary sense of the word, but is roughly isochronous; that is, the receiving mechanism is adjusted to run approximately the same speed as the transmitting mechanism, and a governing rheostat is provided to regulate the speed of the receiving mechanism, so that the relation of the received intervals to the transmitted intervals can be correctly adjusted. This is for the purpose of compensating for any difference in the voltages of the local power at the two ends. With this arrangement any difference in transmitting and receiving speed is not cumulative and allows of considerable distortion of the signals before the selection is interfered with, as it is only necessary that the interval of the receiving mechanism be somewhere within the limits of the corresponding transmitted signal.

The mechanism is divided into a number of elements, the functions of which and their relations to each other are best explained by reference to

Fig. 4, in which T is a motor driving transmitter and home recorder disks. R is a receiving bank of relays and A an auxiliary bank.

The combinations corresponding to the different signals are set up in five pole changers, in the keyboard, one for each of the five selective time intervals. The function of the transmitter disk is to connect these pole changers successively to the main line pole changer. As shown, the keyboard and transmitter control the action of the home recorder relay and the pole changer. The operation of the home recorder is accomplished selectively in exactly the same manner as that of the printing mechanism at the far end.

On the relays the contacts correspond to the "marking" and "spacing" contacts of a Wheatstone relay, and are so designated. The marking contact point of the home recorded relay operates through a disk, which acts as a distributor and successively connects the selective lock relays in an auxiliary bank to the spacing contact of the home recorder relay. The spacing intervals of the signal operate the corresponding selective locks, while the marking intervals leave them unoperated. The lock relays in the auxiliary bank control the mechanism of the printer, the actual selection of the letter being accomplished in the printer.

The first four intervals control a mechanical selecting device, which interposes the proper stop pin in the path of the type-wheel arm, and the fifth interval governs the direction of rotation of the typewheel, and completes the operation of printing the lever.

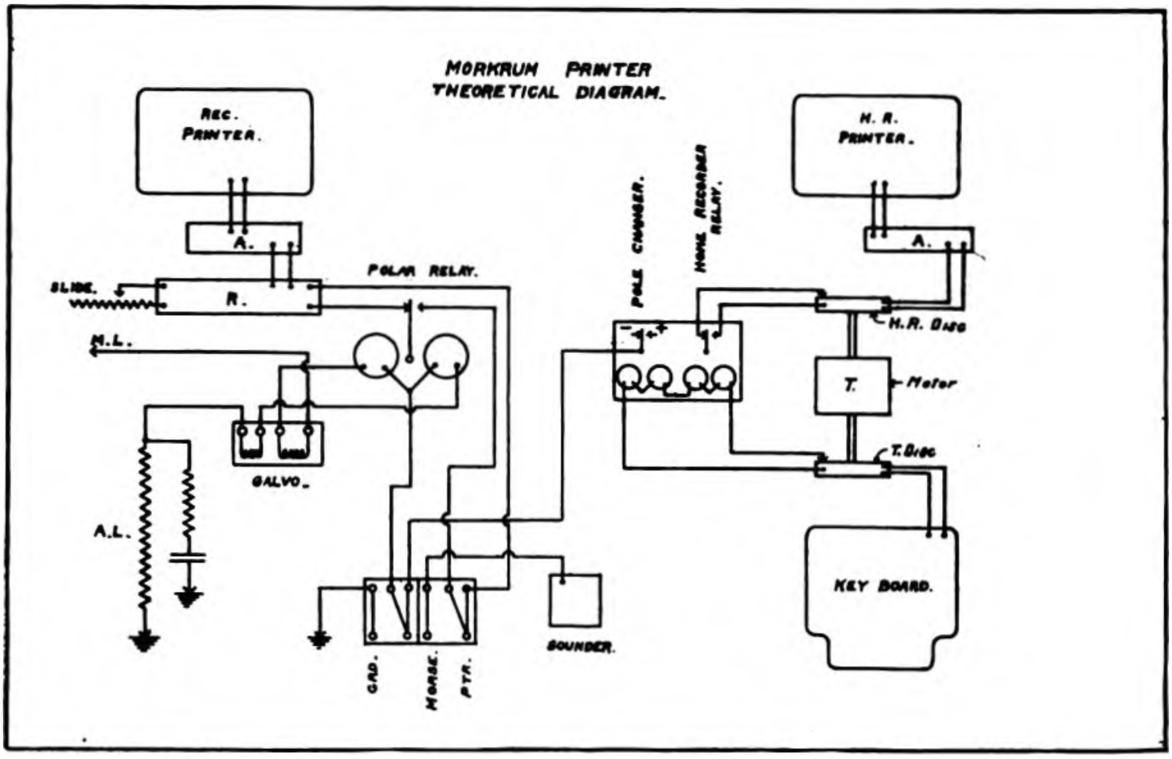


FIG. 4.—DIAGRAM OF CONNECTIONS OF APPARATUS.

FIG. 5.—TOP OF DUPLEX TABLE.

In a duplex set the contact points of the main line pole changer are connected to the two poles of the main line battery, while the tongue is connected through a ground switch to the split of the main line relay. After leaving the main line relay, one side passes through a differential galvanometer to the artificial line.

The contact points of the main line relay control the action of the receiver bank, auxiliary bank and receiving printer. A three-point switch is arranged so that the marking contact of the main line relay may be connected to a Morse sounder, if desired.

The receiver banks, auxiliary banks and printers used in the receiver and home recorder are identical and interchangeable; these, and also the transmitter and keyboard, are provided with slip connections so that any of them may be instantly removed and another element substituted.

The keyboard action is very light, requiring only a slight touch to start it, the stroke being completed by an electromagnet and it can be ope-

FIG. 6.—KEYBOARD AND HOME RECORDER.

rated all day with much less fatigue than an ordinary typewriter. It also has a key lock which insures a complete signal being sent before another can be started.

The Morkrum printers, working duplex, have a capacity of from 900 to 1100 messages in a nine-hour day, the capacity being largely dependent upon the operators. One circuit averaged 988 messages a day for a week, the best records being 1156 in a day, and in one direction 615 and 624 messages have been transmitted. One young lady operator in the New York office of the Postal Telegraph-Cable Company, sent 240 messages in three consecutive hours. If this pace could be kept up both ways for the nine hours it would carry 1440 messages over the line.

The Morkrum printers were first introduced in regular service by the Postal Telegraph-Cable Company, between New York and Boston, that circuit now having been in operation nearly two years. Since then these printers have been installed for the Postal Company on additional circuits between New York and Boston, New York and Philadelphia, New York and Washington, Philadelphia and Washington, Chicago and St. Louis, and in branch office work.

The Western Union Telegraph Company has several sets in operation between New York and Philadelphia, and is extending its use.

The Chicago, Burlington and Quincy Railroad was the first to introduce the Morkrum printers in railroad work, on a line from Chicago to Galesburg, and its use has since been extended on this road. The Lake Shore Railroad has a set between Cleveland and Toledo and the New York Central and Canadian Pacific roads have also arranged for its use.

Institute of Radio Engineers.

The Institute of Radio Engineers met at Columbia University, New York, June 3 at 8 p. m.

The committee on symbols and nomenclature will meet frequently during the summer months at the College of the City of New York, and will report at the next meeting of the Institute the first Monday in September. The members of this committee are: Mr. Fritz Lowenstein, Mr. G. W. Pickard, Mr. John Stone Stone, Dr. Oliver N. Goldsmith, Mr. John L. Hogan, Jr., Mr. R. A. Weagant and Mr. R. H. Marriott (ex-officio).

Mr. Lesh gave a very interesting talk on aeroplanes, in which he said that the noise of the engine is so great at present that it prevents the wireless operator from hearing signals. However, he believed this noise would be eliminated in time. He stated that more and more metal is used in aeroplanes. This metal can serve as one side of the open oscillating circuit of the radio telegraphic apparatus.

He further stated that there is little practical use for aeroplanes except for war scouting and to make them very useful in this service they should be equipped with wireless so they can continually report to headquarters, because it is always a question whether or not they will ever get back to headquarters.

Bust of Lord Kelvin.—A marble bust of the late Lord Kelvin was presented to the Institution of Electrical Engineers, London, by Lady Kelvin, on May 16. The presentation address was made by Sir W. H. Preece. Lord Kelvin, who is better known to the older generation of telegraphers as Sir William Thomson, made many important inventions in submarine and aerial telegraphy, and at the time of his death was regarded as one of the leading scientists in the world.

Mr. A. B. Cowan, district commercial superintendent of the Western Union Telegraph Company, Chicago, Ill., writes: "I enclose check for renewal of my subscription to TELEGRAPH AND TELEPHONE AGE. We cannot be up-to-date without it."

Vacuum Lightning Arresters.—The United States Electric Company has just issued a second edition of its Bulletin 301 devoted to vacuum lightning arresters. The first issue of this bulletin was regarded as one of the best short treatises available on the construction and use of lightning arresters and the general subject of the protection of telegraph and telephone apparatus from high potential discharges. The second edition describes also a new form of unit mounting in which a wood base is used in place of the porcelain and metal base and mounting, and this new form has found general favor, particularly in signaling equipment. The diagrams include various methods of protecting telephone equipment, test offices and submarine cable and the bulletin is especially timely at the opening of the season when damage from lightning may be apprehended.

Western Electric's April Business.—The total of goods billed out during April by the Western Electric Company shows an increase of 17 per cent. over the total for April, 1911. March ran about even with the preceding March, so that the first four months of 1912 are about 1½ per cent. ahead of the same four months in 1911. April's gain is looked upon by the company's officials as somewhat extra-normal and due to several special conditions. It indicates an increase in the year's total business which later months, it is believed, will not sustain. Those close to the company say that if 1912 shows as good business as last year, when sales totalled $66,000,000, they will be well satisfied with the result. Foreign business was an important contributing factor to the April improvement.

Anniversary of the Telegraph.—May 27 was the sixty-eighth anniversary of the transmission of the first message over the Morse telegraph when the historic message, "What Hath God Wrought," was transmitted. The telegraph received instant recognition, and two days later, May 29, 1844, the news of the nomination of James K. Polk for the presidency was telegraphed from the Democratic convention at Baltimore and was announced on the floor of Congress in Washington before the cheers for Polk had died away in the convention hall.

Mr. W. H. Allen, Washington, D. C., writes: "In renewing my subscription, I desire to pay tribute to the surpassing excellencies of the Age. It is not easy to understand how anybody connected with the telegraph business would want to get along without it, and it is none the less valuable to those now engaged in other pursuits, as enabling them to keep informed on the vast progress making in their former vocation. Even the obituary notices are well worth having, as chronicling the passing of old friends and associates, calling up fond memories of pleasant happenings and kindnesses of by-gone years. Undoubtedly the Age is indispensable."

RAILWAY TELEGRAPH SUPERINTENDENTS AND PARTY AT EDISON WORKS, WEST ORANGE, N. J., JUNE 7.

Construction Materials and Methods.*

BY R. E. CHETWOOD, ENGINEER OF CONSTRUCTION, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

The appraisal of the plant of the Western Union Telegraph Company made in the year 1910 by the engineering firm of Westinghouse, Church, Kerr & Company showed that the largest percentage of the telegraph company's investment was in its outside plant, consisting of pole lines, wires, conduits and cables. As the largest part of the telegraph company's investment is in this type of plant, it is, of course, very necessary and advisable that the construction of the outside plant should be of proper character and economical in cost.

Previous to about two years ago, the telegraph company in purchasing poles for use in the construction and maintenance of its pole lines obtained them on specifications which specified a minimum diameter at the top, but did not specify any minimum diameter at the butt. The large telephone companies throughout the country were purchasing their poles on specifications which provided minimum diameters at both top and butt, with the result that the telephone companies obtained the best of the poles and the telegraph company obtained poles which were inferior to those obtained by the telephone companies in that on account of small butt dimensions they were not of sufficient strength, and had not sufficient length of life. One of the first changes in construction materials was the putting into effect of specifications for poles whereby the poles were classified acording to the wire loads which they would be called upon to carry and whereby the different classes of poles were required to meet certain minimum dimensions at the top and six feet from the butt. Under the existing specifications all chestnut poles, all Eastern white cedar poles of 20 wire and over capacity, all redwood poles and all Western cedar poles of over six wire capacity must meet certain minimum dimension requirements at the top and at a point six feet from the butt. This requirement of a minimum dimension at a point six feet from the butt has resulted in obtaining poles of greater strength for the load which they will be called upon to carry, in the construction of pole lines which will resist storm damage to a greater degree than formerly and in the use of poles which will not require replacement or resetting as early as was the case with poles purchased without any butt requirement.

In order to standardize the size of crossarms and to obtain the benefits of the economies incident thereto, the subject of the economical sizes of crossarms to use was carefully considered. The costs of the various sizes of crossarms were obtained, after which their costs in place on the pole were determined, and it was found economical to standardize only the 6-pin and 10-pin crossarms. The standardizing of such sizes has resulted in a reduction in the value of the stock of crossarms it is necessary to carry for construction and maintenance purposes, and has resulted in more economical pole line construction, the cost per pole per pin space having been appreciably reduced.

I mentioned above that the six-pin crossarm was eight feet in length. This is our present standard. We are contemplating, however, a change whereby the six-pin arm will be six feet in length, the pin spacing being the same as is the case with the present ten-pin arm. The use of a six-foot six-pin crossarm instead of an eight-foot six-pin arm will also result in stronger construction. The existing eight-foot arm will stand an ultimate load per pin of approximately 525 pounds, while the six-foot crossarm will stand an ultimate load per pin of approximately 690 pounds.

Pins and insulators have received considerable study during the past two years and changes in both have been made. The result of tests showed that the old type of steel pin would deflect approximately .7 of an inch under a strain of approximately 600 pounds. This was considered to be too great a deflection for such a strain, with the result that the pin was redesigned, distributing the metal in the pin where it would do the most good, and has resulted in the present pin, which requires a strain of 1,000 pounds to produce a deflection of approximately .7 of an inch. It will be seen, therefore, that the present pin is approximately 400 pounds or approximately 70 per cent. stronger than the old pin.

A large number of complaints had also been received regarding nuts coming off and pins pulling out of crossarms. This was investigated and it was found that the nuts on the old pins were not of proper thickness, were of poor material and fitted the pins too loosely. In the case of the new pins the nuts are thicker, they fit the pin better, and in addition the washer has one side cut off so that a nail can be driven in alongside of the nut and keep it from loosening or unscrewing. These changes, together with a very careful inspection of all pins before shipment should result in stronger and better construction and fewer maintenance troubles.

So many complaints were received regarding the so-called Barclay insulator that an investigation and study as to the proper type of insulator was started in the fall of 1910. The results of investigations and tests showed that the complaints regarding the Barclay type of insulator were well founded and that wires were likely, under a slight upward pull, to come off the insulators. It was also found that the insulators were not mechanically strong. Several new designs of insulators were made, following somewhat the old Western Union type of standard insulator and experimental insulators were made up from these designs. As a result of tests on these different experimental insulators the present insulator, which

*Abstract of paper read at the annual convention of the Association of Railway Telegraph Superintendents, New York, June 4, 1912.

is being furnished on requisitions, was decided upon. This insulator is considerably better from an insulation standpoint than either the Barclay or the old Western Union insulator, furthermore, it is mechanically stronger than either of these insulators. From an insulation standpoint, it is theoretically 75 per cent. more efficient than either of the other two types. In regard to the mechanical strength of the new type of insulator, a large number of tests were made comparing its strength with those of the other types. We shall still continue to try and improve the insulator in every way possible, both as regards its insulating qualities and its mechanical strength.

In the construction of underground conduit, the telegraph company has largely made use of iron or mild steel pipe. In the early days when the first conduits were constructed, wrought iron pipe was used. In the last few years mild steel pipe has been used for the reason that practically all pipe now manufactured is mild steel rather than iron, steel pipe costing less to manufacture. The use of iron or steel pipe as far as I have been able to determine, was largely on the basis that it prevented electrolysis trouble on the cables. This is somewhat true, as it did, to a certain extent, prevent cable troubles from electrolysis, but it transferred the electrolysis from a cable to the iron pipe with the result that the iron or steel pipe were gradually eaten away. The use of iron or steel pipes on account of electrolytic troubles was, therefore, only postponing the evil day and making it necessary at a later date to replace not only the pipes, but also the cables, for after the pipes were gone then, of course, electrolysis of the cables commenced. The use of iron or steel pipes for underground conduits is also expensive, inasmuch as the first cost of the pipes, not including labor, etc., for laying them, was from 20 to 25c. per foot, depending upon the point where the pipes were to be laid, and the freight and other charges incident to getting the pipes on the ground, while the first cost of tile ducts or creosoted wood ducts is approximately one-fourth of these figures. In the preliminary specifications that have been issued, as far as practicable, the use of tile or creosoted wood ducts has been specified and the use of iron or steel pipe restricted to laterals or at other places where peculiar conditions make iron or steel pipe advisable and economical.

There have been no very great changes in the character of the cables used, except, of course, to provide that all cables, whether rubber or paper insulated, shall be composed of twisted pairs. All new cables purchased during the past two years have, therefore, been of proper design for telephone service. The constantly increasing use of telephone circuits in railroad work, together with such uses as the telegraph company makes of telephone circuits, have made it necessary that all cables shall be composed of twisted pairs. In regard to paper-insulated, lead-sheath cables, the specifications now require cables of lower mutual and grounded capacity than was formerly the case, which, of course, results in cables of higher and better transmission efficiency, both from a telephone and telegraph standpoint. The specifications have also been changed to provide for cables in which the conductors are insulated with two instead of three wraps of paper. In this way we are able to obtain a larger number of conductors in the same sized sheath than was the case with cables manufactured under the old specifications. The new cable specifications provide for approximately 280 conductors of No. 16 B. & S. gauge or approximately 180 conductors of No. 14 B. & S. gauge in a sheath not over 2⅝ inches in outside diameter, whereas the old specifications provided for only approximately 200 No. 16 B. & S. gauge conductors or 100 No. 14 B. & S. gauge conductors in a 2⅝-inch sheath. In the new specifications for cables provision is made for composite cables, namely cables which contain different gauges of conductors, such as a certain number of pairs of No. 14, 16 and 19 B. & S. gauge conductors. In this way it is possible to provide the most economical and proper gauge of conductor for the different classes of service to be handled through the cable. The changes in the paper insulated lead sheath cable specifications have resulted in reduced conduit and cable costs in that fewer ducts and fewer cables are now required in order to provide for a given number of circuits.

Other materials which have been changed during the past two years are largely such as are known as pole line hardware, and in addition, such materials as guy strand and guy rods, etc.

In the case of guy strand, it was formerly the practice of the telegraph company to use two sizes, one size from actual tests had an average breaking strength of about 5,000 pounds, while the other size from actual tests had a breaking strength of approximately 7,600 pounds. As the strength of the guy strand should be proportioned, as far as practicable, to the load or strain which it will be called upon to carry or sustain, it was decided after careful consideration to use guy strands of four different strengths, each one of which would be used under definite conditions of load or strain. These guy strands are known as 4,000, 6,000, 10,000 and 16,000 pound strands respectively. Their actual breaking strengths are as follows:

4,000 lb. strand breaks at approximately 4,800 lbs.

6,000 lb. strand breaks at approximately 6,500 lbs.

10,000 lb. strand breaks at approximately 12,400 lbs.

16,000 lb. strand breaks at approximately 20,000 lbs.

With these different sizes of strands and with different sizes of guy rods, it is, of course, seen that pole lines can be guyed according to their loads or strains at a much smaller cost than formerly.

In regard to guy rods, the telegraph company formerly used two sizes, namely a 4 foot rod and a 6 foot rod. Both rods were ¾ inch in diameter and were approximately of 18,000 pound strength. The 4 foot rod was usually used with the strand which broke at approximately 5,000 pounds, and the 6 foot rod was usually used with the strand that broke at approximately 7,600 lbs. It will be seen, therefore, that in many cases a guy rod with a breaking strength of approximately 18,000 pounds was used with a guy strand having a breaking strength of approximately 5,000 pounds.

The new type of guy rods which we are now using are six feet long by ½ inch in diameter, eight feet long by ⅝ inch in diameter and ten feet long by one inch in diameter. The six-foot rod has a breaking strength from actual tests of approximately 10,000 pounds, the eight-foot rod has a breaking strength by actual tests of approximately 15,600 pounds, while the ten-foot rod by actual tests has a breaking strength of approximately 35,000 pounds. The six-foot rod is used with 4,000 pound strand, the eight-foot rod is used with 6,000 and 10,000 pound strand, while the ten-foot rod is used with 16,000 pound strand. It will be seen from these breaking strengths of rods and guy strands that the construction as regards strength is better proportioned than was formerly the case. Changes have also been made in the number of guy clamps that shall be used with different strengths of guy strand, so that the holding power of the guy clamps is properly proportioned to the strengths of the strand and the guy rod.

Other changes relate mostly to the tools used in construction and maintenance work.

In regard to construction methods, a large number of changes have been made. The changes relate mostly to pole line construction. In the new pole line specifications that have been recently issued you are aware that the length, class of poles and the number of poles per mile in any line depends upon the ultimate wire load to be carried by the line. This, of course, is the logical method of constructing a pole line, namely, first determine the probable wire load and then construct a line which will most economically and safely carry that load.

Regarding the spacing of poles, the average spacing, or the number of poles per mile, was determined from a consideration of wire loads, pole line costs and the transmission efficiency of the circuits to be carried on the pole lines. The number of poles per mile decided on for the different classes of pole lines were those that theory and experience showed to be correct in order to give the required strength for the various loads, allowing, of course, for a proper amount of decrease in strength on account of decay of poles at the ground line. A required strength of pole line construction can, of course, be obtained by using a larger number of weaker poles or a smaller number of stronger poles. The problem then was to get a line of proper strength at a minimum cost and without decreasing the transmission efficiency of the circuits to be carried on the line below advisable limits. You, of course, realize that the greater the number of poles per mile the lower the insulation of the line wires during wet weather. The insulation per mile of wire on a pole line containing forty poles to the mile, is, under the same conditions, twice as great as the insulation per mile of wire on a pole line containing eighty poles per mile. As the insulation per mile of wire is a big factor in determining the telegraphic and telephonic efficiency of circuits, it is, of course, desirable to obtain as high an insulation as is practicable by using as small a number of poles per mile as will give sufficient strength. The pole spacing decided on, namely thirty poles per mile for six wires or less, forty-one poles per mile for from seven to sixty wires, fifty-three poles per mile for from sixty-one to seventy wires, and fifty-nine poles per mile for from seventy-one to eighty wires, have been found to be the best, taking all factors into considration.

One feature of pole line construction and reconstruction on which considerable emphasis has been placed is the matter of the height of poles to be used. From every standpoint it is advisable to keep the height of poles as small as practicable. The smaller the height of the line, the stronger it is. Furthermore, when necessary to guy poles the strengths of the guys are much greater for the same amount of lead, if the poles are short ones than if the poles are high ones. A lead of five feet for a side guy in the case of a twenty foot pole gives a much more efficient guy than a lead of five feet in the case of a thirty foot pole.

The use of short poles is also most advisable from a cost standpont. It reduces considerably the first cost and the annual cost of a pole line. It formerly was the practice of the telegraph company, in many cases, to set poles higher than was actually necessary so that at a later date the poles could be cut off and be reset. It was thought to be an economical practice, but in reality it was not economical. Mr. Chetwood then cited figures to show that it is economical, not only for the telegraph company, but also for the railroad company, to use in pole line construction and reconstruction as short poles as is practicable.

The figures show that there is a saving in the cost of material, a saving in the cost of unskilled labor and a saving in the cost of skilled labor by using a twenty foot pole instead of a twenty-five foot pole. The economy of using short poles can readily be calculated for other classes and lengths of poles and it will be found to be the economical thing to do, not only from the telegraph company's, but also from the railroad company's standpoint.

That the efforts to reduce the height of poles used in pole line construction and reconstruction have been somewhat successful is shown by the fact that in the year 1909 only eleven per cent. of the chestnut poles purchased were as short as twenty feet in length, while in the year 1910, approximately twenty-eight per cent. and in the year 1911 approximately forty-eight per cent. of such poles were twenty foot poles.

In the guying of pole lines many changes have been made. It was formerly the practice on gradual curves to make each pole a corner pole and to guy each pole. In the new work we have required that along gradual curves the line shall consist of corners and straight section. In that way we have reduced the amount of guying necessary and have also provided a stronger line.

In wire work certain methods have been changed. As far as practicable copper wires are now placed at the top of the pole and iron wires below the copper wires. The copper wires are being placed so that they are adjacent and can be transposed not only for physical telephone circuits, but also to create phantom telephone circuits. The methods of stringing and tying copper wire have also been changed. It is now required that copper wire be given a definite sag depending upon the span length and the temperature at which it is being strung, while previously it was the practice to string the copper wire without much regard to temperature and span lengths. Previous practice resulted in many cases of wire troubles due to the wire breaking during cold weather, the copper wire having been strung too tight. By following the specification requirements as regards sag, most of the troubles due to wires breaking on account of cold should in the future be obviated.

The method of tying the copper wire to the insulator has also been changed. Under the present method, one end of the tie wire is carried over the line wire, while the other end is carried under before they are crossed and the wraps commenced. With this method of tying there is no tendency to unwrap in case of strains on the wire, as under a downward strain one end of the tie tends to tighten up, while under an upward strain the other end of the tie tends to tighten.

The use of a tie wrench also resulted in a large number of line troubles. The hard drawing of copper wire produces only a skin effect and the slightest nick or scratch or kink in the line wire reduces the strength from that of hard drawn copper to that of soft drawn copper. The use of a tool in making the wraps often scratched or nicked the wire, reducing its strength approximately fifty per cent. The present method of tying requires five handmade wraps, no tool of any sort being allowed. In order that the wraps may be made by hand the length of the tie wire has been increased considerably over that formerly in use.

In the recent pole line specifications the method of attaching double arms to poles has been changed, and furthermore, the use of double arms has been restricted as far as is practicable in order to increase the transmission efficiency of the telegraph and telephone circuits carried on the pole lines. Each insulator during wet weather is a point of leakage and part of the low insulation on telegraph and telephone circuits in the Western Union plant has been due to too great a use of double arms at points where their use was not a necessity.

In construction and reconstruction work strong effort is being made to keep the amount of rubber cable used down to a minimum. There is nothing more injurious to telegraph or telephone transmission than the insertion in such circuits of long lengths of rubber cable. It will always be necessary, of course, to carry wires in and out of railroad stations by means of short lengths of rubber cable. These lengths, however, should be made as short as practicable for, although any one length may not seriously affect transmission, still the presence of a large number of small lengths in any one circuit is cumulative, and in a circuit between New York and Chicago the total amount of rubber oable in circuit is a serious detriment to telegraph and telephone transmission.

While not absolutely correct the KR law is approximately correct as regards the efficiency of different types of cable from a telegraph transmission standpoint. In other words, the telegraphic efficiency of cables depends on the total resistance of the conductor in ohms multipled by the total grounded capacity of the conductor in microfarads. The higher the product of the resistance and capacity of a conductor the less efficient it is from a telegraph transmission standpoint.

From measurements made on rubber insulated cable and on paper insulated cable it has been found that the average capacity to ground per wire per mile in the case of rubber insulated cable is approximately .62 microfarads, while in the case of paper insulated cable the average grounded capacity per mile per conductor is approximately .10 microfarads. Comparing No. 14 B. & S. gauge rubber insulated cable with No. 14 B. & S. gauge paper insulated cable, it is seen that one mile of rubber cable is as serious a detriment to telegraph transmission as approximately two and one-half miles of paper cable, or ten miles of rubber cable affects telegraph transmission approximately as seriously as twenty-five miles of paper cable. Comparing No. 14 B. & S. gauge rubber insulated cable with 210 pound copper wire the capacity to ground per mile of which is approximately .015 microfarads, it is seen that one mile of rubber cable is as serious a factor in telegraph transmission as approximately 130 miles of 210 pound copper wire.

The Use of the Telephone in Railroad Service.

BY G. K. HEYER, NEW YORK.

(*Continued from page 360, June 1.*)

The following, taken from an article written by Mr. C. H. Gaunt, formerly superintendent of telegraph of the Santa Fe, and printed in the Santa Fe Employees' Magazine, expresses very clearly what has been experienced by many dispatchers:

"The telegraph is used by the train dispatcher in the intricate operation of his trains for one purpose only—that of communicating with the operators scattered along a stretch of railroad.

"Long use has developed a certainty of action in telegraph manipulation which commands the respect of all, but how often has a half-frantic dispatcher 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 the security that would follow."

When it was first thought of utilizing the telephone for the important service of handling train movements, it was at once apparent, in order to make it a success, that some selective device must be developed whereby any particular station, or a number of stations on a long, heavily-loaded line, could be called quickly and reliably without interfering with the other stations on the line. Thus, in order for the telephone to be used in place of the telegraph for this class of work, it was necessary to develop a system that would meet the following requirements:

1. Reliable means of selectively signaling one or more stations on a long and heavily-loaded line other than by code ringing.
2. Arrangements permitting the signaling to be done in such a manner as not to interfere with conversation being carried on over the line at the same time.
3. Some indication or answer-back by the dispatcher that the signal bell at the station called, was operated.

In the attempt to develop a system to meet the above requirements, three selector systems were developed.

1. The series relay selector.
2. The bridged relay selector.
3. The bridged selector system.

The series circuit was fairly satisfactory, but there were a great many disadvantages. In this system the selectors operated from the contacts of a relay, the windings of which were in series with the line, the relays at alternate stations being placed on alternate sides of the line. The principal disadvantages of this system were that it increased materially the resistance and impedance of the circuit, thereby somewhat impairing telephonic transmission; the troubles experienced from inductive effects were more noticeable, due to the unbalanced condition of the line and burnouts from lightning were much more frequent.

The bridged relay system was a modification of the series relay system in that the relays were wound to a high resistance and were placed across the line instead of being in series. This was somewhat of an improvement over the series system, but was soon replaced by the bridged selector system, in which the selector windings were connected directly across the line, doing away with the necessity of using a relay and thereby reducing the equipment in the selector sets to a minimum and providing a system with only one contact, the function of which was to close the bell circuit. These selectors were wound to a high resistance and the impedance to talking current was such that little or no appreciable loss in transmission was experienced.

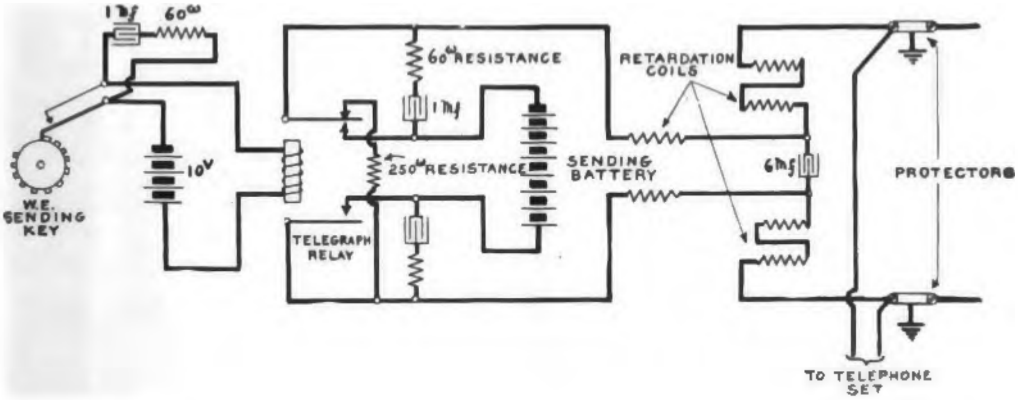


FIG. 1.—DISPATCHER'S SELECTOR CIRCUIT.

There are, at the present time, several selectors which accomplish the desired results and these systems are all of a general bridged selector type.

When the selector was first applied to railroad telephone lines as a means of calling, in place of the old code ringing system, the standard local battery telephone sets were used. It was found, however, that the conditions to be met on lines of this character were so severe as to require a special transmission circuit. In the old form of circuit, the receiving circuit was composed of the secondary of the induction coil, the receiver, and the condenser connected in series bridged directly across the line. The total impedance of this part of the circuit to talking current was approximately 600 ohms, about 300 ohms of which was in the receiver and, therefore, active for receiving purposes.

It is obvious that when a number of other sets are bridged across the line at the same time, the combined impedance of the bridges in parallel is very low and the transmission correspondingly difficult between the terminals or widely separated stations. To overcome this trouble it was necessary to design a circuit in which the receiving bridge had a much higher impedance and at the same time arrange the circuit so that this impedance was not inactive, thereby resulting in a considerable loss in transmission.

The circuit known as the Western Electric standard high efficiency telephone train dispatching circuit was designed by the engineers of that company to meet the severe requirements encountered. A switching device was provided in the circuit to be operated when talking. In the normal position, with the receiver removed from the hook, the receiving circuit connects merely by a condenser and a special receiver bridged directly across the line. The impedance of this circuit is about 2400 ohms to talking current, practically all of which is in the receiver, which is wound to approximately 610 ohms. Normally, neither the primary nor the secondary circuits are closed through the induction coil.

The circuit was arranged in this manner so as to reduce the drain on the batteries when receiving and to obviate the necessity of receiving through the secondary winding of the induction coil, as this would cause a considerable loss in the incoming transmission.

When the switching mechanism is in the operated position the circuit is arranged for talking, as the operation of this switch closes both the primary and secondary circuits through the induction coil and, at the same time, cuts in series with the receiver a retardation coil, the receiver and retardation coil being in parallel with the secondary winding of the induction coil.

The combined impedance of the receiver and retardation coil is high enough so that the outgoing transmission is not noticeably affected, and low enough to allow the dispatcher to break the operator. This circuit is in operation on lines up to 300 miles in length with as many as forty-five stations, twenty of which may be listening simultaneously without seriously affecting the transmission.

In order to utilize to the fullest extent circuits which have been installed for telephone train dispatching purposes, these lines are being simplexed and phantomed to provide additional telegraph and telephone facilities, without increasing the expense for line construction. The ordinary method of simplexing is to bridge the repeating coil at each end of the line and tap out at the middle points for connection to the telegraph circuit.

This method of simplexing lines on which selectors are operated increases the direct current drain on the signaling battery, and to keep this battery drain within reasonable limits non-inductive re-

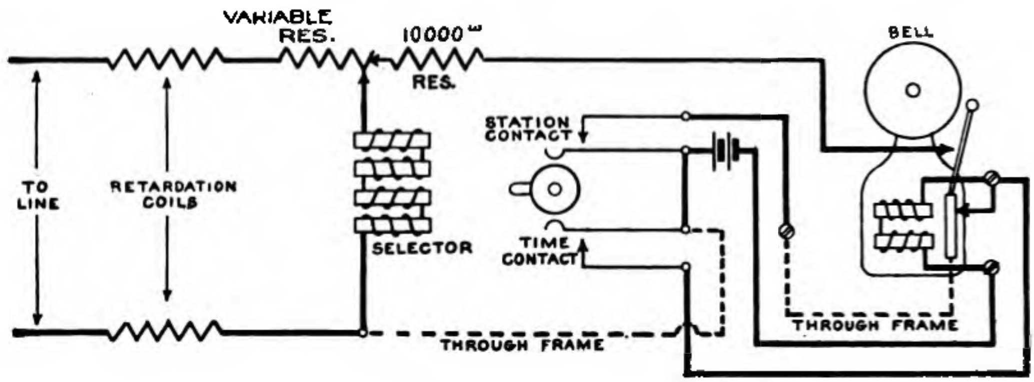


FIG. 2.—WAY-STATION SELECTOR CIRCUIT.

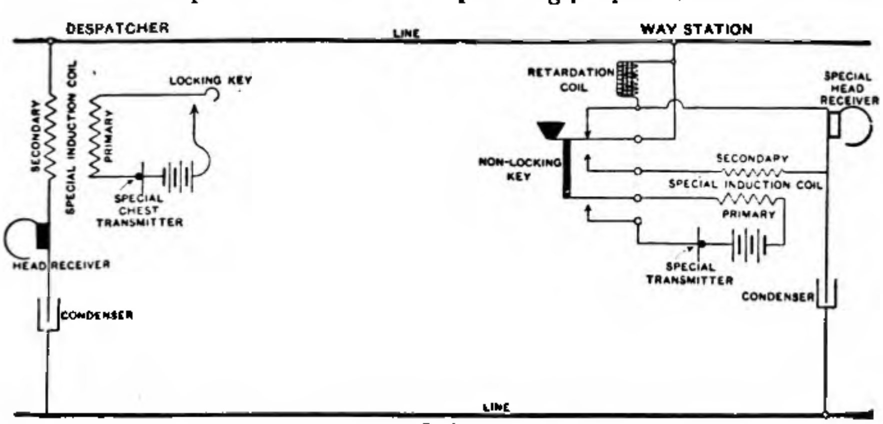


FIG. 2

FIG. 3.—HIGH EFFICIENCY TRAIN DISPATCHING TELEPHONE CIRCUIT.

sistances are placed between each side of the simplex coil and the line.

Another method of simplexing, which was designed by Mr. U. J. Fry, superintendent of telegraph of the Chicago, Milwaukee & St. Paul, does away with the simplex coil at the end of the line nearest the dispatcher, and thereby decreases the current drain on the selector sending battery.

Another means of increasing the efficiency of the wire plant where dispatching and message circuits are strung over the same divisions is by making use of the phantom circuit, which consists of applying retardation coils and condensers to the existing message and train circuits in such a way as to secure an additional telephone line without additional line construction; that is, by the use of the phantom circuit in connection with the train and message wires, telephone conversations can be carried on simultaneously over the two pairs of wires. A number of such installations have been made and are proving very satisfactory.

Another feature which is of vital importance in train dispatching is the manner in which the lines are constructed and maintained. First of all, in installing telephone train dispatching equipment, it is absolutely essential, if satisfactory results are to be obtained, to have a metallic circuit and use wire such as will provide ample transmission. The wire adopted as standard by most of the railroads for train and message service is No. 9 B. & S. hard-drawn copper, weighing 208 pounds to the mile. Of course, on short lines and branches, iron wire may be utilized and the following figures illustrate the differences which will be obtained in transmission with different sizes of copper and iron wire:

The standard for commercial transmission is rated in terms of No. 19 gauge cable, and the transmission over thirty miles of this cable has been adopted as the limit of standard commercial transmission. The transmission over 900 miles of No. 8 B. W. G. copper, weighing 435 pounds to the mile, is approximately equivalent to that obtained over thirty miles of No. 19 gauge cable. With No. 9 B. &. S. copper, 208 pounds to the mile, 500 miles is the limit, and the limit with No. 8 B. W. G. iron is reached at 144 miles. This does not mean that intelligible transmission cannot be obtained over greater lengths of line than given above, but that these figures represent what has been adopted by the American Telephone and Telegraph Company as standard commercial transmission.

A comparatively new wire, known as copper-clad wire, which has been largely used by the signal departments of the railroads, should prove very satisfactory for branches and lines up to 200 miles in length. This wire is constructed of copper and steel in such a way that the steel core is entirely covered by copper so welded to the steel that the wire can be drawn very successfully in the smaller sizes.

Copper-clad wire for the shorter circuits has the advantage of increased conductivity as compared with the steel or iron wire and an increased tensile strength as compared with copper. The increased tensile strength of No. 9 B. & S. copper-clad wire, as compared with No. 9 B. & S. hard-drawn copper, is approximately 45 per cent. and the conductivity of the copper-clad wire ranges from 30 per cent. to 50 per cent. that of the same size hard-drawn copper, depending on the grade specified.

In stringing wires, a careful investigation should be made to find out just what class of service the other wires on the pole are being used for, so that the proper transpositions can be made to avoid trouble from inductive disturbances. It has been found, in the majority of cases, that if the wires are transposed every half mile, little or no trouble will be experienced from this source. In some cases, however, it has been found necessary to cut in additional transpositions on some sections of the line where the exposure is very severe. If the pole lines carry wires which are used for Barclay printing circuits or for quadruplex telegraph service, telephone wires should be placed as far as possible from these. Care should be taken on planning the transposition scheme to have both wires of the pair throughout their entire length subject to exactly the same exposure. This will, in all ordinary cases, neutralize the inductive effects from foreign circuits.

If the ultimate plan is to use the telephone for handling both train and message business, it is advisable to transpose the wires so that phantom circuits can be obtained without the necessity of making further transpositions at the time the phantom equipment is applied to the lines.

A comparison of the telephone and telegraph systems in operation will show the many advantages of the former. With the telephone, the orders are issued verbally by the dispatcher word for word, in place of being sent out by code, and the speed which may be attained is limited only by the ability of the operator to copy the messages. The forms used are the same as with the telegraph, and the operators repeat the orders back to the dispatcher for his O. K.

(To be Continued.)

Mr. D. S. Field, one of our agents at Columbus, Ohio, writes: "I am very much pleased with the articles on electrical matters in general now running in Telegraph and Telephone Age. I want to say to you that after being a subscriber to your valuable paper for twenty-five years, I never noticed such keen disappointment among the boys as they exhibit nowadays when a copy fails to turn up or when the delivery is a day or two late. This is a good indication of how your efforts to furnish them a good first-class paper are appreciated."

Developments in the Telegraph During Thirty Years.

BY W. J. LLOYD, DIVISION TRAFFIC SUPERINTENDENT, WESTERN UNION TELEGRAPH COMPANY, CHICAGO.

On November 28, 1837, Professor S. F. B. Morse, in a letter addressed to the Hon. Levi Woodbury, advising him of the progress being made in his experiments, said: "I have succeeded in working intelligibly at the distance of half a mile," and in another letter to Mr. Woodbury a short time later, he said: "At a distance of five miles with a common Cruikshanks battery of eighty-seven plates, the marking was as perfect on the register as in the first instance of half a mile."

It seems almost impossible for the average mind to fully comprehend the changes that have taken place in the telegraph business in a little over one short half century. Wires now stretch in every direction from pole to pole, or under the seas, all grown from a little strand forty miles long which so recently as May 24, 1844, was all that existed of the great network of wire which now covers the earth. Sixty years have seen this forty miles grow to millions, equipped with instruments not dreamed of in Professor Morse's time. The automatic repeaters; the improved automatic transmitters and receivers having served to increase the efficiency a thousand fold, and yet, paradoxical as it may seem, the old dot-and-dash code is still employed by the operators, in much the same manner as that proposed by Professor Morse, with the exception that the register as a means of receiving has given way to the receiving by sound. This system is still a formidable rival of the automatics, and, in some branches of the service, superior to them.

When we consider that a message is now transmitted from New Orleans to New York and thence under the sea to London, and an answer received in three minutes, we are most forcibly impressed with the marvelous strides that have been made along the lines of development and improvement of the telegraph service in the last few years, to say nothing of the wireless system which, when the proposition was first put forth by the great Marconi, was looked upon as a joke and an impracticable dream of an ultra enthusiast. But, nevertheless, we recently read of a man and his wife who, sailing from Liverpool and missing the family jewels which the wife had secreted in a fireplace in London, were enabled to send a wireless message from mid-ocean by which the landlord of the hotel with the fireplace recovered the gems.

It seems but a very short time since a message on its way from New York to San Francisco was manually relayed at Chicago and Ogden. At the present time it is sent direct from the New York office to San Francisco. This has been brought about by the installation of improved automatic repeaters on these circuits, which have increased the efficiency of the lines one hundred per cent.

Expert operators are now handling one thousand messages during the day hours on a Morse duplex between Chicago and San Francisco. In the short period of three years, in conjunction with the telephone the telegraph has reached a stage in its development where the farmer on the Kansas prairies with his telephone is in a position to communicate with all parts of the world, day or night, and finds himself nearly as well equipped in that particular as are his friends in the cities.

The innovation of the day and the night letter has stimulated the telegraph traffic to a degree undreamed of a few years ago, and the large offices of the Western Union Company, with its enormous wire mileage and up-to-date equipment, are humming day and night, and are veritable hives of industry.

While I find that I can but skim the surface of the subject in a 500-word article, I am satisfied that any practical telegraph man of today cannot help but look upon the development of the telegraph within the last thirty years, and especially the last three years, with amazement.

In Appreciation of Telegraph and Telephone Age.

In a letter to the publisher of TELEGRAPH AND TELEPHONE AGE, Mr. L. C. McIntosh, of the Southern Pacific System, Los Angeles, Cal., writes:

"I presume you are aware of the fact that your paper is being favorably commented on by all who appreciate the excellent articles that appear therein, but I cannot resist the temptation to add a little fuel to the flame. I have heard compliments on the wire and among the office force giving great praise to the several late numbers. The article on the dedication of the Telegraph Monument being of great interest to many old timers, attracted unusual attention. The Course of Instruction in the Elements of Technical Telegraphy is very valuable and much appreciated, as also are the numerous articles on selector installation and the manner of determining resistance of station selectors.

"The article on the effects of poorly adjusted sending machines when worked on the polar side of a quadruplex and the tendency to break up the common side signals was a valuable lesson and I am sure was much appreciated by quadruplex attendants.

"The article has been pasted in our log book and should occupy a conspicuous place in every large telegraph office."

Writer's Cramp.—Tests at the London Hospital, show that writers' cramp and other similar states of apparent muscular paralysis are due not to the tiring of the muscles, but to brain fag. This is poor consolation for those who are afflicted by this malady.

The New York Electrical Exposition and Automobile Show will be held in the new Grand Central Palace, New York, October 9 to 19.

Wire Message Rates.*

BY WM. W. MULFORD, NEW YORK.

The determination and maintenance of reasonable telephone and telegraph charges is of moment and of personal interest to most of us.

We have learned that "the luxuries of yesterday are the necessities of today," and in this way the telegraph and the telephone have come to be necessities. Furthermore, it has often been said the wire service is a natural monopoly, and we recognize that, of all the great industrials, the wire service business holds a unique position in two respects: First, for any extensive wire system, either telegraph or telephone, the one not only supplements and sustains the other, but also the one is the by-product of the other; for economy and efficiency they should be combined. Second, we do not want the annoyance and inconvenience of two telephone systems, and we do want a universal system. Briefly, we want a monopoly, provided we can have a sound guarantee of satisfactory service at reasonable rates.

Therefore, in seeking a basis for reasonable rates, and in order to eliminate quibbling arguments, it is safe to take a look ahead—it may not be a far distant glance even so—and assume that competition no longer exists in the wire service business.

It seems curious that in the art and craft of salesmanship man has so far devised only three basic methods. The first method is known as "good business," or "charge what the traffic will bear"; or "commercial expediency," or "charge according to the value of the service." The second method is known as "charge according to the cost of the service," either with or without an agreed fixed percentage for "the knowing how," sometimes called supervision. The third method is a low, fixed price, with a government backing of ample strength to make up the annual deficit in case it is required.

Under the first method rates are regulated by competition, by the law of supply and demand, and by the Golden Rule. When monopoly appears, competition ceases; the law of supply and demand takes an unusual form, in that there may be difficulty in raising money to provide for the essential increasing development that is to furnish the "supply," and in that it is easy at any time by unreasonably high prices to check the "demand," otherwise this law is ineffective; and to depend upon the Golden Rule, even in the twentieth century, is akin to leaning on a reed. Under the second method the great Boston gas case was solved successfully whereby, briefly, a franchise was granted requiring that gas of standard quality be furnished at a fixed price, this price to be just enough above actual cost to permit the owners of the plants to receive a trifle over the usual savings bank returns on their money invested, and that the owners must reduce the price of gas five cents per thousand for every one per cent. they would be permitted to increase their dividends. Under the third method competition was barred by law and the government assumed the monopoly. To prove that the charge of what the traffic would honestly bear was a rate so low that in comparison with the then current rates seemed absurd was the great work of Sir Rowland Hill, and upon the principles he introduced the mail service of the world is handled to-day.

Another method for regulating rates has been suggested—that of maximum prices fixed by legislative enactment. If this plan were in force, obviously the monopoly would charge the full price—that is, the maximum—if the traffic could be made to bear it, regardless of changing conditions; the minimum and maximum charges would be the same, and would rarely be lowered, except by further legislative enactment. Such a plan places a high premium on legislative control.

Massachusetts arranged that where railroad securities earned over a certain fixed percentage all earnings above that should be paid to the Commonwealth. It was not effective. The books and capital stock were kept in such a manner that the roads were never allowed to show that they earned so much. In brief, the railroads without any difficulty "got around" the law.

Following the assumption that the wire service is a monopoly and that it is desirable to have it a monopoly, in order to regulate rates it is necessary to discover and experiment with some new plan or to follow one of the methods stated.

If we follow each of the three methods to its logical conclusion:

The first method obviously with the recognition of monopoly becomes ineffective, and does not require further consideration.

The second method suggests a plan which, outlined briefly, is to assume that the present charges are reasonable; to accept the present capitalization as an honest and full valuation of their property, organization and "going concern"; to accept a rate of interest 1 or 2 per cent. higher than the average savings bank rate of interest as a just rate; to permit an increase in this rate when it is accompanied by a certain fixed percentage decrease in rates for service and a certain fixed percentage increase in the wages of employes. In considering such a plan it is necessary to provide for means of increasing the size of the plant in order to meet the annual increased development, and to guard against "loopholes" aimed at sacrificing the quality of the service in order to show quick results, and leakages, as, for instance, the purchasing of supplies at exorbitant prices from an inside clique.

The third method would either require government ownership of the monopoly or government recognition and protection of the monopoly, provided it put into effect low rates based, as far as possible, on the principle of mail service rates.

In this connection it is important to recognize that while we have discarded competition in this article and accepted the principle that the wire service of this country should be under one

*Cassier's Magazine.

management, and while at the present day there may not be sufficient competition, except in very few localities, that is worthy of the name, nevertheless the monopoly apparently holds a certain fear of possible competition that it has never so far been able to shake entirely off. This fear or dread is of ample strength to make it an item of large consideration in trading with the government for the privilege and strength of being a recognized and protected monopoly.

Service first and reasonable charges second, is the demand of modern business—"commercial service," as it is called by the trade. A method of regulating rates whereby a recognized and protected wire service monopoly will provide commercial service and charge only what the traffic will honestly bear is the problem before the wire service monopoly. The problem is solvable. Furthermore, it is for them rather than for their vast army of customers to offer the solution, since its consideration is for the good of the service.

St. Louis Terminal Telegraph and Telephone Facilities.

In a paper read at the annual convention of the Association of Railway Telegraph Superintendents, New York, June 5, Mr. F. E. Bentley, superintendent of telegraph of the Terminal Railroad Association, St. Louis, Mo., described the equipment of the main telegraph office at the St. Louis union station. There are seventy-six telegraph wires and four telephone circuits.

Telegraph and telephone message circuits on the eight tables are divided into districts, each operator working six or eight, and these operators also record the condition of the wires at less regular intervals, and likewise announce their presence at quiet wires.

As each operator is credited with the number of messages he handles, a daily average service account being kept and filed for their inspection they are careful to record every message sent and received. This not only spurs the operators to handle all the mesages they can, but together with the wire-condition record and miscellaneous notations on the call sheets, makes a complete supervisory record that line offices seldom assail successfully.

The telegraph is used for train dispatching, one wire covering the Merchants route, with eight block towers, six of them interlocking plants; another the Eads route with five towers, all interlocking plants, and an extension to the east side belt line with two additional interlocking towers.

A message wire encircles both the Eads and Merchants routes, starting from and returning to the main office at Union Station, being connected also with Relay Depot and the Terminal agent's office, East St. Louis. It is also used for time signals and to set one time clock which could not be reached by Western Union time service.

Two private branch exchanges at Union Station and thirty-two private lines between various points, with over 400 telephones are used in Terminal telephone service, handling a daily average of about 12,000 connections.

In the way of special telephone arrangements for very noisy places, such as shops, engine houses, etc., where the six-inch gong could not be heard, it was found necessary to install air whistles connected by a trigger device to the telephone bell box, so that when the air whistle is set off it blows until the call is answered and trigger reset.

Telautographs—electrical writing machines—are used to very good advantage, both at Union Station and Washington avenue new station, where train announcements must be displayed for some time and a permanent record is desired. One transmitter at the principal interlocking tower, Union Station, sends simultaneously to six receiving machines in the facsimile handwriting of the operator, itemized reports of trains arriving, trains departing, cars set into the station, etc. Another transmitter in the telegraph office nearest Washington avenue station writes on two receivers in the station all reports of how inbound trains will arrive and the time that outbound trains pass the first towers on each the Eads and Merchants routes.

Handbook of Telephone Construction.

Mr. Frank B. Hall, Newton Falls, Ohio, has issued a handbook of standard telephone construction methods, which bears evidence of having been prepared with great care and completeness. It was designed on the lines of similar books issued by the American Telephone and Telegraph Company for the use of its employes, and is said to present standard up-to-date construction methods.

The book is divided into eight sections as follows: Exchange aerial specifications, exchange underground specifications; toll-line specifications; sub-station wiring; construction methods; material specifications; material catalogue, and drawings of materials, each section being marked by an index tab which permits of quick reference.

A valuable feature of the book is the large number of excellent illustrations, there being 239 full pages of them. They are well drawn and very clear, and for this reason the work will be extremely serviceable, as nothing vitiates a book of this character so much as poor and obscure drawings.

The text is also clear and easily read, and the whole arrangement and execution of the book has evidently been to give information as clearly and quickly as possible.

The work is bound in a strong loose-leaf cover and is 9 inches long by 5¼ inches wide in size.

The price of this book is $4.00 per copy, postage prepaid. Copies may be obtained of Telegraph and Telephone Age, 253 Broadway, New York, on receipt of price.


KERITE
DAYS
KERITE

Telephone Pioneers of America.

WILLARD L. CANDEE.

Capt. Willard L. Candee is one of the few men who in the early days of the telephone foresaw the great value of the invention and cast their lot with the then infant industry. His early telephone experience led him into manufacturing lines and he now stands at the head of one of the largest wire concerns in the country.

Prior to his entry into the telephone field Mr. Candee was a telegraph operator and his experience thus gained naturally turned his attention to the new invention—the telephone—which service he entered in August, 1877, as assistant superintendent for the Telephone Company of New York. His principal duties were the securing of telephone contracts and as this was a new line of endeavor and the field entirely new, it was up-hill work. Mr. Candee, however, proved himself to have superior ability in this direction and met with success. The first paid telephone subscriber in New York was a wire manufacturer who was then making wire for the cables in the original Brooklyn Bridge and the installation of the first telephone was of great advertising value to the young company.

WILLARD L. CANDEE,
President, The Okonite Company, New York (1877).

In 1879 Mr. Candee became associated with the Weston Electric Light Company and in 1881 he took an active part in organizing and developing the Jablochkoff Electric Lighting Company in New York City. On March 26, 1884, he became associated with Chas. A. Cheever in the new insulated wire manufacturing company under the firm name of the Okonite Company, and has been associated with this concern as an active official ever since, now being president of the company.

Mr. Candee is a man of great public spirit and takes much interest in civic affairs, having been for a time associated with the National Guard of the State of New York. As a business man, Capt. Candee commands the respect of the entire electrical industry and is thoroughly conscientious and just in his dealings with his fellow men. The success of his present business is ample testimony of his ability to conduct and manage the affairs of a large industrial enterprise.

Self-Adjusting Relays.

In referring to an article published in this journal on the subject of self-adjusting relays, written by Mr. Willis H. Jones, a well-known electrical engineer writes:

Self-adjusting relays have been in existence since 1856. The trouble with this and many subsequent devices is that they adjust too much and pick up all vagrant currents. Again, when an escape occurs there is no way to break; the sender keeps right on sending into the earth although the distant station may have his key open. With the English open-circuit methods, relay adjustment ceases to be a factor.

Again, inductive disturbances on parallel circuits are simply a product of stupidity. When we cease breaking the circuit and use continuity keys everywhere there will be no appreciable reaction between adjacent wires.

Take for instance a circuit of say 10,000 ohms, which under a current pressure of say 200 volts, will give us 20 milliamperes of current. Now let us bridge every key with a 10,000 ohm resistance and increase our potential to 400 volts. When the key is open we will have our original 20 milliamperes in the circuit.

When closed we should have 40 milliamperes. The effect on the relays, however, will be as the square of the current. Hence with 20 milliamperes we have the sum of $20 \times 20 = 400$, whereas when the 40 milliamperes exist we have $40 \times 40 = 1600$. Deducting from 1600 to 400 idle milliamperes, we have by the new method a working force in the relays of 1200 or three times that obtained by the dead make-and-break method. As we have not broken the circuit its inductive action on its neighbors is at a minimum.

As for the cut-out plug, a very simple slow-acting thermic wire can be made to automatically close any circuit in which it is included. Such a device will be insensible to Morse signals, but operative on a ten second or any other predetermined length of break.

Finally as to a remunerative reward for mental activity in the inventive line, I fear it is a false hope. Raising potatoes will pay better in most cases.

Mr. F. S. Lewis, manager of the Western Union Telegraph Company at Jersey City, N. J., in renewing his subscription for another year, writes: "I find TELEGRAPH AND TELEPHONE AGE very interesting and instructive, and I would not care to be without it."

The Dot-and-Dash Club.

Among the speakers at the first meeting of the Dot-and-Dash Club of Philadelphia, Pa., May 11, were Messrs. James Merrihew and M. J. O'Leary, of New York.

Mention was made in the report of the meeting published in our issue dated May 16 of the reading of an old letter from Amos Kendall, president of Magnetic Telegraph Company, the first telegraph company organized, in reference to the appointment of an operator. The operator was Mr. W. T. Westbrook, the well-known old-time telegrapher and telephone magnate, who expected to be present at the meeting. The letter is as follows:

Washington City, February 28, 1856.

Mr. W. T. Westbrook,

Dear Sir.—Your letter of the 26th inst. is at hand.

An operator is wanted at the New York office, one who is competent to send and receive, who is willing to work if need be at all hours, who is sober, industrious, honest and of courteous manners.

You know best whether you possess these qualifications. If you think you do, you may report for duty to the New York office of this company on Monday morning next and if on trial you shall be found to possess the required qualifications I will give you an appointment at $500, to be increased if you show yourself worthy of it by uniform good conduct.

Very respectfully,

(Signed) Amos Kendall, Prest.

Wilmington, Del.

Mr. Kendall, is it interesting to note, had such faith in the possibilities of the telegraph that he resigned his commission as postmaster-general of the United States, to take up the duties of president of the first telegraph company organized in this country. Another point of interest in this connection is that the president of the telegraph company attended to the duty of hiring operators in those early days.

But operators were not so numerous then as they are now, nor were the duties of president so burdensome as now, and the president no doubt had plenty of time to select his telegraph timber.

Mr. James Merrihew told an interesting story of how he met Mr. Joseph L. Green at the dinner.

"I met my old friend Joseph L. Green," he says, "after his introduction to the club as the oldest of the Philadelphia operators. I referred to a conversation with him just before the dinner, when I endeavored to bring myself to his recollection by going back nearly to the beginning of things when he and I were operators together in the office of the Magnetic Telegraph Company at 301 Chestnut Street. I said to him, 'Joe do you remember me?' Seeing that he hesitated, I said, 'It is not Joe Beatty, nor Ed. Hunt, nor Ben Snyder, nor Cary Pannell, nor James N. Worl, nor is it Joe Green. Now I have mentioned the names of all the operators, except mine—who am I?' 'Why,' he said, 'Jim Merrihew, of course.'"

Ed. Heist was the cashier, Tom Bladen the receiving clerk and Larry Eglee the delivery clerk. This was the entire force of the Magnetic Company at Philadelphia in 1856. Of these only Joe Green, Jim Worl and I are left. Worl relieved me of the management of the New Hope, Pa., office in 1852.

Mr. M. J. O'Leary, secretary of the Telegraphers' Mutual Benefit Association, New York, gave an interesting talk on the subject of fraternal insurance, dwelling upon the advantages and benefits of membership in the Telegraphers' Mutual Benefit Association.

Mr. Edison's School Days.

Part of the examination for the eighth grade pupils of the schools at West Orange, N. J., this month will be to write an essay on a letter to New Jersey school pupils written by Thomas A. Edison. Mr. Edison's letter is as follows:

"Dear Young Friends: I have been asked to write a letter to the boys and girls in the grammar schools in New Jersey, telling something of my own school days. Such a letter as that would be very short, for I really never had any school days as you understand them.

"I was rather delicate when a small boy, and instead of sending me to school my mother, who had been a high school teacher, educated me herself at home. She had only the one pupil, which was fortunate for me, as I received thoroughly sound teaching. My mother also taught me how to read good books quickly and correctly, and as this opened up a great world in literature, I have always been very thankful for this early training.

"I was fond of experimenting, so, when I was 12 years old I got work as a train newsboy in order to earn my own pocket money to buy chemicals and apparatus with which to experiment. My train ran from Port Huron to Detroit, and this gave me opportunity to go to the library in the latter city and read books that could not be found in Port Huron, where I lived.

"I always kept busy and had lots of adventures in trying to add to my store of knowledge, but to tell you the whole story would make my letter too long.

"School days are very different from what they were when I was a boy, fifty years ago. You now have beautiful school buildings, with modern conveniences and apparatus, and your studies include many interesting subjects relating to the arts and sciences. It seems to me that the boys and girls of the present time ought to be very happy in having these fine opportunities of preparing to do big things in the world. Sincerely your friend,

Thomas A. Edison.

F. W. Barth Becomes Manager at Boston.

F. William Barth, whose appointment as manager of the Boston, Mass., office of the Western Union Telegraph Company, was announced in our issue for June 1, was born in Cincinnati, Ohio, January 1, 1875. He began his telegraphic career in 1888, when he entered the service of the Western Union Telegraph Company as check clerk in Cincinnati, afterward becoming an operator. In 1893 he was appointed manager of a branch office of the Postal Telegraph-Cable Company in the

F. W. BARTH,
Manager Western Union Telegraph Company, Boston, Mass.

same city and in 1900 accepted a similar position with the Western Union Company. In October, 1902, he went to Boston for the Western Union as operator, being subsequently advanced to the positions of solicitor, traffic chief and clerk in the office of district commercial superintendent C. F. Ames. Mr. Barth was appointed cashier and transfer agent of the Boston office, August 9, 1905, and in September, 1909, he was promoted to be district inspector. December 1, 1910, he was advanced to the position of district plant superintendent, with headquarters at New Haven, Conn., which position he held at the time of his appointment as manager at Boston.

Municipal Electricians.

Fire Alarm Stations in Parks.—Fire alarm telegraph stations are to be established in Central Park and Crotona Park, New York, and Prospect Park, Brooklyn, at an early day.

Convention of Municipal Electricians.

Interest in the convention of the International Association of Municipal Electricians at Peoria, Ill., August 26-30 is rapidly growing and every indication points to the most successful meeting in the association's history. Several valuable papers will be presented and discussed, and many new ideas will be brought to the attention of the members. There will probably be many exhibits of apparatus and appliances used in the fire alarm and police telegraph service, and as new devices are being constantly brought out this feature of the convention promises to be of unusual interest. Information as to exhibits, hotel accommodations, etc., can be obtained of Mr. W. E. Wolgamott, city electrician, Peoria, Ill., who has all these matters in charge. Mr. Clarence R. George, city electrician, Houston, Tex., is secretary of the association and will be glad to give any further information regarding the convention.

Additional Radio-Telegraph Notes.

Night Lettergrams in England.—On June 1 a night telegraph letter service was instituted in England between all towns where the head telegraph offices are open all night. The charge is twelve cents for thirty-six words and one cent for every three words over thirty-six.

Report of Marconi Company.—The annual report of the Marconi Wireless Telegraph Company, London, England, was issued June 10. It shows net profits of $708,585 for 1911, against $307,565 for 1910. A final dividend of 1 per cent. on both classes of shares was declared, making 17 per cent. for the year on the preference stocks and 20 per cent. on the ordinary. For the current year a first interim dividend of 7 per cent. on the preference shares and 10 per cent. on the ordinary shares is announced.

Heavy Demand for Wireless Operators.—The Marconi Wireless Telegraph Company, London, Eng., has received during the past few weeks so many applications from shipping companies for additional wireless operators for service on board the principal steamers that the present school at Liverpool is unable to keep pace with the demand, and a school is soon to be opened in London. It is estimated that already 100 ships have been supplied with relief operators since the "Titanic" disaster.

International Wireless Conference, London.—The second international radio-telegraphic convention was opened at the headquarters of the Institute of Electrical Engineers, London, Eng., on June 4. Thirty-seven countries are represented. A variety of entertainment has been provided for the visitors and they will be honored by a reception by King George at Buckingham Palace. The sessions of the convention will be secret. Mr. Reid, the American Ambassador, and Mrs. Reid, on June 7, gave a luncheon to the American delegates to the convention.

Mr. Marconi in Spain.—Signor G. Marconi while in Madrid, Spain, recently, was presented with a gold medal by the Spanish Society for Saving Life from Shipwrecks, in recognition of his services to humanity, especially evidenced in the "Titanic" disaster. At a conference in that city, held in Mr. Marconi's honor, in the presence of King Alfonso and other members of the royal family, Senor Moret referred in eulogistic terms to the heroism and self-sacrifice displayed by J. G. Phillips, wireless operator of the "Titanic."

The Railroad.

Mr. M. W. Jones, well-known in New York, has been appointed train master of the Guayaquil and Quito Railway, with headquarters at Huigra, Ecuador.

Mr. T. Roberts, assistant electrical engineer, formerly telegraph superintendent of the Madras and Southern Mahratta Railway, India, has been granted leave of absence, which he will spend in England, preparatory to retirement.

Mr. D. S. Field, a well-known Columbus, Ohio, operator and a member of the Old Time Telegraphers' and Historical Association, has been promoted to be chief operator of the telegraph department of the Pennsylvania Lines west of Pittsburgh at Columbus, Ohio.

Eight-Hour Law.—A bill has been unanimously reported to the House of Representatives at Washington by the Interstate Commerce Committee which provides that railroad telegraphers and signal men shall not have more than eight hours of consecutive work nor less than sixteen hours' relief from work during each day. It is the opinion of the framers of the bill that many train accidents are caused by telegraphers and signal men being worked overtime.

Telephone Dispatching on the Central of Georgia.—The Central of Georgia has recently placed an order, the second within six months, with the Western Electric Company for apparatus to be used in extending its telephone train dispatching system. The section of road from Macon to Bolingbroke, Ga., about fifteen miles in length, is to be converted and extended to Atlanta, a distance of about one hundred and five miles, as a selective telephone train dispatching system. Seventeen way-stations will be equipped with selector sets. Fifteen siding telephones will be installed in booths along the right-of-way and every train operated on the division will carry a portable telephone set. Mr. G. L. Candler is superintendent of transportation.

The Pittsburgh and Lake Erie Railroad Company has recently placed an order with the Western Electric Company for the telephone train dispatching material necessary to equip its line. The railroad has three branches, from Pittsburgh, extending to Youngstown, Ohio, a distance of about seventy miles, to Connellsville, Pa., about sixty miles, and to Brownsville, Pa., about fifty-five miles. The dispatcher will be located at Pittsburgh. Two complete dispatcher's equipments will be used, so that two calls may be placed simultaneously on either end of the line. Forty-four way stations will be equipped with selector sets, while at the Pittsburgh office there will be motor-generator sets, storage batteries and a battery switchboard panel to be used in connection with the furnishing of ringing and talking current. Mr. L. A. Lee, Pittsburgh, Pa., is superintendent of telegraph.

Obituary.

Chester H. Pond, aged 68 years, a well-known inventor of electrical devices and the self-winding clock, and formerly associated with Mr. Thomas A. Edison, died at Moorehead, Miss., June 11.

H. J. Ebbs, aged 73 years, chief bookkeeper of the Western Union Telegraph Company, at St. Louis, Mo., died in that city June 3.

J. Frank Ellenhereberger, aged 56 years, manager of the Western Union Telegraph office at Lebanon, Pa., died at that place June 3.

Senator G. S. Nixon of Nevada, aged 52 years, a former telegrapher, died in Washington, D. C., June 5. Senator Nixon was largely interested in mining and banking and he was a "multi-millionaire."

E. G. Carley, aged 52 years, general transfer agent of the Western Union Telegraph Company, New York, who died on May 11, was born in New York and entered the telegraph service in 1876, becoming an operator in 1879. In 1880 he was transferred to the main office of the company, and soon afterward became identified with the money transfer service, and in July, 1907, was made general transfer agent.

Mr. George Velie of Winnipeg, Man., aged 56 years, brother of Mr. A. P. Velie, a well-known member of the New York telegraph profession, died at Winnipeg recently. Mr. Velie was well known to members of the telegraph fraternity in northwestern Canada. He bequeathed over $30,000 to various hospitals and other charitable organizations in Winnipeg. He was a public-spirited citizen and charitable to a fault.

The Late W. E. Athearn.

W. E. Athearn, engineer of equipment of the Western Union Telegraph Company, New York, whose death was briefly announced in a portion of the issue for June 1, was a man of sterling integrity, and an able engineer. He was born November 15, 1856, at West Tisbury, Martha's Vineyard, Mass., and was educated at Williams College. During his course at this institution he became interested in the study of electricity and as the telegraph was, at this time, the most important branch of the science he naturally turned to this field. Mr. Athearn's first position was that of operator at Williamstown, Mass., in 1878. He afterward held positions as chief operator, manager and electrician for various companies. Entering the service of the Western Union Telegraph Company in 1890 as night chief at the main office, 195 Broadway, New York, he successively held the positions of electrician of the first district, to which he was appointed in 1894, and assistant electrical engineer. In 1903 he resigned to accept a position on the engineer's staff of the American Telephone and Telegraph Company, being advanced in 1908 to the post of special agent in charge of the operation of the leased wire service of that company. In 1910 the Western Union Telegraph Company again secured the services of Mr. Athearn appointing him engineer of equipment, which position he filled most creditably up to the time of his death on May 29.

The Cable.

English-German Cable.—A new cable is to be laid between England and Germany, according to an announcement made by the British postmaster-general.

Directors Re-elected.—At the annual meeting of the Central and South American Telegraph Company the retiring board of directors was re-elected and at the meeting of the Mexican Telegraph Company the retiring directors were also re-elected.

Claims for Cutting of Cables.—Only two claims against the United States have been presented as a result of the cutting of telegraph cables in the Caribbean Sea at the time of the Spanish-American War. The companies are the Cuba Submarine Telegraph Company and the French Cable Company.

New Wireless Company.—The Wireless Liquidating Company of New York was incorporated June 10 with a capital of $1,700,000. The directors are Arthur P. West, R. M. Owen and George W. Whiteside, New York; George L. Fox, New Haven, Conn., and A. A. Du Ban, Philadelphia.

Old-Time Telegrapher's Reunion.—The next reunion of the Old Time Telegraphers and Historical Association and Society of the United States Military Telegraph Corps will be held at Jacksonville, Fla., October 22, 23 and 24. October is one of the pleasantest months of the year in the Jacksonville latitude and there is every reason to believe that the attendance will be large. Hon. W. S. Jordan, mayor of Jacksonville, and an old-time telegrapher, is president of the association, and he has given the members to understand that they will receive a real Southern welcome when they visit the land of oranges. Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old Timers and he will be glad to give any desired information to those interested.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL.

C. Troeller, Jr., manager at Atlantic City, N. J., and D. McNicol and H. W. Hetzel of the electrical engineer's office New York, were recent callers at this office.

Mr. Almes, repeater chief has been assigned to the early trick to assist all-night chief Poppert.

NEW YORK POSTAL.

Miss H. V. Cullen, of the Holland House office, has resigned to get married.

Examinations in the messenger's telegraph class will take place in the first week in September, and seven cash prizes will be awarded to those having the best records as to proficiency, etc. On graduation from the messenger service the boys become sergeants, then clerks, finally operators in branch offices. Instruction is given by a competent teacher two hours each week-day evening during the months of June, July and August.

NEW YORK WESTERN UNION.

Mr. Martin Durivan of this department has transferred his services to West End, Long Branch, N. J., for the summer, where he will be chief operator as has been his custom for the last quarter of a century. The office is presided over by Mr. P. J. Casey of New York whose managership at this famous summer resort goes back beyond the memory of man.

Mr. H. W. Barbour, aged 63 years, an old-time telegrapher and a chief operator in this office, died in Flatbush, Brooklyn, May 29.

Telegraph and Telephone Age

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Concerning Voltmeters.

A correspondent requests TELEGRAPH AND TELEPHONE AGE to answer the following questions for the benefit of a few interested readers who possess a very limited library of text books:

"A—How is a voltmeter constructed so as to give two different scale readings?

"B—Can a single scale reading meter be made to give a different reading? If so, how.

"C—What is a differential volt-meter, and what is it used for?

"D—What is a 'duplex' meter?"

In order to understand the arrangement for double scale readings, the correspondent must first learn the construction of a single scale instrument and the logic of the principle involved therein.

First, then, what is a voltmeter? It is simply a form of galvanometer, the needle of which is deflected by any current that flows through the coil, the more current the greater the deflection.

As the current that flows through any circuit is determined by the formula $E/R = I$, it follows that if an E. M. F. is applied to one terminal of a voltmeter coil while the other terminal is grounded a certain maximum current will flow through the coil, and the needle will be deflected, say, across the entire arc of the scale. In this case the last division of the scale would represent the full voltage of the battery applied, and the current flowing would in turn always cause the needle to point to the highest voltage the instrument could measure. The scale would then be marked 100, 150, or whatever represented the number of volts applied, as the case might be, and divided into a great many smaller equal divisions, each of which would represent a fraction of the full scale pressure.

The resistance of a voltmeter is usually very high, ranging anywhere from 10,000 to 40,000 ohms or more, in order to not appreciably drop the voltage to be measured at that point in the conductor where one terminal is connected in the form of a leak, the other terminal being grounded.

No matter what scale meter one uses, the needle will not point to the highest reading until the number of volts applied is of the value indicated. Any applied pressure that is less than the full scale value decreases the current, and consequently the degree of deflection, in direct ratio with the voltage causing it, hence the needle always stops over the division or reading which represents the value of the applied voltage. This brings us to questions "A" and "B," which are practically the same.

Having shown that each single scale instrument requires a prescribed current in order to obtain a maximum reading, it follows that if the current is reduced one-half in volume, the needle will only move half way across the scale and point to half its full scale value, that is to say, a meter with a 150-volt scale would indicate that 75 volts were applied. As the current is equal to the voltage divided by the resistance of the coil, it follows that if we double the resistance of the coil circuit and still apply 150 volts, we will reduce the current one-half, and the reading will be only 75 volts, although 150 volts may be applied.

In like manner, if we should desire an instrument that would have one scale reading from 0 to 150 volts and another 0 to 15, all that is necessary is to insert ten times as much resistance in the high reading coil as is required for low reading.

The deflections will be in direct proportion to the current in both cases, but as the 15-volt scale is of practically the same length as that for 150 volts, it permits a greater range of divisions for fractional readings.

Portable instruments of this kind have the different coils within the case and also possess an additional binding post, one for low and the other for high reading.

It is obvious, therefore, that a single scale voltmeter may be arranged to give a different reading, by the addition of extra coils or resistances connected externally in series with the meter, but it is first necessary to know the resistance of the voltmeter so used, in order to compute the value of such coil. The additional resistance must be some multiple of the voltmeter resistance, and for that reason is known as a "multiplier." All manufacturers keep these multipliers in stock ready to be applied to their own and similarly wound instruments. For example, if the resistance of a six-volt instrument was increased ten times by means of a multiplier of that value, the reading would be increased to 60 volts, because it would then require ten times as much voltage to produce the same current in the coils that 6 volts alone caused with the original winding.

"C"—A differential voltmeter is an instrument having two sets of coils wound in such a manner that when two currents of opposite-polarity flow through them in parallel, any difference in the values of the two E. M. F.'s will be indicated by a deflection of the needle towards the positive or the negative side of zero as the case may be. These instruments are used principally in connection with electric power switchboards.

"D"—The word duplex is frequently applied to voltmeters and ammeters to indicate a combination of both in one instrument. For example, the Western Union switchboard test instrument "ES7A" volt-mil-ammeter might be so classified, as it is so constructed as to be used as either a voltmeter or an ammeter.

Recent Telegraph and Telephone Patents.

ISSUED JUNE 4.

1,028,370. Telephone Attachment. To T. L. Ludwig, Sandusky, Ohio.

1,028,614. Primary Battery. To C. B. Schoenmehl, Waterbury, Conn.

1,028,635. Telephone System. To D. L. Temple, Lewistown, Pa.

ISSUED JUNE 11.

1,029,504. Selective Telephone System. To W. F. Marten, Oakland, Cal.

1,029,524. Telephone-Receiver Shell. To J. F. Barbour, Elyria, Ohio.

1,029,573. Wireless-Controlled Current Distributer. To C. Wirth, Nuremberg, Germany.

1,029,577. Telephone-Exchange System. To E. E. Clement, Washington, D. C.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange June 25:

American Telephone and Telegraph Co.	146
Mackay Companies	87½
Mackay Companies, preferred	69⅝
Western Union Telegraph Co.	81½

Personal.

Mr. W. C. Brown, president of the New York Central Lines, and a former telegrapher, is rapidly recovering his strength after a surgical operation on June 17.

Mr. C. E. McManus, circuit manager of the Great North Western Telegraph Company, Toronto, Ont., has retired on a pension on account of ill-health.

Mr. Thomas Ahearn, an old-time telegrapher, now a capitalist of Ottawa, Ont., was a New York visitor last week and took occasion to call on many of his old friends.

Mr. Robert W. Martin, a veteran telegrapher of New York, who has been suffering from the effects of a stroke of paralysis for the past seven years is still in the same feeble condition.

Mr. S. S. Garwood, many years ago manager of the Western Union Telegraph Company at Philadelphia, Pa., and for several years past identified with the telephone interests in that city, was a recent New York visitor.

Obituary.

P. A. Peterson, aged 50 years, night chief of the Western Union Telegraph Company, St. Louis, Mo., died suddenly at his desk on June 19.

Eugene S. Anderson, aged 44 years, general traffic chief of the Baltimore, Md., Western Union office, died at Fallston, Md., June 20.

George A. Lyon, aged 63 years, an old-time telegrapher and manager of the Live Oak Telephone Company, at Suwanee, Fla., died in that place June 10.

Mrs. W. T. Westbrook, wife of Mr. W. T. Westbrook, a forty-niner of the telegraph and a pioneer telephone official, died at Philadelphia, June 6. Interment was at Wilmington, Del.

J. E. Kane, aged 37 years, manager of a broker office in Newport, R. I., and a former and well-known New York telegrapher, died in Buffalo, N. Y., on June 22. He had gone to Buffalo to attend the funeral of his father-in-law.

John F. Guthridge, a member of the United States Military Telegraph Corps, died at Washington, D. C., June 17. Mr. Guthridge was employed as operator in the War Department, Army of the Potomac, during the entire Civil War, afterwards serving in the Western Union office in Baltimore for many years.

Mr. Thomas Blake of the Direct United States Cable Company, New York, died suddenly of heart failure June 18. He was on duty the day previous apparently in the best of health. Mr. Blake was one of the original staff of the Direct Cable Company, going to Rye Beach from England in 1874. He had been in the Direct Company's service in New York for the past thirty years and was well known and respected in cable circles generally. Deceased was 59 years of age and was born in Ireland.

The Late C. H. Pond.

The death of Chester H. Pond at Moorehead, Miss., which was briefly announced in our issue for June 16, started his career as an operator on the Lake Shore and Michigan Southern Railway, and at the age of eighteen, was promoted to be a dispatcher. At the outbreak of the civil war he entered the federal telegraph service and afterwards became a member of the Society of the United States Military Telegraph Corps. He was an inventor of some note, many of his inventions having been adopted by the Western Union Telegraph Company. When he was thirty-three years of age, he moved to New York City and there formed a strong attachment for Mr. Thos. A. Edison. He was associated with Mr. Edison in the latter's early electric light and electric railway work and was the inventor of the self-winding clock, which is now so extensively used in telegraph offices and other public places throughout the country. He left New York in 1895 and invested in timber lands around the Mississippi delta. In later years, Mr. Pond was actively engaged in the development of railroad communication between Memphis and the Gulf of Mexico.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. W. I. Capen, fourth vice-president and general superintendent of plant, New York, has gone to Chicago and the Southwest on company business. He will go as far as New Mexico before he returns to New York.

Mr. Theodore L. Cuyler, jr., assistant treasurer of the company is taking a vacation for the benefit of his health. Mr. J. J. Cardona, his assistant, will take care of the interests of the treasurer's office during his absence.

Mr. J. G. Blake, general superintendent at San Francisco, Cal., who has been in the city for the past two weeks is now taking an automobile trip through the New England States. Mr. Blake is a native of Vermont and his son was graduated at Harvard University last week.

Mr. Jesse Hargrave, division electrical engineer at Atlanta, Ga., has been transferred to Dallas, Tex., as superintendent of the Mackay Telegraph-Cable Company's lines in Texas and Arkansas, vice Mr. F. W. Conger, who returns to Chicago, Ill., to take up the duties of superintendent of the sixth district. Mr. J. F. Heard will succeed Mr. Hargrave, at Atlanta, as division electrical engineer.

Mr. H. W. Hetzel, travelling auditor of the company, with headquarters at New York, has returned after a four months' trip to the Pacific Coast. Before resuming duty Mr. Hetzel will spend a brief vacation at his home in Philadelphia.

Miss T. N. Brown, chief clerk to Mr. E. J. Nally, vice-president and general manager, New York, sailed for Europe June 27 on the steamer "Adriatic." Miss Brown will be absent about two months. A large number of her office associates assembled at the dock to bid her farewell and she was the recipient of many flowers and other tokens of esteem.

Mr. John Nering, manager of the Chicago office of this company, sailed from New York for Europe on June 27, on the steamer "Kaiserin Auguste Victoria," to be gone until October.

Mr. George J. Goalding, manager of the Erie, Pa., office has retired and will take a complete rest from active duties. Mr. Goalding has been in the telegraph service for fifty-four years, nearly twenty-four of which have been devoted to this company's interests. He was a military telegrapher during the civil war and is widely known throughout the country.

Mr. William O. Gaffney, manager of the Charlotte, N. C., office, was one of the successful applicants to the Supreme Court of North Carolina for admission to the bar to practice law in that state.

Several officials from headquarters attended the Baltimore national convention in the interest of the service. They included Mr. C. H. Mackay, president; C. C. Adams, second vice-president; E. B. Pillsbury, general superintendent; F. F. Norton, superintendent of traffic; J. P. O'Donohue, division electrical engineer; D. McNicol and D. H. Gage, jr., of the engineers' office; C. A. Lane, superintendent of construction; J. J. Whalen, manager; J. T. Williams, all-night chief; R. G. Post, quadruplex chief; W. E. Todd, wire chief, and seventeen operators. Mr. C. E. Bagley, superintendent, Philadelphia, Pa., also attended the convention.

The Postal Telegraph-Cable Company is moving its main office in San Diego, Cal., to 951 Fifth St.

Postal Outing.

The fifth annual outing of the Branch Managers Association, Postal Telegraph-Cable Company, New York, took place at Witzel's Point View Island, College Point, Long Island, N. Y., on the afternoon of Saturday, June 29. A number of athletic events were held and valuable and useful prizes awarded to the winners. District superintendent C. F. Leonard, New York, was the guest of honor and made an address. Remarks were also made by several of the managers present, and a vaudeville entertainment concluded the programme.

The party was conveyed from New York to the grounds on the steamer "Orient," and returned to the city about 10 p. m.

Mr. T. E. Heffren is chairman of the Association, Mr. J. Hennessy treasurer and Mr. J. J. McDermott, secretary.

Telegraph Managers Arrested.—Mayor Skeggs of Decatur, Ala., concluding that the best way to force the two telegraph companies to pay their privilege taxes of \$250, was to put the respective managers in jail, and he accordingly issued the necessary instructions.

Mr. C. E. Diehl, manager of the Postal Telegraph-Cable Company at Harrisburg, Pa., and superintendent of fire and police telegraphs at the same point, writes: "I take pleasure in enclosing herewith check for \$2.00 for renewal of my subscription to TELEGRAPH AND TELEPHONE AGE. I congratulate you upon keeping abreast of and a little ahead of the times. No man interested in the business and especially those actively engaged in it can afford to be without your interesting and instructive publication."

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of this company, on June 20 received the honorary degree of Doctor of Laws from Middlebury College, Middlebury, Vt.

Mr. H. C. Worthen, general superintendent, and J. E. Schofield, district superintendent, Atlanta, Ga., on June 18, gave a dinner in Florence, Ala., to the office force in that place.

Mr. J. McRobie, general manager, and M. E. Barrett, plant superintendent of the American District Telegraph Company, New York, and George McGann, superintendent of the same company at Chicago, have gone to the Pacific Coast on business connected with the service.

Mr. Henry G. Bates has been appointed transfer agent of this company, vice E. G. Carley, deceased. Mr. Bates was formerly assistant general commercial superintendent of the American Telephone and Telegraph Company at New York.

Mr. W. J. Austin of the auditing department of the cable service, New York, is visiting Montreal and various Atlantic cable stations to reorganize the methods of accounting in the interests of the service.

The following appointments in the Mountain Division are announced by Mr. J. C. Nelson, general superintendent, Denver, Col.: Mr. W. A. Reynolds, division special agent, attached to general superintendent Nelson's staff, at Denver. Mr. Reynolds was formerly chief clerk to district commercial superintendent E. E. McClintock, and previous to his services in that capacity was city solicitor at Denver under manager Reade. Mr. J. B. Colby, division traffic supervisor under division traffic superintendent, B. L. Brooks. Previous to this appointment Mr. Colby was chief clerk to Mr. Brooks. Mr. C. E. Thorson, formerly chief clerk to district traffic superintendent, E. C. Labadie, at Salt Lake City, succeeds Mr. Colby as chief clerk to Mr. Brooks. Mr. Jas. E. Logan, district special agent under district commercial superintendent, Mr. E. E. McClintock, Denver, Col. Mr. Logan first entered the Western Union service as manager of the Parson, Kan., office in February, 1904. He was later cashier at the Oklahoma City office; manager of the Board of Trade branch office, Omaha, Neb., and manager of a branch office at San Francisco. Mr. J. B. Pemberton was appointed chief clerk to district commercial superintendent McClintock, vice J. E. Logan.

The following named gentlemen from outside cities looked after the company's interests at Baltimore during the national Democratic convention: Herbert Brown, A. R. McGrath and A. P. Carstensen, Chicago; E. M. Edward, St. Louis; G. R. Calvert, Birmingham, Ala.; A. C. Fonville, Montgomery, Ala.; W. W. Kelser, Pittsburgh, Pa.; W. A. Donovan and G. H. Boothby, Boston, Mass.; manager H. F. Taff, Geo. Divan, and solicitor Simpson, Washington, D. C.; commercial superintendent J. F. Nathan, John Simmonds and R. J. Murphy, New York.

Mr. V. J. Albert, manager Western Union Telegraph Company, Baltimore, Md., and Mr. P. D. Callum, commercial agent, New York, addressed the Telephone Society of Baltimore in the evening of June 5. The subject of Mr. Callum's address was "The History of Signalling at a Distance."

Mr. Robert L. Jackson, manager of the Great Northwestern Telegraph Company's Victoria, B. C., office, was born in Lincoln, Neb., January 9, 1876, and began his business career in July, 1888, as a messenger. He soon became an operator and served in that and other capacities in various cities throughout the west, becoming manager at Victoria April 1 of this year.

This company has asked the California State Board of Railroad Commissioners for permission to reduce its rates in that state. Reductions in rates in many other states have been made by both telegraph companies.

This company has issued an eight-page pamphlet on the provisional pension plan which takes effect July 1. The pamphlet goes into the subject in detail.

On May 25 the Western Union Telegraph Company transferred its equipment from the old offices at Houston, Texas, to its new headquarters in the Commercial National Bank building.

Some Observations from Mr. Vail.—Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, who has just returned from Europe, states that he made some progress in inducing several European governments to operate continental telegraph lines in co-operation with American cable companies to avoid delay in transmission. Many of the methods on the Continent, he stated, are old-fashioned, and it is difficult to make the Europeans understand the progressive methods of the Americans. England is well abreast of the times, as indicated particularly in the telegraph business by the transmission of night and week-end telegraph letters. In referring to the Radio telegraph conference now being held in London, Mr. Vail stated that the stopping of interference in wireless telegraphy by amateurs is one of the most important questions the congress will have to deal with. "Wireless will never amount to anything," he added, "until they do that."

Outing of the Morse Electric Club.—The summer outing of the Morse Electric Club will be held at Donnelly's Boulevard Hotel, College Point, L. I., N. Y., Saturday, July 6. The Western Union Telegraph Company has placed its steamer at the disposal of the club for the purpose of conveying the members and guests to and from the hotel grounds. Athletic events, and a game of baseball between the operators and attaches of the executive department of the Western Union Telegraph Company, will be features of the occasion. The steamer will leave Starin's Pier, foot of Cortlandt Street, at 2 p. m. sharp. The hotel may also be reached by College Point Ferry, foot of East Ninety-ninth street. Mr. R. J. Murphy, 195 Broadway, is treasurer.

The Cable.

Dividend.—The American Telegraph and Cable Company paid the regular quarterly dividend of 1¼ per cent on June 1.

Cable Rates From Bahia.—The Western Telegraph Company, which maintains the foreign cable service at Bahia, Brazil, has announced a reduction of twenty cents per word in its rates from that port to European countries.

Cable Record.—It is stated that the special cable messages sent to the *London Daily Telegraph* in connection with the loss of the "Titanic" and the consequent proceedings constituted a new trans-Atlantic record as regards dispatches addressed to one newspaper; 74,203 words were transmitted by the Commercial Cable Company and 2,891 by the Anglo-American Company, making a total of 77,094 words.

The Telephone.

Mr. T. E. Crosson, manager of the Central District & Printing Telegraph Company, Greenville, Pa., is in New York, where he will spend several weeks.

Mr. Harold E. Tarr, assistant division foreman, New England Telephone & Telegraph Company, Boston, Mass., made an address on June 11 before the Boston Plant Chapter of the Telephone and Telegraph Society of New England, on "The Construction of Telephone Pole Lines and the Equipment of Telephone Poles."

Sale of Telephone Company.—The Skaneateles (N. Y.) Telephone Company has been sold to the New York Telephone Company for $20,700.

Local Telephone Company Absorbed.—The Home Telephone Company of Monroe, La., has been absorbed by the Cumberland Telephone and Telegraph Company.

Telegraph and Telephone in Chili.—A ten-year's concession has been granted for the connection of Valparaiso and Santiago, Chili, by telegraph and telephone, with a midway station at Curacavi.

Dividend.—The directors of the Tri-State Telegraph and Telephone Company, Minneapolis, Minn., have declared a quarterly dividend at the rate of 6% per annum on the outstanding preferred stock.

Large Issue of Telephone Directory.—The New York Telephone Company delivered 1,385,000 copies of the June issue of the telephone directory to subscribers in New York and the suburban districts. There are 804 pages in the book.

Telephone Numbers as Telegraph Addresses.—Postmaster-general Herbert Samuel, of Great Britain, referring to the night letter telegram service, which has just been instituted in that country, stated that telephone numbers will be made available as telegraphic addresses. He also stated that a system of urgent telegrams at three times the ordinary rates is under consideration, for continental messages only.

English Village Telephones.—The British postmaster-general has undertaken to establish telephone call offices at all villages where there is a likelihood of the offices being self-supporting, and these can be used for dictating telegrams to the nearest telegraph office.

Telephone-Telegraph Rates in Nebraska.—The Nebraska railway commission has given permission to the Nebraska Telephone Company to make a special rate to all commercial telegraph companies to cover business handled partly by telegraph and partly by telephone.

Eight-Hour Day for New England Telephone Operators.—Mr. Jasper N. Keller, president of the New England Telephone and Telegraph Company, Boston, Mass., announces that an eight-hour work day will be adopted for the operators of that company by January 1, 1913.

Absorption of Telephone Companies.—The Mountain States Telephone and Telegraph Company has acquired the Arizona Telephone and Telegraph Company, an independent concern, and the Southwestern Telegraph and Telephone Company has absorbed the Central Texas Telephone Company.

English Telephone Suit.—The first hearing of the National Telephone Company's claim for $10,000,000 damages against the British Postoffice was held on June 10. This is said to be the largest claim ever dealt with by a British arbitration court, and the case will probably occupy between fifty and one hundred sessions.

Reduction of Telephone Rates Ordered.—The Public Service Commission, Second District, New York, has made an order requiring the New York Telephone Company to reduce its rates so that subscribers living in the town of Elmira in the district known as West Elmira shall be charged the same rate for telephone service as is charged in the local area in the city of Elmira.

Physical Telephone Connections in Washington.—The Washington (State) Public Utilities Commission has issued an order which will bring about the physical connection of the lines of the Puget Sound Independent Telephone Company, of Everett, Wash., with those of the Pacific Telephone and Telegraph Company. The order, in effect, merely ratifies an agreement reached by the two companies since the case was laid before the commission, and applies to the cities of Seattle, Tacoma, and Bellingham.

High-Frequency Generator for Wireless.—Count Arco, the well-known inventor, has recently made a further important invention which is being taken up by the German Telefunken Company. The invention in question is a high-frequency machine for the direct production of electric energy for wireless telegraphy and telephony. It is capable of generating any desired output at frequencies from 15,000 to 120,000 cycles per second, and, therefore, electric waves of lengths from 2,500 to 20,000 metres, which are necessary for large wireless stations.

Telephones in Guadalajara.—The Mexican Telephone and Telegraph Company, with headquarters in Mexico City, Mexico, has been granted a concession by the city of Guadalajara to put in an entirely new telephone system at a cost of about $250,000 gold, with wires underground throughout the city. The company also plans to connect Vera Cruz on the east coast with Manzanillo on the west, thus giving long-distance service between Orizaba, Puebla, Mexico City, Queretaro, Celaya, Guanajuato, Vera Cruz and Guadalajara. American capital controls the company.

Telephones in China.—The telephone mileage in Tientsin on December 31, 1911, was 2,122, and number of stations 1,831—increases of forty miles and thirty-three stations in twelve months. The figures for Tientsin will be practically unchanged for the present year, owing to the fact that the switchboard is filled, and there can be no increase in number of stations until the entire telephone system of the city is rebuilt. In Peking on December 31, 1911, there were 2,136 telephone subscribers, an increase of 505 in twelve months, while 1,434 miles of bare wire and 5,056 miles of cable conductor were in use. The longest long-distance line at present is about 120 miles.

Telephone Statistics of the World.—The American Telephone and Telegraph Company has issued a quarto pamphlet giving telephone statistics of the world. The statistics were compiled by the company's statistician from government reports, telephone company reports and personal correspondence. The contents of the pamphlet are: Condition January 1, 1912, and progress during 1911; growth during past ten years; relative telephone development in various countries; investment—telephone and telegraph; earnings for 1909—telephone and telegraph; traffic—mail, telegraph and telephone; a comparison with other industries. Several charts and diagrams accompany the statistical matter, and show at a glance the relative magnitude of the operations so depicted. They are very instructive.

Artificial India Rubber.—Prof. W. H. Perkin, of Manchester University, Manchester, England, has discovered a method of making rubber synthetically in commercial quantities from starch. A factory for the production of artificial rubber has been established at Ymuiden, Holland. The process is a secret, but the principal ingredient of the product is said to be fresh sea fish. According to report, fifteen to sixteen per cent. of natural rubber added to the fish and the result is a substance as flexible and elastic as rubber, but much cheaper.

Edison Flag.—An Edison flag has been adopted. The field is yellow with the name Edison worked on it in green, the colors having been chosen by Mr. Edison at the request of the Edison Illuminating Company of Boston where the idea was conceived. There was an Edison flag-raising at the Edison works at West Orange, N. J., June 24.

Radio-Telegraphy.

Fifty Words Per Minute by Wireless.—All the wireless stations erected under the Imperial scheme by the Marconi Company will be fitted with apparatus for the automatic transmission and reception of messages, guaranteeing a speed of not less than fifty words a minute.

Small Wireless Set.—A wireless telegraph set, comprising transmitting and receiving apparatus, weighing only 25½ pounds, has been made in Washington, D. C., for the signal officers of the United States Army. It is for use in the fifth military arm (the aeronautical division) of the service, and is thought to be the smallest wireless equipment ever made.

Phillips Memorial Fund.—Contributions for the Phillips' "Titanic" Memorial now amount to about $2,500 and the fund is steadily growing. In Godalming, England, Phillips' home town, a fund of over $500 has so far been accumulated and there, too, contributions are coming in rapidly. Mr. C. C. Galbraith, 42 Broadway, New York, is chairman of the American fund, to whom contributions can be sent.

Wireless Iconograph.—Francesco de Bernocchi, of Turin, Italy, has, it is reported, invented a wireless apparatus by which autographs, shorthand and all sorts of designs and cryptograms besides ordinary messages, can be transmitted and faithfully reproduced at the receiving station. The invention has been tested between Milan and Turin, a distance of 92 miles, and, it is stated, the results were surprising.

Wireless Merger.—The United States Circuit Court of Appeals at Boston on June 18 decided in favor of the United Wireless Telegraph Company in the suit brought against that company by the National Electric Signaling Company of Pittsburgh, charging infringement of patents. In consequence of this decision all obstacles to the consolidation of the United Company with the Marconi Wireless Telegraph Company of America have been removed.

Wireless in Alaska.—The government wireless telegraph stations at Fort Gibbon and Nulato, Alaska, have been changed from three kw. to ten kw. The ten kw. equipment is of the Telefunken quenched spark system, which is stated to be superior to the ordinary spark in overcoming the excessive static disturbances encountered in that region during the summer months. Mr. Murphy, electrical engineer of the United States Signal service installed the two new stations.

Wireless in Argentina.—According to a dispatch from Buenos Ayres, Argentine Republic, the government proposes to establish a wireless telegraph service with a range of 1000 kilometers (621 miles) from the Argentine coast, to be controlled by the State. The bill calls upon owners of all passenger vessels to install wireless apparatus with a range of at least 500 kilometers (about 311 miles) or their ships and grants a period of 60 days for the work to be carried out.

New London Headquarters for Marconi Company.—The Marconi Wireless Telegraph Company, London, Eng., has opened its new premises in the Strand. The building is nine stories high. There is a telegraph office on the ground floor, open night and day, from which messages are forwarded by a private wire to the Clifden wireless station for dispatch to the United States and Canada. An intercommunication telephone system with a 100-line switchboard, and two postoffice exchange boards with five extra points and 50 extensions each, are provided.

Sea Wireless Weather Service.—The plan of Mr. Willis L. Moore, Chief of the United States Weather Bureau, for the establishment of an International North Atlantic Weather Service has been agreed to by the committee of the Radio Telegraph Congress now being held in London. This insures its adoption by the Congress. According to the plan, a meridian line will be established through the North Atlantic. All ships on either side of the line must take a daily weather observation, which will be sent by wireless telegraphy to other vessels, and this will be relayed to the American or European land stations. From these reports weather charts will be made and forwarded to ships at sea.

Adjunct to Wireless on Steamers.—Mr. S. H. Harrington, a consulting engineer, of New York, has invented an adjunct to the wireless telegraph at sea which he claims will be valuable in indicating the position of steamers. It consists of a beam of light thrown up vertically from the deck by a search lamp. The ray can be used for signaling by the usual wireless code. There is also a search lamp which throws a horizontal beam of light. The invention is named the "Rayograph." In case of distress any of the officers by pulling the Rayograph lever the vertical beam will automatically flash the distress signal "S. O. S." The signals, however, are not electric, but are produced by cutting off the light by means of a disk in a manner to correspond with the telegraphic code.

International Wireless System Adopted by United States.—The United States has arranged to carry out the Berlin wireless-telegraph agreement by systematizing the call letters of American ships. Hitherto this system has not been used in this country. The Bureau of Navigation has been conferring with American ship owners, nearly all of whom have agreed to adopt the list which the Bureau has arranged for wireless calls. Each call consists of three letters and the continental Morse code is to be used. The International Bureau, at Berne, Switzerland, has assigned the series beginning with *K* and *W* to American merchant vessels and yachts, and the series beginning with *N* to the vessels of the United States Navy. As far as practicable the same second letter of the call will be assigned to vessels of the same line, while the third letter will be distinctive.

Equipment for New Wireless Stations.

The Marconi Wireless Telegraph Company of America is building three 50-kw. radio-telegraphic sets for the United Fruit Company for the stations at Santa Marta, Swan Island, and New Orleans. Each station will have four hollow steel masts 300 feet high with a ten-foot wood mast at the top. The masts are of pressed steel. Each section is 10 feet long made up of two half cylinders bolted together. The bolt flanges of each section are at right angles to the flanges of the adjacent sections.

The parts are cut to fit so the erection consists in pulling up the half cylinders with a hoist, the men in the platform easily swing them in place and bolt them fast.

500-cycle alternating current and a rotary spark gap will be used in an endeavor to provide a note that will not be interfered with by tropical atmospheric discharges. These stations are intended for day and night service the year around.

Municipal Electricians.

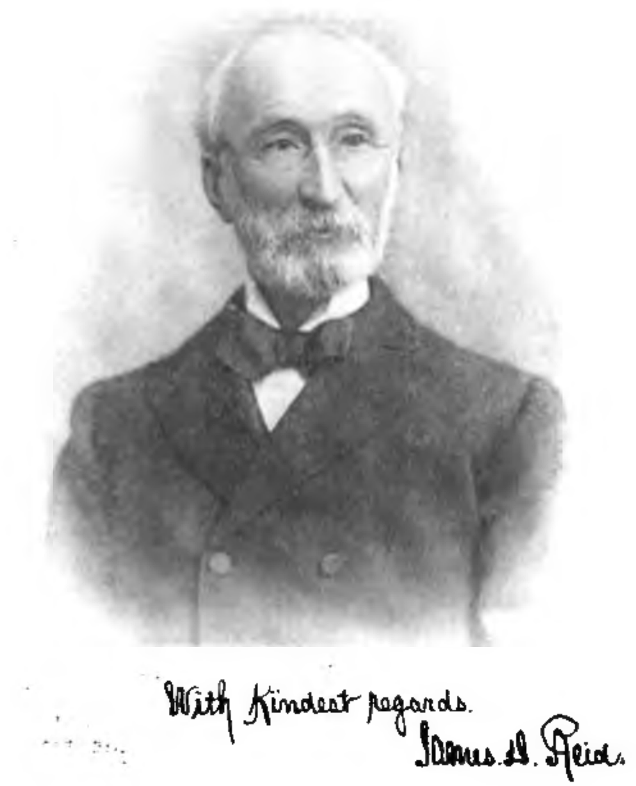
New York's New Fire Alarm Stations.—Three new isolated fire alarm telegraph stations are being erected for the fire department in New York City. These stations will cost $190,000 and the cost of equipment, including switchboards and other accessories, will be $300,000. These new stations will be located in the boroughs of Manhattan, Brooklyn and the Bronx and will be handsome structures architecturally. They will be small being intended to accommodate only the actual fire signal station equipment. All wiring leading to the buildings will be underground and will form a part of the underground fire-alarm telegraph system which is now being installed under the direction of fire commissioner Joseph Johnson, with the assistance of Mr. Leonard Day, electrical engineer.

The Press.

Press Service at Chicago Convention.—The Associated Press and the United Press had private telegraph wires and instruments placed just behind the speakers on the platform at the Republican national convention in Chicago, June 17-22. The service was highly organized and every means available were employed to get the news through to destination with the least delay. From the speakers' platform the wires lead East, West, South and North, and many "relay" points were established. Several innovations at the relay points were made, chief among them being the use of the visible typewriter. The receiving operator copied the matter as it comes over the wire, and just back of him sat another operator who read the copy in the machine as it was written and transmitted it on the branch telegraph lines. The elimination of every possible second of time was accomplished and the public received the news with more rapidity than at any other period in the history of newspaper making.

The James D. Reid Memorial.

A pamphlet relating to the proposed memorial to the late James Douglas Reid has been issued



by the memorial committee, of which Mr. Charles P. Bruch, New York, is chairman. Copies will be sent to the members of the Society of the United States Military Telegraph Corps; Association of Railway Telegraph Superintendents; Magnetic Club, New York; Serial Building Loan and Savings Institution; Gold and Stock Life Insurance Association, New York; Telegraphers' Aid Society; the Morse Club, New York; the Postal Telegraph Club, of Atlanta, Ga., and the Telegraphers' Mutual Benefit Association. The pamphlet gives a history of the memorial project; a biographical sketch of Mr. Reid, and an account of his death and funeral services. It also contains an excellent likeness of Mr. Reid and a view of the stone over his grave in Mt. Hope Cemetery, Rochester, N. Y.

Subscriptions to the memorial are requested and should be sent to Col. A. B. Chandler, treasurer, Reid Memorial Fund, 253 Broadway, New York.

Officers of Telegraphers' Union.—At the fourth biennial convention of the Commercial Telegraphers' Union, held in Buffalo, N. Y., in June, the following officers were elected: President, S. J. Konenkamp, Chicago; vice-president, J. E. Holmes, Winnipeg, Man.; secretary-treasurer, Wesley Russell, Chicago; board of governors, Joseph F. Mallon, New York; D. K. Stevenson, Pittsburgh; James B. Finnan, St. Louis; C. E. Hill, Toronto, Ont., and J. W. Freeman, Baltimore, Md. The board of governors will decide the time and place for the next convention.

Convention of League of New York Loan Associations.—The twenty-fifth annual convention of the New York State League of Savings and Loan Associations, was held at Oswego, N. Y., June 13 and 14. Mr. E. F. Howell, secretary of the Serial Building Loan and Savings Institution, New York as chairmna of the legislative committee made a report of work done by that body during the year. He was reelected chairman of the same committee. Mr. Howell also participated in the discussion of the subject, "Is Additional Legislation Needed?"

GRAVE OF J. D. REID, MT. HOPE CEMETERY, ROCHESTER, N. Y.

Some Facts Regarding the Handling and Recording of Supplies.*

BY W. G. HIGGINS, SUPERINTENDENT OF SUPPLIES, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

The supply department of the Western Union Telegraph Company, as you know, operates four supply warehouses, located at New York, Chicago, Chattanooga and San Francisco. Its headquarters are at New York. It is probable that additional warehouses will be established at Dallas and Denver. A supply department properly organized and operated bears an important part in the success of the operating departments. Aside from the necessity of having a sufficient, but not too large a stock of material for current and normal demands, there is always what is called "rush service" or "emergency demands." An important piece of construction work must be completed in a comparatively short space of time, lines damaged by storm or flood must be replaced, or a manager finds himself without supplies with which to carry on the business; all must be specially cared for, and at once.

It will be of interest for you to know that articles regularly used in our service are with few exceptions, contracted for in yearly quantities. By this means we obtain minimum prices. The usage throughout the entire country is recorded at New York for use in preparing figures for future contracts. All material and instrument contracts are first submitted to the engineering department for approval as to type—thus promoting the matter of standardization, which is at present receiving careful attention.

Prompt service from the supply department is more or less hampered by delays in the preparation of requisitions in some properly scheduled manner. If the writers of requisitions properly anticipate their requirements the supply department is enabled to make prompt deliveries with a minimum of expense. A recent innovation which would help remedy these difficulties lies in the authority given district superintendents to send requisitions covering periodic supplies direct to the supply department; another remedy is the proper scheduling and use of the combined requisition (doubtless familiar to all) by both the superintendents of telegraph and district plant or commercial superintendents. If these combined requisitions are prepared correctly and in due season, it is believed your troubles and ours will be lessened.

As regards requisitions for line construction material, we have been endeavoring to reduce the time consumed in the approval of estimates and the preparation and passing of the supporting requisitions through our operating and engineering departments to the supply department. One step in this direction has been the authority given each general superintendent to approve estimates and secure the material therefor when the value does not exceed $500. A second short-cut is an arrangement with the engineering department whereby the supply department is advised of any large quantities of material covered by estimates just approved. Such material is placed aside either at the manufacturer's or in our warehouses, and is at once available upon receipt of the requisitions supporting the estimate. The movement in this direction has been retarded somewhat by our work with the Interstate Commerce Commission in the standardization of our accounting systems. When this work has been completed, further changes will be introduced to facilitate the approval of construction estimates and the approval and passing of the supporting requisitions.

Regarding requisitions for instruments, the most important feature for 1912 is the proposition of obtaining them rapidly enough to meet the increased demand. During 1911 the demand for instruments of all kinds greatly exceeded existing supplies and the immediate resources of the manufacturers. Instruments for 1912 are being purchased under large contracts and with a clearer knowledge of future usage, we expect to obtain sufficient stocks of all types.

During the past eighteen months arrangements have been completed whereby a careful inspection is made by the engineering and supply departments, under approved standards, of a majority of the articles purchased. Articles not inspected are relatively unimportant in the service. Inspection work is carried on in two ways; first: inspection at the factory or point of delivery, and secondly: inspection after delivery at the supply warehouse. Materials purchased in large quantities, such as wire, pole line hardware, poles, crossarms and instruments of most types are inspected either at the factory or loading point. Stationery forms used in large quantities, such as our message blanks for instance, are also inspected at the printer's. Material regularly inspected at the factory will not be accepted at the supply department unless it bears proper evidences of inspection. Instructions have been issued by the engineer to employes in the field regarding the evidences of inspection which should appear on the goods. Thus the company is properly safeguarded in the quality of materials delivered on its orders.

You will doubtless be interested to know something regarding the investment in the supply department of a large corporation like the Western Union Telegraph Company. A consideration of this feature may offer a new viewpoint to those who consider that the amount of material carried in a supply warehouse is limited only by the strength of its floors. On November 30, 1911, we had on hand stocks valued at approximately $825,500, of which $488,000 represents material carried in the main warehouse and $337,000 poles and crossarms carried in the distributing yards. The average monthly disbursements by the sup-

*Abstract of paper read at the annual convention of the Association of Railway Telegraph Superintendents, New York, June 4, 1912.

ply departments to the operating departments of warehouse material during the previous six months was $168,931, which means that on this class of material the supply department investment was being turned over slightly oftener than four times per year. The investment on November 30, 1912, in poles and crossarms was approximately $337,000, and the average monthly distribution to the operating departments $26,881, representing an investment which would not be turned over for twelve and one-half months. A normal stock of poles and crossarms, because of the difficulties in obtaining them, should last six months; therefore, the additional six and one-half months' stock is an excess. This is accounted for by the heavy purchases made in 1906 in anticipation of continued activity in line construction, which, as you know, has not materialized in the years following the depression in 1907, also the reduction in the lengths of poles used in ordinary construction work. The consolidation of these investment figures covering warehouse material, poles and crossarms and of the distribution figures for the same materials indicate that on all supply department material the investment is being turned over three times each year. Our investment figures will be further reduced by a recent arrangement with manufacturers with whom our contracts are placed, whereby they carry a considerable stock in advance of all our requirements. We then determine upon the smallest amount which it would be fair to ask them to ship direct on field requisitions. This not only reduces our warehouse investment, but the cost of handling as well. Some just criticism has been offered of our allowances for old instruments returned. We have made yearly contracts with New York concerns covering repairs to maximum quantities. All old instruments from all supply warehouses, excepting San Francisco, have been consolidated at New York and all future instruments returned, except from the Pacific Division, will also be shipped to New York; thus not only maximum quantities can be repaired, but the instruments can be turned over to the repairers without delay. The credits allowed for standard instruments will be the current cost of the new instrument minus the cost of repairs, minus a fair percentage for handling and supervision at the supply department.

We have gone a step further by the establishment at San Francisco of a trial repair shop in which instruments returned by the Pacific Division will be repaired and it is believed that this will ultimately result in the establishment of similar shops in all divisions and the reduction of present repair costs.

A feature of our business which I feel may well deserve careful study by all concerned, is the matter of excess stocks. Much has already been done to obtain information in regard to excess stocks of line construction material and instruments in the possession of our plant superintendents. The plan utilized is as follows: Each month each district superintendent prepares a list of "overstock" in his district (the word "overstock" in the absence of special consideration, means broadly, a quantity in excess of a six months' supply, although special considerations may change this application). This monthly report is forwarded to the division superintendent. The division superintendent compiles monthly the lists from all districts and forwards a complete copy to the supply department. The district superintendent will not order material for one portion of his district, which his list indicates is an excess in another; the division superintendent will not order material for one district which can economically be transferred from another district, and the supply department will not invest money in new material required by one division which can economically be transferred from overstock existing in another division. Working on this theory the supply department disposed of field overstocks during 1911, which it is fair to assume would not have been moved otherwise, amounting to about $152,000. The next necessary step is to obtain information from the superintendents of telegraph regarding overstocks (owned either entirely or jointly by the Western Union Telegraph Company) in the possession of railroad companies. How this information can best be obtained has not as yet been determined and the methods adopted will probably be the result of consultation between the members of this association and our plant representatives. It has been suggested that the proper amount of stock to be carried by each railway can be determined on a unit basis from the number of miles of pole right-of-way along the line of that road. If this suggestion is ultimately followed, the proper supervision of such stocks by the plant department would be considerably simplified.

Book on Storage Batteries.

Storage Batteries: Their Theory, Construction and Use. By A. E. Watson. Second edition. Price, $1.50.

This excellent work has been completely revised and enlarged and brought up to date. The author is assistant professor of physics in Brown University, Providence, R. I., and the manner in which he has treated his subject shows that he is thoroughly familiar with it. The contents are descriptive and general, and there are no mathematics whatever to confuse anyone not familiar with algebra.

The book contains chapters on the construction of plates, the action of the lead storage battery, how to make a storage battery, disease and remedies of the storage battery, boosters, etc., and gives much information valuable to anyone interested.

This book or any other on electrical and kindred subjects may be obtained of Telegraph and Telephone Age, 253 Broadway, New York.

The Association of Railway Telegraph Superintendents.

At the banquet at Martin's, New York, June 7, in honor of the Association of Railway Telegraph Superintendents, Mr. Charles Selden, general inspector of transportation and superintendent of telegraph, Baltimore and Ohio Railroad, Baltimore, Md., responded to the toast "The Association."

He was reminded of the contrast between the convention just closed and the first meeting held in Chicago, thirty odd years ago.

"The telegraph lines of the Wabash Railroad had recently been placed in my charge," he said, "and it became necessary to dismiss an employe of the telegraph department, through whose remissness a collision had occurred. The Chicago and Alton Company, which crossed the Wabash lines, was in need of operators, and, without knowing anything of the circumstances, employed this operator. Happening to hear of it in the course of a few weeks and accidentally meeting Mr. Morley, superintendent of telegraph of that line, I asked him if he knew that he had employed a man who had been dismissed, and gave him the cause of the dismissal. He thanked me and said they knew nothing about it, and asked if I would not draft a circular letter addressed to the officials of the railroads entering Chicago and see if we could not get together for mutual protection of the public. I said to him that I had just been placed in charge of some four thousand miles of telegraph lines that were in a tumbled down and generally disorganized condition, I had gangs in all directions, and every moment of my time was occupied, and I, therefore, suggested that he, having an established, well-conditioned property, should issue the circular, which he did. This resulted in bringing together several of the telegraph superintendents of the roads entering Chicago, and, as I now recollect, numbering some fifteen gentlemen, who, after an informal discussion, decided that it would be a good thing to form an association, and I was delegated to write a constitution to be submitted for their formal action at a later date.

"What concerned me as of most importance," he continued, "was to set forth the object of the association so that it would be clearly understood, and, as I recollect the draft, it read: 'The object of this association shall be the improvement of the telegraph service and the promotion and advancement in general of the interests of the telegraph departments of railroads.'

"There seemed to be a feeling on the part of the telegraph companies that such an association might possibly be inimical to their interests, fearing that each member might bring a copy of their contract into the meeting, look them over, see what good things some had that the others had not, and upon the expiration of existing contracts insist with a unanimity that all should receive the same kind of a contract. In this view an injustice was done, because the members of the association felt that they were the custodians of a confidential agreement, and it was not proper that the terms of the same should be even discussed. They recognized that what might be proper under certain conditions on some railroad, would be absolutely unfair on others, because equal compensatory clauses on the other side could not be afforded. Therefore the matter of contracts was always tabooed, and to the honor of the association and its members I have to say that I have never heard them discussed in or out of meetings.

"Originally the railroad superintendent of telegraph seemed to be considered as almost a parasite; he was acknowledged to exist on account of the mystery surrounding the business, but was looked upon more as a telegraph company's clerk whom they had to have upon a railroad in order to get a contract and the service necessary; but a right principle strictly adhered to and patiently proclaimed and followed, is bound to win, and as years rolled on the railroad people were convinced of the necessity for such an officer, and they began to insist on having one that not only understood the practical part of the business, but the technical as well, and who would keep abreast of the times with the progress of the art. The telegraph people discovered also that there was increased efficiency, less friction, better feeling and closer intertwining of the mutual interests, and under the impetus of this excellent support from each side, the association has moved forward and its object obtained, in the improvement of the telegraph of the railroad service in an appreciable measure, and to a very large extent has increased the efficiency of the commercial telegraph companies' service.

"It would be discourteous if in thus outlining the initiative and the progress of this association, we failed to give credit also to the help that we have received from our friends who are not in the profession, but who supply the necessities by which the transaction of the telegraph and other electrical departments has been made possible.

"Today we are honored with the presence of some of the most eminent men in the wonderful electrical art. We are their guests, but, more than that, they are our friends and we are theirs.

"We recognize that as railroad superintendents of telegraph, we occupy a difficult position, in so far as we have two masters to serve, and at times the interests involved are of different opinions in reference to certain matters that come up, and if the superintendent sees fit to be upon one side, or the other, he is very apt to be charged with partiality.

Referring to the use of the telephone in railroad service, Mr. Selden said, in conclusion: "At the Detroit meeting about twenty years ago the association minutes contained a paper on the subject of the telephone in railroad service, urging the railroad companies to take advantage of this wonderful advancement. Twenty years seems a long time to hark back to, but this association feels satisfied in its achievement; it has been patient; it has been hard working; it has maintained and shall continue to maintain the object for which it was formed, and every practical progression presented in connection with the transmission of intelligence electrically will be welcomed and given a fair and impartial trial."

The Telephone Habit.

What strikes and frightens the backward European almost as much as anything in the United States, says Mr. Arnold Bennett in *Harper's Magazine*, is the efficiency and fearful universality of the telephone. Just as I think of the big cities as agglomerations pierced everywhere by elevator-shafts full of movement, so I think of them as being threaded, under pavements and over roofs and between floors and ceilings and between walls, by millions upon millions of live filaments that unite all the privacies of the organism—and destroy them in order to make one immense publicity. I do not mean that Europe has failed to adopt the telephone, nor that in Europe there are no hotels with the dreadful curse of an active telephone in every room. But I do mean that the European telephone is a toy, and a somewhat clumsy one, compared with the inexorable seriousness of the American telephone. Many otherwise highly civilized Europeans are as timid in addressing a telephone as they would be in addressing a royal sovereign. The average European middle-class householder still speaks of his telephone, if he has one, in the same falsely casual tone as the corresponding American is liable to speak of his motor-car. It is naught—a negligible trifle—but somehow it comes into the conversation!

"How odd!" you exclaim. And you are right. It is we Europeans who are wrong, through no particular fault of our own. The American is ruthlessly logical about the telephone. The only occasion on which I was in really serious danger of being taken for a madman in the United States was when, in a Chicago hotel, I permanently removed the receiver from the telephone in a room designed (doubtless ironically) for slumber. The whole hotel was appalled. Half Chicago shuddered. In response to the prayer of a deputation from the management, I restored the receiver. On the horrified face of the deputation I could read the unspoken query: "It is conceivable that you have been in this country a month without understanding that the United States is primarily nothing but a vast congeries of telephone-cabins?" Yes, I yielded and admired! And I surmise that on my next visit I shall find a telephone on every table of every restaurant that respects itself.

It is the efficiency of the telephone that makes it irresistible to a great people whose passion is to "get results"—the instancy with which the communication is given, and the clear loudness of the telephone's voice in reply to yours; phenomena utterly unknown in Europe. Were I to inhabit the United States, I too should become a victim of the telephone habit, as it is practised in its most advanced form in those suburban communities to which I have already incidentally referred. There a woman takes to the telephone as women in more decadent lands take to morphia. You can see her at morn at her bedroom window, pouring confidences into her telephone, thus combining the joy of an innocent vice with the healthy freshness of breeze and sunshine. It has happened to me to sit in a drawing-room, where people gathered round the telephone as Europeans gather round a fire, and to hear immediately after the ejaculation of a number into the telephone a sharp ring from outside through the open window, and then to hear in answer to the question, "What are you going to wear to-night?" two absolutely simultaneous replies, one loudly from the telephone across the room, and the other faintlier from a charming human voice across the garden: "I don't know. What are you?" Such may be the pleasing secondary scientific effect of telephoning to the lady next door on a warm afternoon.

United States Military Telegraphers' Pensions.

We have been informed that the political exigencies of the pending national elections will, in all probability, prevent any action being taken during the present session of the Congress on the bills now before it to extend the pension laws to the military telegraphers who served in the United States Army during the Civil War. Pension legislation has been confined to the increase of pensions to those already favored by existing laws, and, in view of a presidential election, none of the different shades of political opinion seems willing to go before the country on the issue of extending the pension laws to any group of men not already clearly provided for. There are several groups asking such action. The claims of the military telegraph corps are recognized as the most meritorious and there is a very strong sentiment in both houses of Congress favorable to the justice of this cause. The bill will go over to the December session and its friends, both in the House and Senate seem assured that it will become a law before that session adjourns.

President William Bender Wilson, secretary David Homer Bates and chairman A. A. Zion of the Congressional Committee, have kept themselves in close and constant touch with the situation and have been indefatigable in pressing the passage of the bill. Not a stone will be left unturned nor zone of helpful influence left unexplored to secure the recognition and justice for which the United States Military Telegraph survivors have been appealing to Congress for over forty years.

The Telegraph in the Panama Zone.—There were few changes or additions to the telegraph lines in the Panama Zone in 1911, all energy being directed toward the improvement of existing lines, most of which have been overhauled and put in good condition. The old No. 9 galvanized iron wire is fast being replaced by No. 10 copper wire, and 600 iron poles have been substituted for the old wooden poles. A bank of sixty storage cells with mercury arc rectifying outfit has been substituted for the old gravity battery of 250 cells in the main office at Panama and is showing its efficiency in better and superior work and greater economy.

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July 1, 1912.

Pensions.

One of the objects of chief concern to men and women whose living depends upon daily work is how their livelihood is to be gained when old age overtakes them. An individual's earning capacity decreases as age increases, and if a man has spent the best years of his life in the service of one master, every human instinct dictates that he should receive some consideration when old age incapacitates him for further work. It is gratifying to know that the telegraph companies take this humane view of the situation and are providing ways and means for caring for faithful employes.

There was a time when the idea prevailed that corporations had no souls, but whatever this means the evidence shows that they are not always deficient in human instincts and that the sentiment of brotherly love has not yet disappeared from the face of the earth.

The recent institution of a systematic pension scheme by one of the telegraph companies will have a wholesome effect upon its employes both physically and mentally and incidentally the company will derive much material benefit in consequence of the contentment of its employes. The latter will to a large extent be relieved of the incubus that has weighed them down concerning their physical welfare when they reach an age where they will be unable to work, and with the knowledge that their future well-being is practically assured if they remain loyal to the company they will be encouraged to do better work and render a day's service for a day's pay while they are able to do so.

The pension scheme will also have a tendency to make the service more attractive. In the past many have regarded telegraphing as a sort of stepping-stone to other vocations. It certainly does offer advantages in this direction because the wideawake man in passing through the school of experience in telegraphy gains an education that fits him for almost any other line of business, and when an opportunity is offered to better himself in other directions, he naturally cuts loose from his telegraph affiliations and applies his talents elsewhere. The assurance of a pension, however, may have a staying influence upon his adventurous spirit and compel him to remain with the interests that will thus benefit him.

Employes should not, however, look to the pension alone, as their ultimate goal. The pension will be larger the more useful they make themselves to their companies and it will be to their great advantage to improve their knowledge and minds through study and observation. The more they know about their business the more useful they will be to their employers and the more remuneration will they receive for their knowledge and services.

The Rapid Development of Wireless.

The rapid unfoldment of the possibilities of wireless telegraphy is the most interesting development in electrical application at the present time. Hardly a day passes but what a step in progress is not recorded and the limitations hitherto placed upon the system seem to be rapidly approaching the vanishing point.

It is interesting to review the record of progress in wireless as reported in our columns in each issue, and one is led to the belief that wireless telegraphy will before long reach the stage of development where it will be classed as reliable in operation at all times as are the telegraph and telephone.

The telegraph, the telephone and wireless telegraphy form a trio that is bringing the human family into closer relations. A man cannot escape his responsibilities and their vigilance. On land he can, in a few moments, be found and singled out from among the millions of his fellow-men by telegraph or telephone, wherever he may be, and at sea, although he may be a thousand miles from the nearest point of land, his presence in the world of affairs is just as real through the instrumentality of wireless telegraphy as if he were at his place of business or home.

The world owes much to Mr. Marconi for the development and practical applications of wireless telegraphy. Many other inventors have done splendid work in the cause for which they also are entitled to due credit, but no one can question the right of leadership to Mr. Marconi. He has accomplished much and there is much more yet to be done, but with his experience and all the facilities at hand it is not safe to assume that he will not be the conqueror.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(96) Q. In the "Answers to Questions" column of May 1 issue, it is said that a three-phase alternator is one delivering three similar currents from three coils wound on one armature. In this connection, please explain something that I have never clearly understood: Can these three currents be used separately just as though they came from three different generators, or must they be used in one circuit? If the answer is "yes," then why are not all generators wound three-phase on the score of economy? H. G.

A. The three-phase current cannot be separated and used as three separate currents. It is really one current composed of three electromotive forces with their maximum voltages occurring at regular intervals of time. Three-phase currents are employed principally to drive electric motors, although they are used in lighting, too, to some extent. Motors so operated are self-starting. This explanation answers the last question.

* * *

(97) Q. What are the conditions necessary to cause induction on telegraph wires? I often read about inductive disturbances, but have a vague understanding as to the cause? O. R. A.

A. The study of electromagnetic induction is a fascinating one. Electromagnetic induction, or simply induction, is due to the magnetic effects of an electric current in a wire. When a current flows in a wire, magnetic lines of force come into existence in the space around the wire, the wire being the core. If other wires happen to be in the near vicinity, the magnetic lines of force will embrace them; in other words, the wires will be within the field of the magnetic lines of force and will exhibit electrical properties. Momentary electric currents will be produced in them and cause more or less disturbance in the working current. On sensitive instruments these effects are marked. The conditions necessary to cause induction are, therefore, proximity of wires and flow of current in one or all of them.

* * *

(98) Q. What is the "constant" of a galvanometer, and how is it used in testing? G. A. H.

A. The "constant" of a galvanometer is the deflection of the needle obtained when using a standard battery and a standard resistance. It is the product of the deflection in degrees and the resistance in ohms, multiplied together. In testing wires the "constant" is first ascertained, after which the wires to be tested are inserted in circuit one by one. The result in ohms in each case is equal to the quotient obtained by dividing the "constant" by the deflection.

Telephone Maintenance.

The rapid application of the telephone to railway service has given rise to a strong demand for practical information on the subject. In order to handle any apparatus most efficiently—whether it be telegraph, telephone or a steam locomotive—it is necessary to understand the construction and know why and how it acts and operates under given conditions and circumstances. Those who handle telephone train-dispatching apparatus should have a practical working knowledge of the telephone, and become a master of the instrument rather than allow the instrument to become the master of them.

"Electricity and Magnetism in Telephone Maintenance," is the title of a book that should be in the hands of every one, especially those in the railway service who has a telephone in his charge. It was gotten up by Mr. G. W. Cummings, instructor of inspectors of the Chicago Telephone Company, and is an excellent book of its kind. It is not technical, but thoroughly practical.

The character of the book may be inferred from a quotation from the preface. Mr. Cummings says there: "The experience of the author, like that of every telephone man, has been a continual tackling of these every-day problems, and the answers and methods given here are offered in the hope of helping others who are wrestling with them. The methods employed are those of the practical man rather than of the student, and differ materially, in many cases, from those given in the text books."

The book contains nine chapters, as follows: Introduction; Current; Electrical Pressure; Resistance; Magnetism; Electromagnetic Induction; Capacity; Batteries; Circuit Drawing.

It will be seen from this list that the work is as serviceable to the telegraph as to the telephone man, although it was written especially for telephone men. The subjects of the various chapters concern the telegraph as much as the telephone and the information as given by the author under each heading is stated in clear language which will appeal to the non-technical man, and lead him so easily into widening fields of knowledge that he will be fascinated and yearn for greater information.

The book contains 133 pages and 45 illustrations, and each chapter is followed by a series of test questions on the subject of the chapter preceding. The price of the book is $1.50 and copies may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Anniversary of the First Telegraph Message.—In an item on page 396 of our issue, dated June 16, the statement was made that May 27 was the sixty-eighth anniversary of the sending of the first message over the Morse telegraph. The actual date of this historic event was May 24, the typographical error which made it three days later having slipped by undetected.

Course of Instruction in the Elements of Technical Telegraphy—XVIII.

(*Copyrighted.*)

(*Continued from page 388, June 16.*)

But now take a moderate exterior resistance of say, 8 ohms, and note the results.

In series the current is $\frac{6}{12+12} = .25$ ampere.

In two parallel sets, $\frac{3}{3+12} = .2$ ampere.

In three parallel sets $\frac{2}{1⅓+12} = .15$ ampere.

The largest current is obtained from series connections.

Note the result of a large external resistance, say 60 ohms.

In series $\frac{6}{12+60} = .083$ ampere.

In 2 parallel sets .047 ampere.

In 3 parallel sets .032 ampere.

Here an increase in the E. M. F. increases the current very nearly in the same proportion, for although each cell in series adds is resistance, the whole resistance of the battery is but small compared with that of the whole external circuit.

If therefore it is wished to increase the current on a long line, the number of cells in series is increased, since the resistance of the added cells is unimportant.

On the other hand if the battery resistance forms an important part of the circuit resistance, better results may be obtained by using sets of cells in parallel, and thereby diminishing the battery resistance.

The arrangement of cells which brings the resistance of the battery nearest to that of the circuit on which it is used gives the greatest current strength.

Example: With an external resistance of 4 ohms what arrangement of 8 cells will give the largest current?

Solution: In series internal resistance = 16 ohms.

In 2 parallel sets of 4 cells each, 4 ohms.

In 4 parallel sets of 2 cells each, 1 ohm.

As the external resistance is 4 ohms, the second arrangement will give the largest output, namely .5 ampere.

Magnetism.

The natural magnet or lodestone is an ore of iron which possesses the property of attracting pieces of iron or steel and of pointing north and south when suspended by a thread.

If a piece of iron or steel be rubbed with a lodestone it will acquire the properties characteristic of a magnet and become an artificial magnet.

An artificial magnet which retains its magnetism for a long time is called a *permanent* magnet.

The common horse-shoe magnet consists of a steel bar bent into the form of a horse shoe, and then hardened and magnetized. A piece of soft iron, called the armature, is placed across the magnet ends, or poles, which helps the magnet to retain its magnetism.

The strength of a magnet is greatest at its poles; at the middle there is no apparent magnetism.

Every magnet possesses a north and a south pole. A magnet may be broken up into any number of

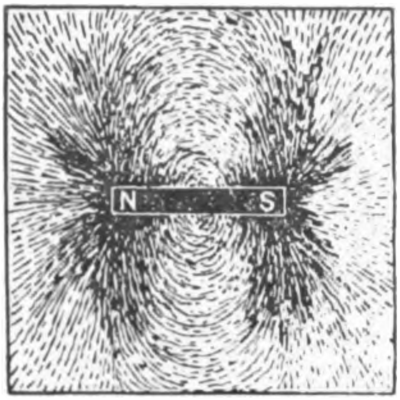

FIG. 11.—ILLUSTRATION OF LINES OF FORCE.

pieces, but the ends of each piece will still be of opposite polarity, and each fragment will be in every respect a perfect magnet.

The magnetic forces of magnets are assumed to act along certain lines of direction termed *lines of force.* Each line of force moves in a complete circuit, passing out from the north pole of the magnet, through the surrounding medium, or external circuit as we might call it, to the south pole, and back through the magnet to the north pole.

An illustration of the lines of force emanating from the pole of a magnet is given in Fig. 11, but a much better idea of the curves could be obtained by covering a magnet with a thin sheet of paper and then sprinkling fine iron filings over the paper. A common ten-cent magnet is good enough for this experiment, and the student should make it; it will prove both interesting and instructive.

(*To be Continued*)

[**Correction.**—Our attention has been called to two slight errors in this department in the issue of April 1, caused by the misplacement of a decimal point in one instance and the use of a comma for a decimal point in the other. On page 213, second column, the result of the solution of the first example should have read:

R = .154 + ohm

instead of

R = 1.54 + ohm.

— the decimal point having been placed after the 1 instead of before it.

The result of the solution of the second example, given near the top of the first column of page 214, should have read 1.245 + ohms, instead of 1,245 + ohms, as printed.]

What the Telephone Has Done for the Santa Fe Railway Company.*

BY L. M. JONES, SUPERINTENDENT OF TELEGRAPH, ATCHISON, TOPEKA AND SANTA FE RAILWAY, TOPEKA, KAN.

The only objection to the telephone train dispatching system that has been brought to my notice is the one due to the use of the headband receiver, which the dispatcher is required to wear constantly for eight hours daily. The pressure of the band, and its weight, with that of the receiver, in time becomes annoying and the hard rubber shell of the receiver cap makes a heavy pressure upon parts of the ear. The soft rubber cushion, if used, relieves this trouble to a considerable extent but in warm weather causes considerable perspiration and consequent discomfort. We should, in my opinion, have a transmitter capable of permitting a receiver to be mounted in such a position that the dispatcher may hear equally as well by placing his ear near it and in this way avoid the necessity for the use of the headband receiver. We have all noticed operators along the line wearing the receiver headband while engaged in other work, which is done for the purpose of keeping in touch with train movements. In this we must admit an advantage in favor of the telegraph.

The first distinct advantage of the telephone, and one that is noticeable as soon as a circuit is placed in service, is the time saved in calling offices for the purpose of putting out orders. An operator having outside duties, such as delivery of freight, baggage, or express, looking after a pump, etc., has, by the ringing of his selector bell, his attention immediately called to the fact that he is wanted, while by telegraph he is called until he happens to come in the office. In the meantime, even though only five minutes may have elapsed this may have made the combination the dispatcher had in mind valueless, and the setback this train has received may result in its having a number of other delays during the day. On the other hand when the telephone bell rings it receives the operator's attention immediately, and the time saved in calling offices may always be used by the trick dispatcher to good advantage.

In getting information from offices; a weather report for example may be secured from twenty offices in less than five minutes by telephone. By telegraph it would take probably twenty minutes and be closed with possibly one-fourth of the offices failing to respond. It is not unusual for the dispatcher to be called upon by a relay or Western Union office to ring an office for which it has a rush message and is unable to raise the office promptly by telegraph; this he can do with practically no effort as compared with calling by telegraph.

In transmitting orders by telegraph the rate of speed is governed by the ability of the poorest operator on the circuit to receive while by telephone the ability of all operators being about alike the speed is regulated by the dispatcher who writes the order in his book at the time it is sent to offices. While about 25 per cent. of time is saved in transmission, by far the greatest saving is made in repeating the order back to the dispatcher. The order being written in the book by the dispatcher as transmitted it may be repeated back at about the rate of ordinary conversation, or in approximately one-fourth the time required for telegraph repetition.

The consensus of opinion is that the telephone increases the efficiency of the train dispatcher at least 25 per cent.; in fact some insist that everything considered, 50 per cent. is nearer correct. In some cases it may be possible to lengthen dispatcher's districts and possibly get along with fewer dispatchers.

Under the telegraph system the dispatcher copies the order in his book as it is first repeated, sending the order without a written copy for reference. By the telephone system the order is written in his book as it is transmitted to the offices interested, so that the repetition by operators is checked directly against his book copy rather than his memory, an error being detected immediately.

In cases of washouts, broken rails, etc., when reported to the dispatcher, he looks at his clock and notes that a train may be very near the last station: Instead of calling desperately and hoping he may have the good fortune to find the operator on hand, it is only necessary to make one turn of his wrist and a bell rings which will call the operator if within a block of the office.

Under the telegraph operation when derailments occur between stations, a lineman must go to the scene to cut in a temporary office; an operator is also necessary, with the usual delays attending such movements. Then the lineman must go back to cut the temporary office out when the wreck is cleared. This is not necessary where we have a telephone circuit. A portable telephone set with the usual connecting line pole is all that is required, thus saving the time of a lineman and an operator. Under the present method, in case of a derailment the conductor goes to the nearest telephone and talks with the trick or chief dispatcher, tells him of the exact conditions, cause, etc., and also advises regarding material necessary to repair track, giving the division officers the details first-hand.

If there is a situation which the dispatcher does not understand it is so easy to obtain all the facts by telephone as compared with the telegraph that there is no way of accurately comparing the saving in time. This is particularly true in case of accidents.

By talking with agents the trick dispatcher saves a great many messages daily which it would otherwise be necessary to send regarding cars required for loading, etc. In fact a conservative estimate would place the saving at an amount at least equal to one operator in each division office.

*Abstract of paper read at the annual convention of the Association of Railway Telegraph Superintendents, New York, June 6, 1912.

On two of our desert divisions where telegraph offices are some distance apart all blind sidings are equipped with iron box sets. When conductors have reason to believe they may get help they ask the dispatcher, and long delays are often prevented in this way. Some of our night trains on branch lines are equipped with portable sets which are used in emergencies, often greatly facilitating the movement of trains.

We probably derive greater benefits, so far as an actual saving of money is concerned, by the use of portable sets from those furnished work trains, extra gangs distributing laying and picking up rails, etc., between stations. It is estimated that the same number of men in a gang will be able to do one-third more work if furnished with a portable set than under the old system of protection.

The telephone circuit is not affected by fogs, while the telegraph is often rendered inoperative where lines parallel the coast. Prior to the use of the telephone, we had two Pacific coast and one Gulf coast circuits which gave us so much trouble in the early days that one of my predecessors endeavored to overcome the trouble by stringing insulated wire for a considerable distance, but without result. The telephone solved this problem for us. In fact the more fog we have the better it works. We find our telephone circuits often work when all telegraph wires on the pole line have failed during storms.

We all know of the troubles in wet weather, especially at night during fogs, due to the relays at way stations getting out of adjustment, dispatchers sometimes calling offices intermittently for half an hour or more, and often resorting to the old custom of having a nearby station call the desired station and having him adjust for the dispatcher. This does not happen with the telephone, for no adjustments are required.

The resulting harmony on circuits cannot be overestimated; instead of the contention for circuit and discord between the dispatchers and operators the dispatcher is brought in much closer touch with the operators and agents. All petty quarrels, such as frequently occur by telegrapn, are entirely eliminated for the reason that they are usually due to a misunderstanding. The telephone harmonizes the whole force and as a consequence in every way facilitates the handling of business. It has made it possible for the dispatcher to keep agents posted accurately regarding the arrival of trains, thereby bringing the traveling public and the company closer together. Some of our superintendents and trainmasters are not telegraph operators, but the telephone has made it possible for them to get information of all kinds from agents, operators, and trainmen on the line first-handed.

At first dispatchers except those afflicted with operators' paralysis are almost to a man more or less opposed to the use of the telephone. After using it a short time, however, they consider it a hardship to have to go back to the telegraph system even for an hour or so in an emergency.

About a year ago our dispatchers were given an increase in salary. One said he really felt ashamed to take the money for the reason that never in his twenty years' experience had he found his work so easy, which he attributed to telephone train dispatching and the use of oil burning engines.

Entertaining Old Timers in Portland, Ore.

Fifty old-time telegraphers were recently entertained at Estacada, Ore., on the invitation of president B. S. Josselyn of the Portland Railway, Light & Power Company.

The guests of the evening were taken care of by several officials of the road in the absence of Mr. Josselyn, who is himself an "old-timer." Immediately on arrival the guests sat down to a banquet.

As time was limited, the regular order of business was suspended and speeches were made durcourses. Augustus F. Wheeler was elected president of the society to succeed W. A. Robb, who has filled that position for four terms. S. A. Josselyn, aged 82, and father of B. S. Josselyn, was elected vice-president; Alexander Craib was re-elected secretary and treasurer by the unanimous voice of the meeting.

Speeches by the old-timers during the banquet were listened to with lively interest.

Dr. O. P. S. Plummer, dean of the profession, gave a most interesting address concerning his connection with the telegraph, particularly his experiences in Portland and Oregon. He alluded feelingly to the assassination of Abraham Lincoln, and related how intense the interest was in Portland over the tragic event.

S. A. Josselyn gave his experience with the telegraph in the ante-bellum days and recounted much of interest to the assemblage.

The next speaker, James S. Urquhart, told how he began his telegraphic career in 1849, delivering telegrams to Horace Greeley and the elder James Gordon Bennett. Mr. Urquhart came to San Francisco in the early days, and was made manager of the office there. Later he became superintendent of the fire alarm system of that city.

Other addresses were made by W. T. Buchanan, Frank S. Fields, Jeff W. Hayes, A. F. Wheeler, E. L. Smith, F. D. Hunt, Thomas Lawson, Alex Craib, John C. Mann, Keith Lackey, W. A. Robb and H. B. Thielsen.

Telegrams were sent to B. S. Josselyn, John Annand and other absent members bearing the "73" of the society.

Besides those mentioned these persons were present: Dr. E. L. Ross, J. S. Urquhart, F. W. McKechnie, H. Bennett, W. A. Humphrey, G. A. Taylor, H. W. Peterson, J. V. Reid, S. Weston, J. W. Shafford, S. A. Josselyn, George W. Hann, George L. Kirshmyer, L. J. Henderson, K. W. Schmidt, J. C. Giles, E. E. Carnes, J. A. Carter, M. Stover, W. Butler, E. W. Smith, B. S. Durkee, W. J. Robb, E. D. Lackey, L. C. Auld, C. R. Bartlett, A. P. Campbell.

Spreading News of Great Events.

In a paper entitled "Spreading News of Great Events," read before the Telephone Society of New York, Hudson Section, at Albany, N. Y., May 27, Mr. S. M. Williams, manager press service, Western Union Telegraph Company, gave an interesting account of how the news of extraordinary events is handled by telegraph. He first gave an historical review of the early telegraph and how it was used for news dispatches.

The *Utica Daily Gazette* of September 13, 1845, tells of the extension of the lines of the Electro-Magnetic Telegraph from the railroad to the fair grounds in that city, a distance of about one mile. The wires, it stated, were supported "by an occasional twist round a chimney—our own smoker is thus honored, and we contemplate constructing a branch of our stove pipe in order to get the earliest intelligence from the fair by tapping."

After quoting several early newspaper utterances on the development of the telegraph, Mr. Williams brings his discussion up to recent times and tells how the telegraph and telephone became related in 1910.

"Our two services," he said, "had been ordered to co-operate, the rules laid down, and they were supposed to be in co-ordinate operation. But the alliance existed more in theory at first than in practice. During the formative period of 1910 a political convention was held at Saratoga. As a rule state conventions are mere routine events in the telegraph service, but at this particular one political happenings suddenly focused widespread public interest and a very large amount of press telegraphing was foreseen.

"I sent a hurry call for Mr. Meade, who then was manager of the Albany office. He was on the scene in a few hours with reinforcements, and more help came up from New York. We had no functional organization then in the Western Union, and we had only vague ideas as to what constituted supplementary relations between telephone and telegraph. But we set up a functional operating organization of our own and sent word to the telephone company that if they loved us like long lost brothers now was the time to stand by us. And they did. There at Saratoga we put to practical test the great conception of our president, Mr. Theo. N. Vail. We swung telephone wires into telegraph service between Saratoga and Albany and New York. We had plant men of both companies hustling with enthusiasm, and all down the line to New York operating chiefs were lending loyal support.

In our hastily arranged three-column organization Mr. Meade took station as traffic chief, and valiant work he did. Meritorious indeed was his advancement to the post he has today, of traffic superintendent for this district.

Up from New York came a big, jolly, tireless hustler, James F. Nathan by name. He took the commercial column of our convention organization. Today Mr. Nathan is Western Union commercial superintendent for New York City, the biggest telegraph revenue district in the United States.

The plant department we assigned to manager Waterbury of Saratoga, one of the veterans of Western Union service, a courteous, loyal official, who is one of the foremost citizens of the Springs.

I do not know what our superior officers thought about our presumptuous actions, but I do know this, that the practical results were the answer to any question."

Mr. Williams then tells in detail the story of the telegraph service following the "Titanic" disaster, and the extraordinary measures adopted to handle the great volume of business resulting therefrom. As the steamer "Carpathia" neared New York with the "Titanic" survivors, preparations were made for emergency work anywhere, and Mr. Williams' account of these preparations is extremely interesting.

From Montauk Point at the end of Long Island to Sandy Hook, every station was manned for continuous duty. All around the harbor, offices were prepared for service in case the "Carpathia" should anchor down the bay, Highlands of Navesink, Atlantic Highlands, Sandy Hook, Quarantine, Coney Island and Bath Beach were doubly manned and arrangements made for cutting in extra wires on a moment's notice.

Close to the Cunard pier in West street, New York, we set up a special telegraph office with twenty-five loops and as many operators. In the main office the regular force was largely augmented. A flying squad for emergency relief was held in reserve with automobiles to run them to any point. Commercial department scouts were sent to every anticipated point of activity. Companies of smart messenger boys were put at stations. A temporary telegraph office was improvised on the pier from which messages from survivors were sent free.

At 6 o'clock on the night of May 18, when the "Carpathia" was still outside Sandy Hook, reports from all points came to headquarters that every man was at his post, every land wire had been tested, and all large offices throughout the country signalled they were ready and waiting.

Central cable office in Broad street, New York, reported every cable ready. Hearts Content and Canso, way up on the northern coast, where the cables finally leave this western hemisphere for their long plunge under the Atlantic, sent word that day and night forces were on duty and cables clear all the way.

For three hours there was a lull—tedious, impatient, nerve racking—until the "Carpathia" reached her pier at 9 o'clock. Then the flood gates of telegraphic messages broke loose.

The records show that there were sent out from New York that night over Western Union wires 715,000 words of domestic press specials to various newspapers, not including the thousands of words sent out by press associations over leased wires.

The previous high water mark of Western Union press specials in a single day had been 433,000 words from a Chicago national convention.

The cables, too, were busy, and during that night and the following day they carried 45,000 words of cable press to Europe. All told, more than three-quarters of a million words of press specials were sent out from the Western Union office in New York on "Titanic day."

There was never before a news event to equal it in a telegraphic sense. Yet with it all there was not a ripple of confusion, not an outward sign of anything unusual in the operating rooms.

Cunard Line officials declined to permit of temporary installations on the pier, so that the facilities there were limited. But across the street in a water front hotel where newspaper reporters made headquarters, extensive telephone service was arranged. There was furnished to the press that night a total of thirty-seven extension stations, six private lines and one leased line for Morse operation.

Despite the overwhelming seriousness of the great tragedy there was an amusing incident in the midst of the solemnity. When the "Carpathia" drew near, reporters rushed for the few stations on the pier. As soon as they obtained connection with their offices they teamed up, one man holding the connection while the other went in search of news. In this way they managed to tie up the entire pier equipment with the exception of two open telephones.

When other persons applied for service the newspaper men refused to surrender.

Down on the "Carpathia's" pier, out in the streets and in some of the newspaper offices there may have been confusion and excitement. But inside telegraph or telephone offices there was the calm and precision of perfect discipline.

A press association would call for more facilities—a wire quick Chicago to Denver! In a minute or two it would be turned over for service. A newspaper correspondent comes in with 5,000 words. "Rush it," he cries. Soon the dispatch is poured into some distant city over several wires. From the office of the *New York Times* alone more than 150,000 words of press dispatches were sent out over Western Union wires. Where the same copy had multiple addresses, great circuits of wire, hundreds, even thousands, of miles long were looped up, and one sending operator flashed the news to many cities simultaneously. When the Western Union's own plant facilities in any particular part of the country were found insufficient to carry the enormous traffic load without delay, long distance telephone circuits were requisitioned and converted to telegraph use. Thus Mr. Vail's plan of supplemental relations between telephone and telegraph, of interchangeable plant facilities, demonstrated its practicability and its usefulness for public service under the most extraordinary emergency of the times.

Mr. P. D. Callum, commercial agent of the Western Union Telegraph Company, New York, in renewing his subscription, writes: "I feel that TELEGRAPH AND TELEPHONE AGE is of exceeding value to the telegraph profession, and that it should be in the hands of every one engaged in this work. It will give me pleasure to call to the attention of those with whom I come in contact, the value of the publication."

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What is the principle of the hot wire voltmeter and ammeter?

Describe the general construction of a hot wire instrument.

What kind of currents are the hot wire instruments used in measuring?

What was the name of the first instruments of this type?

Name some of the disadvantages of hot wire instruments.

Describe the mechanism and action of the Whitney hot wire instruments.

How are ammeter shunts constructed?

What is the effect upon the instrument indications of poor shunt contacts?

What is the solenoid type of measuring instrument and what are its main features?

What are the chief characteristics of the magnetic vane type of instrument?

How may a thermometer be used for measuring current?

What is the principle of the Westinghouse type of voltmeters and ammeters?

What is the principle of construction of the Thomson inclined coil ammeter?

Describe the action of this instrument.

What is the Thomson astatic voltmeter?

To what are deflections of the coil due?

How are the oscillations of the needle damped?

What does a red disk on these instruments indicate?

What is the principle of construction of the wattmeter?

What is the electrical action of the two coils of this instrument?

How is the stationary coil of a wattmeter wound, and how is the movable coil wound?

What is the effect of change of current strength in the main circuit?

Is this type of instrument limited to use on direct current circuits only?

What is the principle of construction of the Keystone voltmeter, and on what class of circuits can it be used?

In the electro-dynamometer type of instrument how is the moving coil controlled?

What is the function of the "pendulum" spring?

Describe the Queen voltmeter and ammeter.

Telegraph Traffic.*

BY W. N. FASHBAUGH, TRAFFIC ENGINEER, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

There is no doubt that the principal cause of errors is the lack of experience or inattention on the part of the operators. As it is impossible to eliminate the human element entering into the handling of the business, we cannot absolutely insure the correctness of every message; but we can by systematic supervision and inspection, greatly improve the character of the work.

In our larger operating departments throughout the country we have detailed a supervisor, whose duty it is to cut in on the various circuits for short intervals, noting the manner in which the operators work the wires, making records of any occurrences which might have a tendency to impair the service and at the same time calling the attention of the operators to any delinquencies.

At repeater stations, the through circuits are under the observation of repeater attendants whose duty it is to call to the attention of the terminal offices any apparent imperfections in the work of the operators engaged on the circuits.

The traffic supervisors in our larger offices note from time to time the character of the work of the various operators under their direction, and they are also required to exercise great care in the assignment of the force so that operators of mediocre ability will not be assigned to the working of circuits beyond their capabilities.

Inspections are regularly made of a proportion of the received messages with a view of calling to the attention of the receiving operators any imperfections in the form or character of their work.

In the larger cities a considerable proportion of the business either originates or terminates at branch offices, being relayed through the main offices. At these places we have established a system of inspection by having comparisons made of the main and branch office copies.

As the various inspections are made without the previous knowledge of the operator working the particular wire concerned, the effect is that all the operators, knowing that their work is liable to be under observation and subject to criticism at any time, exercise greater care in the performance of their duties and the result has been a marked improvement in the character of the work throughout the entire system, and we hope as the work of inspection continues, to finally reach such a degree of proficiency that errors and imperfect copies will be exceedingly rare.

The introduction of company-owned typewriters should also do a great deal in effecting the improvement desired, and as we eliminate operating handlings by extending the use of automatic telegraph systems, there will be still further improvement.

Passing to the item considered as second in importance, the speed of service, I think it may not be out of place to say that a number of years ago, delays ranging from thirty minutes to an hour in the handling of messages at our larger offices were not uncommon, and with the exception of the business of special urgency, no particular efforts were made to reduce the delay. In recent years, however, the public has become more exacting, until at the present time, it is necessary to handle some classes of business with great speed; there have been numerous recent instances where we have sent messages from different points in the South and Southwest destined to London and Liverpool, to which the answers have been received in three minutes. There have also been instances in the handling of land line traffic of no especial urgency, where the service has been performed so quickly as to raise a doubt in the minds of the patrons as to whether the answers were authentic.

One of the things which we are striving for in connection with the speed of service is a regularity of time, so that from experience, the patron can be reasonably well assured that within a certain time a telegram will reach the addressee. It is manifestly unsatisfactory to have business handled to destination in ten or fifteen minutes on some occasions and on others to have the service delayed for an hour or more. To prevent such irregularities in speed, it is necessary that much consideration be given to the various elements that enter into the handling of the message from the time it is written by the patron until it is delivered into the hands of the addressee.

In cities, a large proportion of the originating business is picked up by messengers. We have then first to consider the speed of service of messengers answering call boxes and returning to the telegraph office; next, the handling in the business telegraph office and in the operating department and later in the delivery department; and last, in the hands of the messenger who makes the delivery. While no considerable time may elapse in any one of these, yet the aggregate of the whole is often so great as to cause adverse criticism. In some cases it has been found that while the wire service has been prompt, there has been a delay in delivery which has practically nullified a quick wire service.

Our efforts in the messenger departments have been first to determine the requirements in number of messengers for the various times of the day by having tabulated by half hour intervals the number of calls and the number of messages to be delivered, having this information as to the work to be performed each half hour, after ascertaining approximately the average time required by messengers to perform each service, we are able to determine approximately what number of messengers should be on duty for each half hour period of the entire day.

Although the pay of messengers is usually on the piece work plan, it has been found that this

*Abstract of paper read at Annual Convention Association of Railway Telegraph Superintendents, New York, June 5, 1912.

supervision has resulted in quickening the deliveries and the return of the boys to the office and therefore, as well as having improved the service, the earnings of the boys have been somewhat increased.

Another feature that has resulted in reducing the time of handling from sender to addressee is the progress we are making in handling the messages to and from patrons by telephone. The number of messages handled in this manner has been steadily growing for the past year until at our principal offices the aggregate has now reached a monthly total of over one million and there is no doubt that this will be greatly increased as the public becomes more familiar with our practice in this respect and avail themselves of the opportunity to have their business more quickly handled.

A speed of service report has also been instituted in the principal offices covering the movement of the traffic on all of the circuits. This report is designed to show by minute intervals up to fifteen minutes, and by five minute intervals up to one hour, the percentage of the traffic handled on each of the circuits, and it is encouraging to note the improvement in speed which has been brought about by adopting the report. Instances can be cited where two years ago only 5 per cent. of the traffic was being handled within five minutes and 42 per cent. within ten minutes, which have now been raised to 50 per cent. and 60 per cent. within five and 90 per cent. and 95 per cent. within ten minutes.

The circuit load report is of great assistance in determining suitable assignments of force. We have also individual records showing the average number of messages handled per operator per hour, which are compiled in some of the larger offices to show the average per hour in certain sections of the office, and in the office as a whole.

In all principal offices a monthly report is made which shows the volume of the various classes of business handled, the expense for traffic supervision and for operating and clerical work in handling the business.

These reports from fifty of the larger offices are tabulated and compared with each other, the information being sent out so that each may see in what particular other offices are making the better showing, with the result that a spirit of rivalry or competition has been brought about and those in charge of the offices are striving to have their particular office make the most satisfactory showing. This, together with the frequent inspections of the individual operators' records has resulted in effecting considerable economies.

A question of considerable importance which I think can properly be made a subject for the consideration of your convention is the handling of the Western Union service at your railroad joint offices.

There are approximately 22,000 of these offices with a business aggregating possibly ten per cent. of the total Western Union business. As the telegraphing at these offices is generally handled by an employe having many other duties in connection with the railroad service, it is apparent that in many cases the commercial telegraph service will suffer delay. These delays occur not because of any unwillingness on the part of the railroad employe, but for the reason that with the important railroad duties pressing upon them and the difficulties sometimes experienced in obtaining the right of way on the commercial telegraph circuits, the operators find it an impossibility to give a quick handling on the commercial telegrams.

We have recently issued instructions to all of the independent Western Union relay offices that if working with another independent office, they should stop at the end of the message and clear any railroad office that may have offered them business. In this way it is hoped that the movement of business from the railroad offices will be expedited as the railroad operators will not have to watch the wires and wait for an opportunity to send their messages.

One of the important questions in regard to the handling of business from railroad offices is what inspections should be made of the commercial telegraph service at such offices.

From the information I have been able to secure, I do not think there are at present any regular methods of inspection. On some railroads inspections are made by the superintendent of telegraph or his assistants when visiting an office. On others the railroad traveling auditor makes such inspections in connection with his railroad work; but as a general proposition, I think it is safe to say the inspections now made are so infrequent that we do not keep informed of the character of the service and it is natural to assume that unless inspections are regularly made, the service will tend to deteriorate.

At the larger railroad station offices, division points and cities of some prominence where through trains stop, it is important that the messages originating on the trains receive special attention. If they are unduly delayed I have no doubt it results in criticism of the service of the railroad as well as the telegraph company; therefore, I would suggest that more frequent inspections of the service should be made at such offices than at the smaller intermediate offices.

To secure the full benefit of the work, I believe it is essential that the inspections be made by an employe of the railroad company, reporting to the railroad superintendent of telegraph. The latter would take such action in connection with unwarranted delays or unsatisfactory service of any character as the conditions might justify and would forward to the superintendent of the telegraph company a copy of the report, together with a statement of any action taken. By this means the representatives of both companies would keep advised of the character of the service as well as any improvements which might be effected.

Early Telephone Train Dispatching.

BY S. WHINERY, NEW YORK.

Between March, 1881, and June, 1884, I was engaged on the location, construction and temporary operation of the northern division of the New Orleans and North Eastern Railroad from Meridian, Miss., to New Orleans, La., which was built in the interest of the "Queen and Crescent" route, now known as the Cincinnati, New Orleans & Texas Pacific Railroad. John Scott was president and G. Bouscaren was consulting engineer. Construction work was begun in the spring of 1882 under the contract method. It was considered very important to complete the road at the earliest date. As all the contractors on my division (about 100 miles), except two or three, fell greatly behind in the progress of their work, the contracts were annulled and the work, including track-laying and ballasting, was completed by the company under my direction.

At that time the telephone was in local commercial use in many cities and on short outside circuits, but the microphone had only recently been invented and little or nothing had practically been accomplished in long-distance telephoning, though its possibilities were beginning to be understood.

Appreciating the great assistance it would be in directing the construction work, I proposed the construction at once of a telegraph line to be equipped with telephones so as to avoid the expense of telegraph operators. This was, at first, opposed as impracticable by my superiors, and it was only after the Bell Telephone Company assured us of its practicability and agreed to supply the instruments on condition that if the project proved a failure they were to be taken out at its expense, that I was given permission to make the trial.

Accordingly the contractors were required, as their first work, to clear off the right of way, and as rapidly as this progressed from Meridian southward a telegraph line with a single wire on temporary poles was erected. In the meantime the telephones, which were of the pattern then in use, but with somewhat more powerful magnetos, were supplied by the telephone company. One of these was put up in my office and another was carried by the party erecting the telegraph line, so that direct communication could be kept up, as the work progressed.

For construction purposes, the road was divided into the usual "Residencies" from twelve to fourteen miles long, each in charge of a resident engineer. As the offices of these residencies were reached by the telegraph line a telephone was installed therein.

Much to our gratification the line worked very well though it was often necessary to relay messages at distances of twenty-five to forty miles. It proved to be a very valuable aid in the construction of the road, as my office was in constant communication with my assistants down the line.

When track-laying was begun at the north end, the track gang carried an extra telephone which could be cut into the telegraph line at convenient points. As the track advanced and the number of construction trains increased the telephone was used to direct their work. When about forty miles of track was laid it was decided to put on a regular train to handle passengers, freight and supplies, and each station was equipped with a telephone. The movement of this train in connection with the construction and special supply trains was controlled by the telephones.

When about ninety miles of track were ready it was found advisable to put on a second train, making two regular trains each way daily. A train-order system was adopted and a special code of instructions for handling these train-orders by telephone was issued. Later, as the track progressed southward, my operating jurisdiction was extended and we continued to dispatch the trains by telephone, but with increasing difficulty. The most southerly station to which the telephone was thus used was Poplarville, 125 miles from Meridian. It was often necessary to relay messages and orders three or four times to reach that point.

In the meantime preparations were made to substitute telegraph instruments for the telephones, the former being installed at each station so that they could be cut in almost instantly. When all preparations were made orders were issued that at 11.55 a. m. on a given date the change from telephone to telegraph was to be made. The change occurred without a hitch, and before 12 o'clock noon a train order was being transmitted by telegraph.

The telephones were thus in use for dispatching trains for a period of about one year. Of course, it was done under difficulties that would not have occurred if the long-distance telephones of today had been available. But no error or mistake in transmission occurred that caused a single accident.

The line wire and the insulators used were those then considered standard in telegraph practice. In fact the whole scheme was worked out in accordance with our knowledge of telegraphy and our lack of knowledge of telephony. A single wire was used with earth return circuit. Had we known enough to put up two wires so as to provide a metallic return circuit, or even if we had grounded the circuits to the track-rails, the working would have been greatly improved. Our principal trouble seemed to be due to stray or induced currents caused by differences in temperature or other meteorological conditions. A thunderstorm along the line would put us out of business except over short, grounded circuits. Generally, talking was difficult in the middle of clear, hot days. The working was good between sunset and sunrise and best during the prevalence of general cloudiness and quiet rains. Under such conditions on a few occasions, so few as to be regarded as phenomenal, Meridian talked direct with Poplarville without much difficulty.

I remember some things that impressed me at the time. One of these was the seemingly almost infinitesimal quantity of current necessary to operate the line in talking. For about a mile out of Meridian our wire was put on the telegraph poles of the Vicksburg and Meridian Railroad only about two feet from the nearest telegraph wire. My operator could easily read the messages passing over this telegraph wire and the interference was so confusing that we had to move our wire down the poles to a distance of six or eight feet from the telegraph wires to get clear of the induction. At the residency offices, sometimes several hundred feet from the line, loop wires were strung on the poles about two feet apart. A good ground was provided at each office partly for the purpose of shutting off communication with the offices beyond if desired; but with the ground on, the induction between the two wires was often sufficient to enable the offices beyond to hear and understand the conversation.

Had any one told us at that time that in a quarter of a century great trunk-line railroads would be substituting the telephone for the telegraph in train dispatching we would have regarded him as a lunatic.

Cleaning Lacquered Instruments and Switchboards.

BY J. F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

If we analyze the process of polishing and lacquering apparatus and the nature of the materials used we can understand the difficulties which arise when it comes to an attempt to restore the finish.

Manufacturers polish brass on a grinder with flour emery. This leaves it with a sharp, clean surface, free from any film of grease. A coating of lacquer, a kind of transparent varnish, is then applied and baked on in an oven. On the best work several coats of lacquer are applied, each coat being baked on independently. This is the kind of work done on high-priced scientific apparatus, but it is too expensive for ordinary use, as such lacquering would cost more than the apparatus in some cases. Telegraph apparatus usually gets one or two coats of cold lacquer applied to the metal, which has been previously heated.

When instruments are placed in service moist atmosphere and flies attack the lacquer and in time air will pass through it, oxidizing the brass and causing it to turn black. Instruments have been laid away for years where they were not exposed to flies or damp atmosphere, on which the finish looks like new.

Anything used to brighten up lacquered apparatus may do one of two things. It may remove the dirt and fly specks on top of the lacquer, or it may remove both the dirt and the lacquer and the oxide on the metal. Ammonia, gasoline or similar cleaning agents, will take dirt off, but they will not reach the oxide on the metal unless they first remove the lacquer. Brass polishes are usually made up of ammonia, benzine or gasoline and whiting or gasoline and French rouge. The gasoline dissolves the dirt and the rouge or whiting polishes the surface when friction is applied. Rouge and whiting are, however, poor conductors and when they get into switch peg holes are likely to cause trouble. Because of the gasoline or benzine used in many polishes they are not safe cleansing agents to use around a switchboard if there is any current on the board—the slightest spark may cause a fire. A number of polishes have been withdrawn from the market because of insurance restrictions, due to their explosive nature.

It is practically impossible to remove all the lacquer from a switchboard and to re-lacquer it properly, without taking the board apart. It is a relatively simple matter to sandpaper the old lacquer off an assembled board, but if this is done and new lacquer applied, the new lacquer cannot be baken on, and unbaked lacquer does not stop oxidation for any length of time. It is also difficult to apply lacquer to an assembled switchboard without getting lacquer into the switch peg holes, and as lacquer is an insulator, this is a serious matter.

Various finishes have been tried upon telegraph apparatus in the endeavor to improve upon lacquer—gun metal, oxidized copper, etc. They cost more and do not look as well as lacquer in the first place, and when flies get at them the result is as bad as with lacquer.

Perhaps the best thing to do is to use ammonia to take the dirt off the lacquer, and to follow the ammonia by the use of a cloth with a few drops of oil on it to correct the milky effect of the ammonia upon the lacquer. It is not advisable to use any kind of polish on the metal parts of a switchboard.

The desire to keep apparatus clean is commendable but the cleaning process may be done "not wisely but too well." I know of a certain navy yard telegraph office where the instruments have been frequently put out of commission because they were polished daily like the brass on a flag ship. I also have a lively recollection of a switchboard which was in service in a small branch office some time ago. The lady in charge of the office did not like the soiled appearance of the switchboard and longed for a new board to match the rest of the office equipment, which she kept as neat as the proverbial new pin. When she tried to get a new board she did not receive much encouragement, because the board in use was sound and healthy, so she made up her mind that she would do the best she could with what she had. She bought a yard of blue ribbon and a bottle of gold paint, painted the entire switchboard, disks, straps, wood and all and made a bow of the ribbon and fastened it to the corner of the board. It was a thing of beauty, but what happened to the circuits through that board, and the remarks of the wire chief, are another story.

Writers' Cramp.

BY FRANCIS W. JONES, SPRING VALLEY, N. Y.

In the *New York World* of June 2 appeared the following special correspondence dated London, May 24:

"Biological tests by scientists at the London Hospital show that 'writers' cramp' and other similar states of apparent muscular paralysis are actually due, not to the tiring of the muscles, but to brain fag.

"It appears that the particular part of the brain which controls special combinations of muscle-action, such as the movements of writing or the working of a telegraph key, tend to become more quickly exhausted in some individuals than in others. Such exhaustion leads to a state in which the brain is actually unable to send out its necessary messages to the hands and fingers to write, tap a key, hold a violin bow, and so forth. Furthermore, once the nerve cells, the 'batteries' of the brain, get thoroughly run down, it is not easy to restore their energy.

"Heretofore it has been supposed that all troubles of the kind were due simply to overtiring of the muscles concerned."

If the above is a correct interpretation of the tests, it opens for further explanation some phases of the subject that are very puzzling. It is well known that there have been, and there are at present, several Morse operators whose right hands and right arms, from many years continuous use of the pen and Morse key, have become incapacitated for fast work, but who have so educated their left hands as to be able to use them as well as they could their right hands prior to being crippled by writer's cramp. The use of mechanical transmitters and typewriters, as substitutes for the Morse key and the pen, have, as it were, renewed the youth of very many old timers. One notable case is recorded in TELEGRAPH AGE of January 1, 1906, page 20. Mr. A. Winder, at 71 years of age, having suffered much from writer's cramp, resorted to the use of the vibroplex and typewriter, which restored his old time ability as a fast Morse operator. In TELEGRAPH AGE of July 16, 1906, an article upon the use and operation of (so-called) mechanical Morse transmitters alludes to the numbness of the hands and arms from a long use of the Morse key, and the article points out the reason why mechanical transmitters afford relief.

According to the explanation of the cause of writer's cramp, given in the London article quoted, it seems that the right and left hands respectively must be controlled by entirely separate sets of "nerve cells or batteries" in the brain, so that "brain fag" produced by the constant use of one set of cells for a long period does not result from the exhaustion of both sets, as is shown by a change from one hand to the other. The brain has a right and left hemisphere with a great longitudinal fissure between them, a fact which lends color to the theory of a duality of the functions of the brain.

Rev. William Albert Frye, D. D., of Orange, N. J., has founded the Order of the Knights and Ladies of Ehud, and persons eligible to membership must be left-handed. Mr. Frye states that persons are right-handed because the left side of the head and the left lobe of the brain are more developed than the right side, and that there is a distinct advantage in having the right side and the right lobe of the brain more developed, and that if the right side is more developed you will be left-handed. Mr. Frye also asserts that left-handed persons are right brained, and out of the ordinary. The new theory advanced by the scientists of the London Hospital will raise some serious questions. It indicates that many of the various applications and nostrums which have been in use for several years for the relief of writer's cramp have been applied to the wrong place.

Houston Telegraphers' Banquet.

A social and educational club was organized by employes of the Western Union and Postal Telegraph-Cable companies and the Southern Pacific Railroad at Houston, Tex., June 8. Prior to the organization a banquet was held, at which all three companies were represented. After-dinner speeches were made by manager R. L. Gould of the Western Union, manager J. D. McClellan of the Postal, C. A. Cline, manager of the Cotton Exchange office, and Louis Casper, superintendent of equipment of the Western Union. T. D. Walker acted as toastmaster.

Following is a list of those present: L. Casper, B. H. Moody, J. A. Brooks, Mr. and Mrs. T. D. Walker, Mr. and Mrs. A. F. Waitz, C. A. Cline, E. M. Tanner, A. W. Lamson, Mr. and Mrs. J. Bertram, H. C. Sherrill, A. F. Helfrich, C. Simmons, J. W. Jackson, Robt. Plitt, J. W. Oberiell, Mrs. Kelly, H. Miller, Miss Neita Raymond, H. A. Trotter, Wm. Helfenstein, E. C. Leo, J. R. Scott, A. W. Reed, J. A. Lachance, W. C. Armstrong, J. D. McCleland, Mr. and Mrs. M. A. Martin, Mr. and Mrs. R. D. Gould, D. A. Norton, J. W. Collins, F. H. Bush, A. C. Lupau, C. C. Bowers, G. S. McWhirt, Mr. Welch and A. S. Hunt.

The office force and managers of branch offices of the Western Union Telegraph Company at Worcester, Mass., met at The Baldwin in that city June 12, and discussed matters pertaining to a betterment of the service in the Worcester district. A. M. Pearson, district commercial manager, Boston, was present and talked of new methods of serving the public. He mentioned the new wireless coast-to-coast service and of efficiency and the best ways to bring it about. Others present talked about what can be done to improve the service and suggestions were made along technical lines. After the conference a dinner was served. Those present were manager C. H. Simpson, chief operator F. E. Hall, cashier J. C. Bonner, telephone supervisor Miss L. M. Fox, counter clerk Mrs. F. G. Simpson, delivery clerk W. N. Anthony, night chief operator Harry V. Lewis, night telephone superintendent Miss M. V. Donnelly, Mrs. G. A. MacDonald, manager of the new State Mutual building office; Lulu Anderson, Mary Powers, Mary H. MacDonald and Agnes Malley.

The Use of the Telephone in Railroad Service.

BY G. K. HEYER, NEW YORK.

(Concluded from page 403, June 16.)

It is a well-known fact that the rate of sending attained by the average railroad telegraph operator is about twenty-five words a minute, while with the telephone a speed of 100 words or more may be attained.

Experience has shown that fourteen to sixteen train orders may be put out in one hour with the telephone, while with the telegraph a dispatcher was doing exceedingly well to send out half this number.

The greater speed possible with the telephone is also shown in the reporting of trains, that is, the stating of time of the passing, arrival or departure of trains at stations. The dispatcher is, of course, always in on the line, and, as is customary, the station operator, when wishing to report, merely removes the receiver from the hook and, after being assured that the line is not busy, calls his station name. The dispatcher instantly replies by saying "dispatcher;" the report is then given, usually in the fractional part of the minute.

Information regarding accidents, derailments, etc., is conveyed to the dispatcher verbally by either the operator or the conductor, and the narration is at once so complete that the chances of misunderstanding and the necessity of additional messages are eliminated.

FIG. 4.—DISPATCHER'S TELEPHONE SET.

The use of the portable telephone puts the conductor in immediate touch with the dispatcher in case of a breakdown or other trouble between stations, while with the telegraph it is necessary to reach the nearest telegraph office to send in call for help. One of the large roads in the East has over 500 of these portable sets in use, having equipped a large number of the passenger and freight trains and all of the wreck trains with them. Further, the use of siding sets is of great value in that they enable the train crews to reach the dispatcher and keep him advised of their movements.

In some cases the roads have installed semaphore signals at sidings to operate in connection with the selector to enable the dispatcher to set the semaphore against any train desired and have the conductor report by telephone for orders.

In calling, the selector makes possible the operation of a bell at any station desired by the mere act of turning a button located within easy reach of the dispatcher and corresponding to the station wanted. This answer-back is caused by the making and breaking of the bell contacts across connected in series with the bell and thus producing an inductive effect, which is repeated in the dispatcher's receiver. The fact that the dispatcher has a means of knowing that the bell has operated, coupled with the better signal produced by the ringing of an electric bell, as compared to the click of the telegraph relay or sounder, arouses an immediate response, and the time of calling offices is practically eliminated. Further, if occasion demands, the advantage of calling stations in on the line while a conversation is being carried on may be resorted to. In fact, this feature is used continually on divisions where the traffic is heavy and the rate of calling is high.

FIG. 5.—DISPATCHER'S KEY CABINET.

If for any reason the first call failed to raise the operator, a second call may be sent out and the bell kept ringing at the will of the dispatcher until a response is received.

With regard to the accuracy of the telephone as compared with the telegraph, it may be stated that since the telephone has been used for the directing of train movements, not only since 1907 but also previous to that date, when the equipment had not reached the present state of perfection, not a single accident has been reported resulting from the use of the telephone.

FIG. 6.—SIDING SET.

Greater accuracy of transmitting orders is assured, as the dispatcher writes down the words as they are spoken, thus completing his record as the order is given and checking this record, word for word, as the order is repeated back by the operator.

With the telegraph the dispatcher sends his order and the record is made by his copying it as received from the operator. It will be readily seen that with this method the chances of error are greater on account of the liability of the dispatcher not catching errors in the repeat, due to the inclination to write down the message as sent out by him.

The ease and speed with which the dispatcher can handle his work is believed by many railroad men to be a further guard against accidents. The increased speed of calling and transmitting allows more time for laying out the work, planning of meeting points, etc., thus relieving the dispatcher of much of the mental and physical strain of trying to keep traffic moving and the almost continual operation of the telegraph key.

It is claimed by some that the translating of the sounds received over the Morse wire is done automatically. This may be true to a certain extent, but nevertheless this translation requires mental effort and this mental effort should be available for other purposes. Then the physical strain, which sometimes results in operators' paralysis, has a damaging effect under the severe conditions frequently experienced, due to congestion of traffic resulting from wrecks or holdups of any other kind.

With the telephone the dispatcher is in closer personal touch with the men along the line than with the telegraph. This is shown by the fact that a number of sharp remarks made over the telephone have greatly decreased or that such occurrences have stopped altogether since the installation of the telephone.

The likelihood of misunderstandings is remote, and this feature can be readily understood by those not familiar with railroad work, if one will consider how much more satisfactory any conversation may be carried on by telephone with a person located at a distant point than is possible by the telegraph or the mails.

Due to the federal and state laws limiting the working days of the railroad employes occupied in the receiving and transmitting of orders pertaining to train movements to eight hours, a considerable increase in the number of men necessary for handling the work was effected. Before the passage of these laws the field from which the railroad companies could draw operators was none too large, and the burden of securing the necessary help was greatly reduced by the introduction of the telephone, in that when occasion demanded, men could be taken from the other departments, as the requirements no longer necessitated the ability to send Morse. A field at once opened to trainmen and other employes who had met with such accidents as to incapacitate them for the class of work previously performed.

Under the severe conditions experienced along the Pacific Coast, where the heavy salt fogs make the operation of the telegraph almost impossible, the telephone has been operated satisfactorily on the lines of both the Santa Fe and the Southern Pacific.

In summing up, the advantages which must be conceded to the telephone method of operation are that it is quicker, safer and more reliable, and in addition makes possible better discipline and cooperation between the dispatcher and operator, as well as providing means for officials who are not familiar with the Morse code to exercise supervision and obtain immediate and accurate information in cases of emergency.

For handling message or other commercial and routine business between stations, the worth of the telephone has already been proven on several roads, and it is estimated that for this class of business one telephone circuit has the capacity of two telegraph circuits. On roads where the traffic is light, both the dispatching and message work can be carried on over the same pair of wires.

In connection with manual blocking, the old telegraph wires may be utilized, thus providing a grounded block circuit, or, if convenient, a metallic circuit may be employed. Either the grounded or metallic circuit is far superior to the telegraph. Blocking sets or a switching mechanism may be provided to allow one set of telephone equipment to be used on the train, message and block wires, and to cut two blocks into one for night operation.

The loud-speaking receiver is admirably adapted for this service and, it is thought, will ultimately replace the ordinary receiver for block work.

Another use for the loud-speaking receiver is in the dispatcher's office, where it may be connected directly to the train wire and relieve the dispatcher of wearing the head receiver at least part of the time.

This instrument, in connection with a special transmitter, may also be used in terminals for announcing trains.

For moving trains out of terminals the telephone has, in cases where installed, proven so much quicker and more flexible that there is but little doubt that all terminal circuits will within a short time be telephone circuits.

The train order semaphore, one of the recent developments, which consists of a standard semaphore mast arranged for mounting the selector and telephone apparatus in a weatherproof compartment, can be placed at any point along the line and the telephone and selector connected directly to the train wire.

In the large freight sheds and at transfer points, in office buildings, etc., and in fact at all places where direct communication between parties not located in the same room is desired, the telephone will prove invaluable.

Western Electric Expansion.—The Western Electric Company, on June 1, formally opened a large warehouse and branch office at Houston, Tex., in order to handle more effectively the growing business in the Gulf Coast. Complete stocks of telephone, power, supply and line material will be carried.

English Electrical Instruments.—The Bureau of Manufacturers, Washington, D. C., has issued a monograph dealing with the manufacture of electrical instruments in England, in which the works of seven leading electrical firms are described in detail. Much attention is given to the equipment of the shops, and a number of novel installations are described.

The Railroad.

Mr. E. E. Backus, superintendent of telegraph of the El Paso and Southwestern system, El Paso, Tex., has accepted a position with the General Railway Equipment Company, New York, with which concern he was identified prior to going to El Paso, a year ago.

Railroad Telegraph Contracts Expired.—The Postal Telegraph-Cable Company's contract with the El Paso & Southwestern Railway, and El Paso & Northeastern Railway lines having expired on June 15, these companies transferred to the Western Union on that date.

Hours of Service Law.—Two suits aggregating $12,000 each have been brought by the United States of America against the Atlantic Coast Line Railroad Company, for alleged violation of the Federal statute limiting the hours of service of railway employes.

Railroad Convention Echoes.—It is the custom of technical associations to hold their annual conventions on a fixed date each year, but the wisdom of departing from fast and inflexible rules has been demonstrated in the case of recent conventions of the Association of Railway Telegraph Superintendents. These meetings have been held at about the same time each year but on dates most convenient for the members, and with due consideration of outside influences, such as concurrent conventions and other occasions which would tend to diminish attendance. The selection of the date of the recent New York convention so early in June was a happy one. Early June is the best time of the year in New York, and no mistake was made in this regard as experience proved. Then again the national political conventions were set for later dates in the same month and to have held the convention at the same time would certainly have brought a large degree of failure. Happily, however, all these things were taken into consideration with the result that the New York convention was the largest and most successful ever held by the Association. Besides learning a great deal about their own business the superintendents were given a peep into other lines of related business which proved highly instructive. The benefits of the convention, as we have already pointed out, will show themselves in improved railroad telegraph and telephone service in the future, as each one of the members will naturally appropriate to his own use some of the ideas that he gained during his attendance at the meetings and his visits to telegraph and telephone plants.

Wire Crossings over Railways.

At the recent convention in New York of the Association of Railway Telegraph Superintendents the committee on wire crossings made the following report:

We have been preparing specifications to cover the construction and maintenance of aerial wires or cables of telephone, telegraph, signal and all other wires of similar character, crossing railroad rights of way, property, tracks or lines of wires; also aerial crossings of the lines specified with other telephone, telegraph or similar wires. The wires to be covered by the proposed specifications not to carry more than 550 volts or be used for purposes other than these enumerated.

In preparing these specifications we took such data as we could use from existing specifications of various railroads, the Western Union Telegraph and Postal Telegraph and Cable Companies and the American Telephone & Telegraph Company. As soon as we had completed our tentative draft we intended to send a copy to each member of our association and the large wire using companies and ask for criticism or suggestions, and when we had received the same, we then intended to invite the Western Union Telegraph Company, Postal Telegraph-Cable Company, American Telephone & Telegraph Company, and other companies interested, each to delegate a representative to meet with us and endeavor to agree on such specifications as could be adpoted for general use, and hoped to be able to present specifications which could be generally followed for crossings of such wires, as are the specifications for electric light and power wires adopted by our association at its Boston meeting last year.

We have held several meetings and drafted part of the specifications, but were unable to get them in shape for submission at this meeting, and suggest that a wire crossing committee be appointed to continue the work, as the investigations so far made by your committee show that there is urgent necessity for uniform specifications which will provide proper construction and maintenance of aerial wire crossings of telephone, telegraph and similar wires.

The report was signed by Messrs. E. C. Keenan, chairman, Wm. Bennett, M. H. Clapp, G. A. Dornberg, W. W. Ashald, C. Selden, and S. A. D. Forristall.

Mr. E. J. Little, superintendent of telegraph of the Great Northern Railway Company, St. Paul, Minn., writes: "Kindly accept many thanks for your favor in renewing my subscription, which I desire to have you do in the future, merely sending me bill, which will be paid with pleasure."

Grounding Device.

The accompanying illustration shows a device known as the "Maxum" grounding box, which has been designed to meet the most exacting requirements of electric light and telephone service. The construction embodies the salient features that have proven, from numerous tests, most effective in establishing an earth connection at once efficient and permanent in character.

The "Maxum" grounding box consists of a hollow cylindrical cast iron shell approximately five inches in diameter and twelve inches long. Supported by this shell, and forming part of the same casting, are a number of longitudinal ribs that extend radially outward from the circumference of the cylindrical surface. The center of the box serves as a receptacle for holding a special hygroscopic compound of silicates, sodium, carbon and vegetable fibre. Connection to the ground box is made by means of a one-inch galvanized iron pipe that is screwed into the top of the casting and securely fastened to the body of the casting by means of a suitable clamping lug. The entire construction is heavily galvanized by the hot-dip process and eliminates any possible corrosion due to electrolytic action or oxidization of the exposed parts.

GROUNDING DEVICE.

This particular design of the grounding device provides a surface of over 500 square inches, so that the current density per unit area for any given discharge is reduced to a very small amount. This feature is of particular importance where continuous or recurrent charges of long duration are experienced. In cases where the current density is high, due to too small an area of contact surface, the heating effect is sufficient to rapidly drive off the electrolytic moisture that supports conduction and this renders a ground inoperative.

Tests made upon the "Maxum" grounding box have shown a very high ampere hour capacity even under heavy discharge rates, without any apparent increase in resistance due to local heating.

Another point that has been given particular attention in this device is the method of supplying electrolytic moisture to the earth immediately surrounding the ground connection. Practical tests have proven that in general all the resistance to current flow from an electrical conductor to the surrounding earth lies within a few inches of the grounding device. Further, since the transfer of current is principally by means of electrolytic conduction, the efficiency of any ground connection will be dependent upon the chemicals existing in the earth in intimate contact with the ground electrode and also upon the amount of moisture present.

In the "Maxum" ground the composition is exceedingly hygroscopic in nature and therefore not only tends to draw and retain a considerable amount of moisture, but also to supply to the strata of earth surrounding the outer surface those chemicals most needed to support electrolytic conduction.

Care has been taken to provide a mechanically strong pipe connection and rigid grounding element. The material of which the box is composed is cast iron and the extra heavy coat of galvanizing precludes any danger from corrosion due to the electrolytic action of the discharge currents. Local action, invariably present where dissimilar metals are exposed to a common electrolyte, and producing rapid deterioration of the metal parts, is also effectually guarded against.

The "Maxum" ground should be sunken to a depth of five or six feet, depending on the nature of the soil and the connecting pipe added, so as to bring the end twelve inches or more above the grade level.

In practice it has been found that several hours usually elapse before the ground shows an appreciable discharge capacity, and under certain condition does not reach a maximum value for several days after installation, this latter condition existing where the soil is particularly dry and no water is poured amid the ground.

In large installations of electrical apparatus, where it is desirable to install a particularly heavy ground connection, it has been found best to install several ground boxes five feet or more apart and connected together by a common grounding bus.

The "Maxum" ground box has been placed on the market by the Fairmount Electric and Manufacturing Company, Philadelphia, Pa.

Old Telegraph Friends Entertained.—On the afternoon of Saturday, June 22, Mr. Cornelius G. Kolff, a well-known real estate dealer on Staten Island, but previous to 1880 identified with the Western Union Telegraph Company in New York, entertained a few of his old telegraph friends at the Philosophers' Retreat, Emerson Hill, Staten Island. Although this place is located within the limits of the city of New York, it is suggestive of a wilderness both in elevation and surroundings. A most enjoyable afternoon was spent by those who were fortunate enough to be present. They included, besides the host, Mr. C. G. Kolff, J. B. Van Every, W. J. Dealy, W. J. Austin, H. W. Pope, L. Dresdner, J. B. Taltavall, F. J. Scherrer, T. G. Singleton, Jas. A. Berry, W. D. Schram, J. W. English, Frank E. Coyle, J. W. Connolly, Michl. Dresdner, Edwd. O. Dierks, Jno. A. Dierks, Wm. P. Waters, F. E. Fitzgibbons, J. M. Phelan, T. E. Fleming, Berry P. Stephens, J. Wm. Schmults, David M. Edgar and C. M. Fulton.

Heavy Convention Telegraph Business.—During the first day of the Republican national convention at Chicago—June 18—about one million words were handled by the telegraph companies.

Western Union Superior, Wis., Office.

One of the neatest and most attractive telegraph offices in the middle northwest is that of the Western Union Telegraph Company at Superior, Wis. It is equipped throughout in the most modern manner and is a credit to the company and to manager A. T. Ritzman, who is naturally proud of it.

The equipment is entirely new, and no expense was spared in fitting up the quarters. The public counter is of oak and runs across the room. At the right is a sound-proof telephone booth and at the left the American District Telegraph equipment, comprising over three hundred boxes. The office is well lighted by electric lamps, and every convenience has been provided both for the public and the employes.

New Telegraph Office in Madrid, Spain.—A new building is in course of construction at Madrid, Spain, which will house the main telegraph office in that city. It will be up to date in every particular and will be completed and occupied in 1913.

T. M. B. A. Assessment.—Assessment No. 539 has been levied by the Telegrapher's Mutual Benefit Association to meet the claims arising from the deaths of Clarence Cary, at Greenwich, Conn.; Milan W. Russell at Calgary, Alb.; E. W. Bradford, at Worcester, Mass.; H. C. Stough at Toledo, Ohio, and H. W. Barbour, at Brooklyn, N. Y.

Post-Hole Digger.—Mr. W. O. Goodwin of Salina, Kan., has invented a post-hole digger, for which some remarkable results are claimed. It is stated that it will dig a five-foot hole in less than one minute.

Western Electric Business for May.—Western Electric Company's gross sales during May ran 3 per cent. behind May, 1911, making the total for the five months of the fiscal year elapsed 1 per cent. ahead of last year.

Mr. A. A. Patterson, manager Western Union Telegraph Company, at Bay City, Mich., writes: "I have been a subscriber for a number of years and appreciate each issue of the paper. Your publication is very helpful. No telegraph man should be without it."

LETTERS FROM OUR AGENTS.

NEW YORK WESTERN UNION.

One of the features of the visit of the railway telegraph superintendents to this office on June 5, during the convention at the Waldorf-Astoria hotel, was a fire drill given in their honor by direction of Mr. T. A. McCammon, superintendent of traffic. The drill was conducted under the supervision of Captain T. F. Clark, fire drill instructor, and was cleverly carried out, and the visitors were generous in their applause of the performance. The seventh floor, where over five hundred employes were at work, was selected as the scene of the drill, and the entire floor was cleared in one minute, the return being made in thirty-seven seconds. The drill was unexpected by the employes, and showed that they were thoroughly instructed. The latest fire appliances, with a system of gongs and fire boxes on each floor, that indicate the exact location of a fire, are among the many new improvements adopted by the management to insure the safety of the employes.

Telegraph and Telephone Age

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Duplex With Battery at One End.

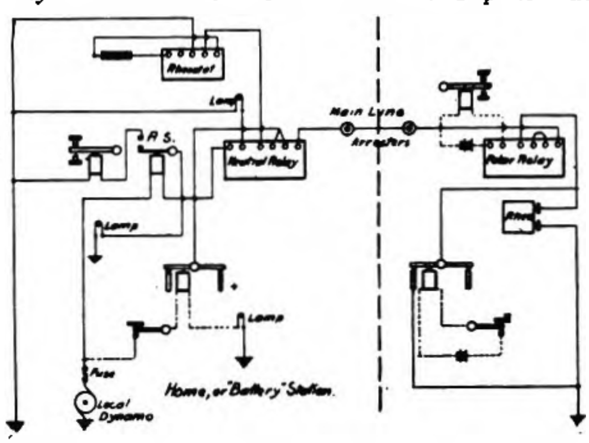
The writer is frequently asked why the duplex system with battery at one end of the circuit only has not been used more extensively, the general impression being that the economy therein lies principally in the saving of battery. As a matter of fact, however, there can be no economy in that direction because if there is no battery at the distant terminal there must be just twice as much at the home station to provide the required energy.

The true reason for not using this duplex more extensively is probably due to the fact that there is no real necessity for it in most localities. Today nearly every suburban or other town of sufficient importance to require a duplex to handle its business possesses local electrical energy which may be obtained for much less than it would cost to install and maintain dynamos or gravity battery; hence, for practically the same cost one has the one-battery duplex and the more efficient polar duplex to select from.

The earliest type of duplex, with battery at one end only, which was used by the Western Union Telegraph Company, and invented by Gerritt Smith, was more applicable to the conditions at that time. In those days the dynamo had not yet been introduced in telegraph offices, and wires were not so plentiful as now, and all of them were strung on poles. Gravity battery costs a little over one dollar per cell per year to maintain, hence at that time there was more to gain in the saving of battery than in the mere conductor itself.

Unfortunately, owing to static interference, the pioneer system could not be worked on circuits of more than three or four miles with any degree of satisfaction, which fact, together with improper handling, was discouraging to its general use.

Some years later Mr. Robt. H. Morris, of New York, improved the system by substituting a differentially wound relay for the single line relay used by Mr. Smith, and caused the polarities of the battery to pass alternately through the two oppositely wound coils. By this method the polarity of the relay core was permanently maintained regardless of changes in the battery polarity. It was then found that the duplex was



DUPLEX WITH BATTERY AT ONE END OF THE CIRCUIT.

very efficient for distances ranging from one to seventy-five miles and was at once installed for service. Many of the circuits out of New York and elsewhere thus equipped are still in successful operation. A full description of the Morris duplex, together with complete diagrams of connections may be found in Jones' "Pocket Edition of Diagrams."

Circuits over fifty miles in length develop too much static to justify the installation of this duplex without making provision for its compensation. As there are some localites in the South and West where suitable electrical energy is unavailable and a duplex would save the expense of constructing another conductor, the system may be made efficient by the addition of a few accessory apparatus, as shown in the accompanying illustration, which, together with the description following, is contributed by Mr. James B. Dillon, of Dallas, Tex.

"The diagram herewith shown represents the manner in which we are enabled to work the Morris duplex on a 150-mile copper, or a 149-mile iron wire circuit. Just what the maximum working distance is I have not as yet determined, but I believe I can safely say that it will work 200 miles copper and 160 miles iron.

"We are at present working it to Wichita Falls, Tex., 150 miles copper, to Jacksonville, 149 miles iron, and to Denison, Tex., seventy-three miles iron. The purpose of using a rheostat at the home end is to provide a resistance equal to that of the line plus what the distant station has unplugged. Under these conditions the condensers exert their influence to compensate for the static developed on reversals of polarity.

"We first tried to work the Wichita Falls circuit with the original Morris arrangement, but the static was so strong that we could do nothing. The arrangement shown here, however, gives us a strictly first-class duplex.

"To determine the resistance to insert at the distant end of the circuit, measure the current with open and closed key and keep the currents in the proportion of 3 to 1.

"To determine the required home resistance, make a conductivity test of the wire, or estimate it by allowing approximately five ohms per mile for copper and fifteen for iron, to which add the artificial resistance at the distant station. These approximate values will usually answer, since a true balance is not necessary."

While this method is not new (Mr. Morris having tried it several years ago), Mr. Dillon shows that if a good thing is not advertised, other bright intellects will rediscover it and make practical use of it.

Recent Telegraph and Telephone Patents.

ISSUED JUNE 18.

1,029,591. Electrical Switching Apparatus for Telephone Systems. To E. E. Clement, Washington, D. C.

1,029,593. Connecting Circuit for Magneto Telephone-Exchange Systems. To E. H. Colpitts, New York.

1,029,724. Telephone Repeater. To F. J. Shubert, Portland, Ore.

1,030,089. Party-Line Telephone System. To W. W. Hawkins, Cleveland, Ohio.

1,030,197. Selective Signaling System. To J. McFell, Chicago, Ill.

ISSUED JUNE 25.

1,030,308. Telephone Installation. To O. Kabitsch, Hamburg, Germany.

1,030,412. Impulse Transmitter. To J. W. Lattig, Rochester, N. Y.

1,030,415. Relay and Circuits Therefor. To R. H. Manson, Elyria, Ohio.

1,030,504. Telephony. To E. R. Corwin, Chicago, Ill.

1,030,505. Telephone System. To E. R. Corwin, Chicago, Ill.

1,030,509. Telegraphing Instrument. To C. C. Ferguson, New York.

1,030,550. Telephone Instrument. To W. P. Stunz, Lansdowne, Md.

1,030,551. Telephonic Instrument Including Transmitters. To W. P. Stunz, Lansdowne, Md.

1,030,684. Telephone Stand. To H. W. Schussler, Philadelphia, Pa.

1,030,780. Multiplex Telegraph System. To J. F. D. Hoge, New York.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange July 11:

American Telephone and Telegraph Co.	144¾
Mackay Companies	90
Mackay Companies, preferred	69⅝
Western Union Telegraph Co.	81½

Personal.

Mr. B. M. Downs, of the Hemingray Glass Company, Covington, Ky., has been seriously ill at Cincinnati, but is now convalescing.

C. H. Adams, aged 60 years, state superintendent of the New England Telephone and Telegraph Company for Maine, died recently in Limerick, Me.

Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York, accompanied by Mrs. Ghegan and daughter, will sail for Europe on July 20. Mr. Ghegan will be absent about six weeks.

Mr. C. S. Rhoads, of the Sandwich Electric Company, Sandwich, Ill., is now with the General Railway Equipment Company, New York. Mr. Rhoads is the son of Mr. C. S. Rhoads, superintendent of telegraph of the Big Four System, Indianapolis, Ind.

Mr. Kenneth Windram Endres, lately associated with the Western Electric Company at New York as a railway sales engineer, has resigned to become assistant treasurer of the Windram Manufacturing Company, Boston, Mass.

Mr. R. L. Barry, general superintendent of the Tri-state Telephone and Telegraph Company, St. Paul, Minn., has been appointed commissioner to take charge of the Manitoba government telephone system, with headquarters at Winnipeg, Man.

A Notable Issue of London "Times."—The London *Times* of June 28 devoted 80 pages to a description of American railways, their growth and cost. Included in this vast amount of information there is a story of the modern development of the American telegraph, telephone and cable services. It is historical and statistical in character, and covers the Commercial Cable system, the Postal Telegraph-Cable Company's system, the Western Union system, and the Bell Telephone system, and devotes some space to the use of the telephone in railway service. This issue of *The Times* is remarkable, not alone for its size, but for its wide scope as well.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. H. Mackay, president, sailed for Europe on July 9 on the steamer "Kronprinzessen Cecilie," to be absent about two months.

Mr. Charles C. Adams, second vice-president of the company, who was present at Baltimore in the interests of his company, during the recent national Democratic convention, spoke in the highest praise of the work of the telegraph staff. He says the operators were high-grade, clean-cut, and their work at the key was most creditable, with the result that a large volume of traffic was handled to the satisfaction of all concerned.

Mr. C. P. Bruch, third vice-president, and F. F. Norton, traffic superintendent, New York, are on their vacations. Mr. L. Lemon has returned from his vacation.

Mr. W. I. Capen, vice-president, New York, has returned from an inspection trip throughout the West.

Mr. George H. Usher, general superintendent of the Southern Division, Atlanta, Ga., was a recent New York business visitor.

Mr. E. B. Pillsbury, general superintendent, New York, has returned from a trip to Boston and other New England points.

Mr. J. F. Skirrow, associate electrical engineer, New York, has returned from a business trip to Buffalo, Pittsburgh, Chicago and St. Louis.

Mr. W. A. Boyle of the Savannah, Ga., office has been promoted to be manager, vice W. T. Austin, resigned.

Mr. J. C. Crowley has been appointed manager of the New Bedford, Mass., office of this company.

Mr. K. F. Stiles, of Dallas, Tex., has been appointed manager of the Waco, Tex., office of the Mackay Telegraph and Cable Company, vice S. S. Lacey, resigned. Mr. Stiles was in the Western Union service until December, 1911, when he left that company to accept a position as chief clerk to Mr. F. W. Conger, division superintendent of the Mackay Company at Dallas, Tex., which position he held at the time of his recent appointment.

The Atlanta, Ga., office is to be moved into larger and more up-to-date quarters.

This company has installed an up-to-date messenger call box system in Cincinnati, Ohio, which will be in operation on August 1, when the existing contract with the American District Telegraph Company will expire.

Mr. John Fletcher Heard, whose appointment to the position of division electrical engineer of the Postal Telegraph-Cable Company at Atlanta, Ga., was announced in TELEGRAPH AND TELEPHONE AGE, dated July 1, is a Southerner by birth and experience. He was born in Auburn, Ala., December 27, 1876, and in 1897 graduated in the electrical and mechanical engineering course at the Alabama Polytechnic Institute. He entered the telegraph service in Richmond, Va., November 20, 1899, as inspector for the Postal Company and in 1903 became construction foreman. Between 1904 and 1910 Mr. Heard was foreman of the first district of the Southern Division, and from 1910 to June 30 this year he filled the position of electrical inspector of the Southern Division. On the latter date he was appointed to his present post, succeeding Mr. Jesse Hargrave, promoted.

The Cable.

Mr. W. H. Ash, superintendent of the Eastern and Associated Telegraph Company's training quarters and cable station at Porthcurno, Cornwall, England, has retired.

Cable Rates from Peru.—The Central and South American Telegraph Company and the West Coast of America Telegraph Company (Ltd.), have made material reductions in some of their rates. The cost per word to the United States, Canada, Germany, Belgium, France, Great Britain, and Holland, is reduced from 1.80 soles ($0.87) to 1.40 soles ($0.68), and to Italy from 1.90 soles ($0.92) to 1.50 soles ($0.72).

Decision in Favor of Commercial Cable Company.—The Privy Council of the English House of Lords on July 10 decided that the contract between the Commercial Cable Company and the Government of Newfoundland of February, 1909, is valid and binding on the Newfoundland Government. It was a contract entered into by a former administration. Under it the Commercial Cable Company laid two cables to Newfoundland and broke up the cable monopoly that had existed in Newfoundland for forty years. Upon the Morris administration coming into power it repudiated the contract. The Supreme Court of Newfoundland sustained that repudiation but the House of Lords now reverses that decision with costs to be paid by the Newfoundland Government.

New Company Chartered.—The Metropolitan Telephone and Telegraph Company with a capital stock of $3,000,000, has been chartered at Dover, Del. The incorporators are: C. A. Stillman, New York; H. Lee Sellers, Montclair, N. J., and Reynolds Clough, Dover, Del. The general purpose of this company is to build telegraph lines and lease them, and with a view of connecting some of the independent telephone companies along the territory through which these lines are to pass.

Mr. H. A. Vaughan, assistant superintendent of telegraph, Chicago, Burlington & Quincy Railroad, Lincoln, Neb., in renewing his subscription writes: "Herewith please find my personal check for $2.00 to keep me in good standing on your books. I am very glad that you have renewed my subscription as I do not wish to have the AGE stop coming."

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager, New York, left for Denver, July 11, to be absent two weeks.

Mr. G. D. Perry, general manager Great North Western Telegraph Company, Toronto, Ont., was a recent executive office visitor on company business.

Mr. A. G. Saylor, general superintendent, New York, has returned from a business trip to Portland, Me., and Boston, Mass.

Messrs. G. M. Yorke, engineer, M. C. Allen, division plant superintendent, and H. A. Emmons of the traffic engineer's office, New York, have gone to Nova Scotia and Newfoundland on company business.

Mr. R. W. Gray, division plant superintendent, San Francisco, Cal., was a recent New York visitor on companyn business.

Messrs. J. S. Calvert, district superintendent, Richmond, Va., J. A. Pferd, manager, Buffalo, N. Y., and L. C. Hall, manager, Norfolk, Va., were recent executive office visitors on company business.

Mr. J. P. Parmentier, for the past ten years manager of the Green Bay, Wis., office, has been appointed special agent.

Mr. W. H. Jones of the office of the engineer of equipment, New York, is spending his vacation touring Long Island and New Jersey.

J. B. Wooster, manager of the Auburn, N. Y., Western Union office, died on July 9. Mr. Wooster was well known throughout the service and his sudden death was a great shock to his numerous friends. Mr. Wooster was thirty-seven years of age, and was a loyal official. Bright's disease was the cause of his death.

Library Presented by Mr. Vail.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, and of the Western Union Telegraph Company, has presented to the Massachusetts Institute of Technology, Boston, Mass., the Dering library of 30,000 volumes, on electricity and electrical engineering, valued at $100,000. He has also provided funds for the maintenance of the library.

President Vail to the Western Union Employes.

The copies of the pamphlet on the provisional pension plan now being distributed to the employes of the Western Union Telegraph Company, contain the following letter from president Theo. N. Vail:

"TO ALL EMPLOYES: It is with great pleasure I hand you a copy of the Provisional Pension Plan, which represents a year's work of the Pension Committee, consisting of Thomas F. Clark, vice-president; A. R. Brewer, treasurer; William Holmes, superintendent of tariff, and F. D. Giles, special agent, all Western Union employes of over forty years' standing.

"It has always seemed to me a matter of first importance to provide for those employes who, after years of loyal service, are obliged through disability or advancing years to retire from active work, and in our last annual report it was stated that an effective and beneficial pension scheme was to be inaugurated that good men might not only be retained, but encouraged and made to feel that the interest and prosperity of the company works for their interest and prosperity. It is believed that the terms of the plan here submitted with that end in view are as liberal as any in force in other organizations.

"I can but repeat and emphasize that it is the determination of the management to offer further advantages as fast as the prosperity of the company will permit to those whose earnest work is effectively promoting its interests.

"It was also stated in the annual report mentioned that it was the desire not only to benefit those who have been in the service for many years, but also those who have been in the service for shorter periods. To this latter end we have under consideration a plan which we hope will accomplish this purpose and from which all who have been in the service for any considerable period will derive some benefit in case of disability or death.

(Signed) "THEO. N. VAIL, President.

"New York, June 25, 1912."

A conference of officials of the Gulf Division was held in San Antonio, Tex., July 1. J. C. Smith of Dallas, division commercial and traffic superintendent, presided at the meeting. Among those present were: H. Vandevender, New Orleans, commercial superintendent; J. W. Brooks, Oklahoma City, commercial superintendent; W. E. Bellman, St. Louis, district commercial manager; F. C. Cole, Dallas, special agent; W. B. Kendall, Dallas, special agent; W. A. Logan, Oklahoma City, special agent; A. F. Felder, Dallas, special agent; R. P. Simmons, Dallas, special agent; R. G. Williams, Dallas and F. H. Gournoe, manager, San Antonio.

Rearrangement in Central Group.—A new arrangement of conducting the systems of the Bell Telephone in the Central Division, comprising Ohio, Indiana, Michigan, Illinois, and Wisconsin, was inaugurated on July 1. Hereafter each state will be in charge of a separate general manager, with vice-president A. Burt, in general charge. B. F. Hill, formerly general manager for the five states, will be general manager for Illinois, with headquarters at Chicago. L. N. Whitney of Indianapolis, Ind., will have charge in Indiana, E. A. Reed of Columbus, Ohio, in Ohio, E. A. von Schlegell of Detroit, in Michigan, and H. O. Seymour of Milwaukee, in Wisconsin.

Canadian Notes.

Mr. James Kent, manager of the Canadian Pacific Railway Company's Telegraphs, Montreal, Que., is making his annual inspection trip to the Pacific Coast.

Underground Wires in Canadian Cities.—In the latter part of May the Board of Railway Commissioners for Canada heard the application of the City of Hamilton, Ont., to put all wires underground on certain streets. Owing to the very meagre information furnished by the City of Hamilton and the various companies not having been approached, the hearing was adjourned to enable the city and the different companies to compile data to be brought up at a future date.

On July 3 the Board of Railway Commissioners took up the application of the City of Ottawa to put all wires underground on certain streets, but the city was not more prepared to go on with the case than the City of Hamilton had been, with the result that the case was postponed until next September.

Death of Harvey P. Dwight.

H. P. Dwight, aged 84 years, president of the Great North Western Telegraph Company, Toronto, Ont., died in that city on July 5. Although a native of New York State deceased had served Canadian telegraph interests for so long a time that he was affectionately known as the "Father of Canadian Telegraphy." He began his telegraphic career at Belleville, Ont., in 1847, and rose steadily through positions of importance until 1893 when he was elected president of the Great North Western Company. Mr. Dwight rendered valuable service to the government on various occasions, and after the northwest rebellion in 1885 he received public acknowledgment in Parliament for his work in behalf of the government in connection with the uprising.

He was beloved by all who had the honor of his acquaintance, both in the United States and Canada.

Col. W. C. Connelly, aged 56 years, manager of the Associated Press at Pittsburgh, Pa., died in that city on July 9. Mr. Connelly was a telegraph operator in his early career, and in 1878 became agent for the Associated Press, which position he retained up to the time of his death. He was a member of the Old Time Telegraphers' and Historical Association, and was prominent in military, Masonic and civic affairs. The funeral services were held July 12.

Outing of the Morse Electric Club.

The annual outing of the Morse Electric Club was held at Donnelly's Boulevard Hotel, College Point, Long Island, on July 6 and was attended by about 150 persons. The day was delightful and every one present had an enjoyable time. The party was conveyed to College Point by the cable steamer "Robert C. Clowry" which was placed at the disposal of the club by the Western Union Telegraph Company.

The steamer left New York shortly after 2 o'clock, and on its arrival at College Point, a game of baseball was played between the Western Union and Morse nines, resulting in a score of 9 to 2 in favor of the former.

Other athletic exercises were held, resulting as follows:

The 75-yard dash was won by A. M. Lewis, A. C. Gibbs, second and W. C. Merly third.

The Fat Men's race was won by J. A. Pferd of Buffalo, A. H. Lewis second, and J. J. Riley third.

The next event, a 75-yard dash, was won by M. A. Porter, with C. H. Mulford second.

The fourth race, free for all, was won by T. J. Smith, J. Coffee second and L. V. Murphy third.

A boy's race ended the athletic programme. It was won by F. J. Sheridan, with W. Finn second.

Some unique prizes were awarded to the successful contestants. They included orders for pineapples, a shirt, a necktie and a bottle of mixed pickles.

At the close of the athletic exercises dinner was served in the pavilion, accompanied by piano music and singing by a soloist, and, after dinner, prizes were drawn by the members.

The following were among those present: L. Dresdner, E. H. Falls, R. L. Otis, C. Jacobsen, W. A. McAllister, F. E. Fitzgibbon, T. G. Singleton, M. H. Kerner, F. C. Halstead, C. A. Kilfoyle, C. B. Peto, W. C. Behrens, H. S. Latimer, J. E. Jenkins, Wm. Marshall, F. Kitton, G. H. Messner, D. A. Marstay, F. I. Fitch, J. Piccolo, W. G. Geehr, N. B. Hall, J. F. E. Hopkins, John McDonough, F. A. Hoffman, F. J. Scherrer, R. J. Murphy, F. J. Sheridan, T. Conaty, L. C. Hall, H. Durland, M. J. Hayden, C. A. Harvey, A. O. Wallis, M. A. Porter, E. B. Saylor, N. M. Griffin, H. W. Dealy, J. A. Sweeney, J. S. Calvert, C. McKary, E. F. Howell, B. H. Reynolds, Thos. F. Clark, J. J. Reilly, L. D. Beall, J. F. Nathan, M. J. O'Leary, J. B. VanEvery, J. A. Berry, L. Roth, W. S. Fowler, C. H. Huston, A. M. Lewis, H. M. Heffner, D. J. Murphy, L. V .Murphy, F. S. Lewis, J. A. Pferd, Geo. Schreiner, W. J. Savage, C. H. Mulford, Alex. Kline, W. A. Schudt, T. J. Smith, J. Coffey, W. C. Merly, J. Brennan, C. Hearon, A. H. Lewis, L. Herman, Thos. Bonero, C. Nertz, C. H. Ludwig, J. J. Phelan, A. J. McGivern, F. Rahberger, M. J. Tobin, L. Gilmartin, T. Skidmore, J. O. Gegler, F. Cummings, A. M. Fisher, Capt. Royen, Capt. Olmstead, W. C. Royan Jr., H. M. Smith, Mr. Baker, Mr. Gundry, A. C. Gibbs, J. Simons, G. Irving, W. H. Rost, Wm. Finn, W. J. Finn, T. A. Finn. W. H. Finn, Alf. Finn, T. R. Taltavall, J. B. Taltavall, S. R. Crowder, J. W. Connelly, Geo. Rhoem and J. A. Dierks.

Mr. W. W. Murphy, manager at Savannah, Ga., has been promoted to be district manager with headquarters at Birmingham, Ala. Mr. Murphy is succeeded by Mr. W. T. Austin, who was manager of the Postal Telegraph-Cable Company's office at Savannah.

The Telephone.

Mr. W. T. Gentry, president of the Southern Bell Telephone Company, Atlanta, Ga., who has been in Carlsbad, Germany, for several weeks, taking the baths for the benefit of his health, has been greatly improved, and will return home within the next two weeks. While in London Mr. Gentry was called as an expert in the suit of the National Telephone Company against the English government.

Telephone Opposition in Denver.—A new independent telephone company is being formed in Denver, Col. It proposes to operate an automatic system and charge $6 per month for unlimited business service.

Omaha Independent Telephone Plant Sold.—The Independent Telephone Company in Omaha, Neb., an automatic plant, was sold at a receiver's sale on July 1 for $995,000 to the Nebraska (Bell) Telephone Company.

Damages for Removal of Telephone.—E. T. Curran, a lawyer of Brooklyn, N. Y., has sued the New York Telephone Company for $100,000 damages because the company removed the telephone from his place of business.

New Telephone Works in Russia.—The Mix and Genest Telephone and Telegraph Works Company of Berlin, Germany, have concluded an agreement for the formation of a Russian telephone factory. The new company will have a capital of $250,000.

Telephony Between Berlin and Stockholm.—Telephonic communication between Stockholm, Sweden, and Berlin, Germany, is soon to be established. The Swedish long-distance microphone will be used and it is thought that this instrument will eventually permit of communication between Berlin and London.

Line Repairing on Skis.—Mr. John T. Kelley, wire chief of the Mountain State Telephone Company, at Sheridan, Wyo., while searching for a recent break in the lines on the Big Horn mountains was compelled to use skis over forty-five miles of the route. In many places the snow had drifted over the tops of thirty foot poles.

The Telephone in Denmark.—The annual report of the telephone company of Copenhagen for 1911 shows receipts from rentals, $1,050,000; from public telephones, $191,000; for removals and entrance fees of new clients, $54,000. The Government will take over the company in 1918. The Copenhagen Telephone Company operates not only in that city, but also over all the island of Zealand, which includes a territory of 2,000 square miles, with 1,100,000 people.

Two-Rate System in Louisville.—The Cumberland Telephone and Telegraph Company on July 1 instituted a two-rate system for city subscribers in Louisville, Ky., the ordinance rate and the "Metropolitan" rate. The former does not provide for free service to suburban towns, while the metropolitan rate allows of service to certain suburban points without additional cost. The new system is a result of the recent ruling of the United States Supreme Court sustaining an ordinance fixing maximum telephone rates in Louisville.

Independent Telephone Companies Absorbed.—The New York Telephone Company has purchased the property and business of the Onondaga Telephone Company; the Albany Home Telephone Company, in Greene County; the Baldwinsville Telephone Company; the Newburgh Home Telephone Company; the Home Telephone Company of Frewsburg, Chautauqua County, and the Deposit Home Telephone Company, all in New York State. The New York Telephone Company is now carrying on the business formerly conducted by the separate companies.

Long Distance Speech.—During the recent annual convention of the Texas Press Association at Temple, Tex., vice-president Mr. E. S. Bloom of the Southwestern Bell Telephone system delivered an address to the assembled editors from St. Louis, Mo., by long-distance telephone. This was followed by an address by Mr. J. E. Farnsworth, vice-president of the Southwestern Telegraph and Telephone Company from Dallas, Tex. Addresses were also made by telephone by Judge S. R. Scott from Waco, Tex., and Mr. Frank B. Knight, special agent in charge of publicity Southwestern Telegraph and Telephone Company, from Temple, Tex. The total wire distance from St. Louis to Temple is about 1,170 miles.

Edison Medal for Mr. Westinghouse.—At the annual dinner of the American Institute of Electrical Engineers held at the conclusion of the annual convention in Boston, June 27, the Edison medal was presented to Mr. George Westinghouse for meritorious achievement in the development of the alternating current system for light and power.

Mr. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line, Wilmington, N. C., writes: "I want to express my appreciation of the feast of good things served by the AGE twice a month. Its educational and technical chapters, devoted to the twin arts of telegraphy and telephony, are invaluable to one who really loves his vocation; through its reviews of current events pertaining to the profession we are kept abreast of the times and in touch with the men and the forces that are dealing with one of the most fascinating problems of the centuries and are developing a stupendous reply to that unanswerable first message, 'What Hath God Wrought?" its personals are like letters telling us about absent friends; its editorials, always optimistic, progressive and inspiring. Altogether it is a most welcome visitor."

Radio-Telegraphy.

Wireless in Honduras.—The north coast and interior of Honduras, Central America, are to be connected by wireless. Owing to rank vegetation and dense forests in tropical countries, wire telegraphy is difficult.

American Marconigraph.—The Marconi Wireless Telegraph Company of America will issue an American edition of the *Marconigraph*, which is published in London by the English Company. The first number will appear about September 1.

Mr. Marconi Entertains Radio Convention Delegates.—Signor G. Marconi and Mrs. Marconi on July 6 gave a luncheon party at Cedarhurst, their country place in England, to a number of the delegates to the London Radio-Telegraph conference.

Marconi Company Absorbs United Wireless.—The Wireless Liquidating Company, which was formed to take over the assets and plant of the defunct United Wireless Telegraph Company, and turn them over to the Marconi Wireless Telegraph Company, carried out its purpose on July 1.

Wireless in the Dark Continent.—A wireless station is to be put up at Accra, Gold Coast, by the Marconi Wireless Telegraph Company. A wireless station is also to be erected at Lusambo, in the heart of the Congo. It will be possible to transmit messages direct between Belgium and the Congo in a short time.

High Wireless Tower in Germany.—The new iron wireless tower to be erected to take the place of the one recently blown down at Nauen, Germany, will be 813 feet high. When it is completed experiments will be undertaken on the transmission of electric waves through the earth. The wires in this case will be sunk 325 feet.

Wireless in German South Sea Colonies.—The German government has granted a joint concession to the German-Netherlands Telegraph Company and the Telefunken Company for the construction and operation of wireless stations at Yap-Rabaul (New Guinea), Apia (Samoa) and Nauru, all South Sea colonies. The German-Netherlands cable lands at the island of Yap.

Wireless Ship-Stations.—According to figures presented by the German delegation to the London Radio-Telegraph Conference, 926 ships (apart from war-ships) have been equipped for wireless telegraphy, and there are 155 coast stations open for public service. The total number of ships equipped is no less than 1,577, and the total number of coast stations, 286.

Government Control of Wireless in Austria.—The Austrian Government has established under the Ministry of Commerce a State department for wireless telegraphy, which will undertake the working of this service on board Austrian ships, the technical management to be in the hands of an inspectorate in Trieste. The system chosen for adoption is that of the Telefunken Company, and the six installations already carried out by the latter on six Austrian vessels will be purchased by the Government.

Compulsory Acceptance of Wireless Messages by Ships.—At the London Radio-Telegraphic conference it was announced that the British Empire, Italy and Japan, had accepted the principle that all messages, and not only those relating to cases of distress, must be accepted by ships from other ships, no matter what system of wireless telegraphy was employed.

Wireless in Tasmania.—The wireless station at Hobart, Tasmania, has been opened. Working during the night time recently with one-twentieth of its power, the new Pennant Hills (Sydney) station reached every known official station within a radius of 2,000 miles, including Fremantle (2,000 miles), Suva (1,732 miles), Wellington (1,230 miles), and Macquarie Island (1,281 miles).

List of Wireless Telegraph Stations of the World.

The latest list of wireless telegraph stations of the world, published by the United States government, will be of value to wireless managers, operators and others interested. It gives the names of ships and location of stations; call letters; range in nautical miles; power in kilowatts; wave length in meters and character of station. There is also an alphabetical list of call letters. It is a very complete work and contains 165 pages. Copies may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, at 35 cents per copy.

Annual Meeting of Marconi Company.

At the annual meeting of the Marconi Wireless Telegraph Company in London on July 9, Signor G. Marconi referred to the progress of the company's business during the year, the greatest and most important development being that of the American company. Over $7,000,000 of the capital stock of the American Company ($10,000,000) he said is now a liquid cash asset, the balance being represented by valuable assets in the shape of eighty important telegraph stations situated upon the Atlantic and Pacific coasts and the Great Lakes. These conduct a big business, both with each other and with ships at sea.

"The existing business alone of the American company," he said, "is a very substantial one, and we look to a great extension of this branch of the company's service.

"But however important and profitable this section of the business may be, it is, we think, dwarfed by impending developments in telegraph business which have been taken in hand and to which seven million dollars of new capital will be devoted. We are satisfied that an excellent service will be furnished, which will put the United States in communication by wireless telegraphy with this country, across the Pacific with the East and South to many South American states, and which we hope in time will be extended.

"By reason of the agreement which we have entered into with the Western Union Telegraph Company, and also with the Great North Western Telegraph Company, our service will be fed by the 20,000 telegraph stations which those companies possess."

Sound Reasoning From Headquarters.

The following is a copy of one of the "Weekly Talk Letters," recently mailed to all managers of the Postal Telegraph-Cable Company of Texas, by its president and general manager, Mr. S. M. English. It contains so much good reasoning and common sense that we commend it to the careful consideration of every member of the fraternity:

"You know the kind of a man who never learns the business he is in because he always 'intends' to go into business for himself. Many men 'jolly' themselves with such excuses for their lack of energy or ambition to improve their condition. There are some operators who have received fairly good salaries for years, but have never saved a cent, yet they too have dreams of a little business of their own; when they will be independent—their own bosses.

"It takes capital to start any kind of business. It takes hard work and careful management to make it a success. Ability to successfully manage a business is not acquired in a day—some never acquire it.

"Did it ever occur to you that every employe is a partner of his employer? No? Well let us see if he is not. A few men put up enough money to build a telegraph line; a large number of men without any money put up their labor, and the revenue is divided. As a rule the employes get the big end of the gross revenue, and the men who put up the money get what is left after the salaries and fixed charges are paid, which is seldom more than 5 or 6 per cent on their investment. The investors take all the risk of loss and pay all the damages caused by the mistakes and negligence of their salaried partners.

"Suppose you started a little business of your own, say with $10,000 capital, and it netted you 10 per cent, or about $83.33 per month. You would more than likely work from twelve to fourteen hours per day and spend many sleepless nights when business was bad, collections slow and your creditors pushing you.

"Suppose, on the other hand, that you prepared yourself for promotion and accepted a managership at, say, $150 per month: on the 10 per cent net basis of the 'little business of your own,' your income would represent an investment of $18,000. Now for your 'investing partner' to make $150 on the 6 per cent basis, he must invest $30,000 and take all the risk. He must depend upon you and his other salaried partners for his income. You are certain of yours, but is he? Yes, to the extent that he would not have you for a partner if he did not believe in you and know that he could rely upon you at all times to guard his interests as you do your own.

"Does it not look like a pretty fair proposition for the employe? Does it not behoove you to prepare for a better position and thereby increase your investment in the business? It is worth thinking over, for it is much easier to invest a better quality of labor in the business which will pay you so well for so little effort and absolutely without risk, than to raise enough capital to start a business of your own and risk it on inexperience.

The best way to begin to prepare for a better position is to begin. TELEGRAPH AND TELEPHONE AGE, and Jones' Pocket Edition of diagrams and complete information for telegraph engineers and students will be found helpful."

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What are electro-static instruments used for?

What is the principle upon which they are constructed?

What is the relation of the aluminum plates in this type of instrument?

How is the index plate controlled?

How are the aluminum plates connected to the circuit?

What other instrument does this one resemble?

What causes the movable plate to swing?

Why are the scale divisions not uniform?

Do electro-static instruments consume current?

What is the principal advantage of the electro-static voltmeter?

What is the parallax, and why is it difficult to get an accurate reading of the indications?

How is parallax prevented in portable instruments?

What care should be given to electrical measuring instruments?

In taking measurements what precaution should be taken with reference to placing the instrument?

What effect upon the readings has the rubbing of the glass front of the instrument?

Why is it not advisable to rub the glass before taking a reading?

How may undesirable static currents be dissipated?

What is an equalizer and what is it used for?

Why is the zero point on scales of ammeters for storage battery circuits placed at the center?

What is a polarized instrument?

Why is it inadvisable to use a horizontal-reading instrument in a vertical position and vice versa?

Underground Conduits in Chattanooga.—The city of Chattanooga, Tenn., will build an underground conduit system for telegraph, telephone and other electrical wires, and lease them to the various companies.

The Maintenance of Telegraph Lines.*

BY G. M. YORKE, ENGINEER WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

A telegraph company must have a good plant—not merely a plant which is good under favorable conditions, but one which may be worked with ease and speed in wet weather, which will not go out of business because of lightning or foreign currents, except when the conditions have for the moment become too hazardous to be endured, which will stand firm through heavy gales, and which is as far as practicable free from the menace of falling trees and from liability to serious interruption by sleet storms. Little annoying things must not be always happening to it. All this is necessary to give reliable service, which is a duty as well as a source of profit.

The careful initial construction required to obtain such a plant is well understood. What I wish to call attention to are the steps to be taken to ensure steady reliability as the plant grows old. Whether the plant is watched and kept up in a far-sighted manner, or is treated with indifference, with a view chiefly to the ease and economy of the moment, makes a great difference in the service to be obtained from it.

Taking particularly the outside plant, the results that ought to follow from good original construction may gradually be vitiated by inadequate regular attention to the inevitable small recurring sources of trouble, such as leaning poles, loose ties, and loose or broken insulators; by alterations in construction, such as the insertion of cable; by unheeded changes in surrounding conditions, such as the construction, dangerously near, of high tension lines, the erection of buildings, and the washing out of embankments; and by lack of systematic replacements of decayed, rusted or worn-out parts.

ROUTINE REPAIRS.

To correct at an early stage the numerous defects which a telegraph line is constantly tending to develop, requires a close and intelligent personal interest. The most effective way of securing this that I know of is to combine a proper supervisory system, including means for comparing results, with the plan of dividing the lines up into suitable sections, say a hundred miles, more or less, according to conditions, giving a lineman complete control, under proper supervision, of the routine repairs to each section. The lineman should make regular inspection trips over his section, on which he should repair minor defects before they cause trouble and interruption to service. He should do all maintenance work which can economically be handled by himself and not more than two assistants. In general, he should clear the trouble on his section, but if some other lineman should be more available for a given trouble, that lineman should be assigned.

Under this plan the lineman is under the direction of the wire chief when clearing trouble. At all times the wire chief knows the lineman's whereabouts. The wire chief, however, is not the judge of the physical quality of the lineman's work. This is a matter for the inspection and the criticism of line inspectors, line supervisors and plant chiefs.

Heavy maintenance work, such as extensive pole replacements, or changes in location, or the repairing of general breaks, should, of course, be done by regular gangs.

A principal penalty for not paying enough attention to the prompt correction of small defects is an unnecessarily large number of what are very significantly known as "troubles." If we can establish a system which makes an increase or decrease in the number of troubles in a given section of line conspicuous, which makes comparison unavoidable between one section and another, and which makes this exhibit not only to the superiors, but also to the men who actually do the work and know that they are responsible for the results, and who see every time they clear a trouble the relation between cause and effect, we will be taking an important step in the direction of keeping the number of troubles down to a reasonable minimum.

This is the object of the system now being put into effect by the telegraph company for "counting, recording and reporting line troubles."

A system of reports to be effective should give the following information and data:

1. Speed in clearing line troubles, together with the nature and cause of such troubles.

2. Nature and locations of line troubles as determined by the wire chiefs compared with the causes and actual locations of the troubles as found by the section linemen.

3. Data which will fix the responsibility for excessive delays in clearing line troubles and any unnecessary expense connected therewith.

4. Data which will associate the troubles on a given section of line with the last inspection of that section, in order to determine if inspections by the section linemen are too infrequent or not thorough.

5. Data from which a detail monthly analysis of line and cable troubles and their causes can be made, by sections of line and by districts, and which will give a basis on which to compare the efficiency of the districts and direct future repair work.

6. Data from which the troubles per mile of wire and the average time to clear a trouble can be determined. Based on the troubles per mile of wire and the average time to clear a trouble, it will be possible to establish a friendly rivalry between districts and between section linemen by issuing a monthly statement showing the rating of the various districts in the division and the rating of the section linemen in a district or in the division.

A system of reports which will provide for all the above is described in Engineering Depart-

*Paper read at annual convention of Association of Railway Telegraph Superintendents, New York, June 6, 1912.

ment Instructions C-4-A. These instructions describe a method of counting, recording and reporting line troubles and the forms to be used in such work.

It will be seen that the instructions provide for putting the comparative results in the hands of the linemen and of the various responsible officials. The comparisons the lineman receives are between himself and other linemen. District superintendents receive comparisons between themselves and other district superintendents. The final summary, by divisions, is made up in the general office. Any extraordinary change in the results shown by these final summaries can be readily traced back in the manner customary with such systems to the individual linemen's sections.

A high degree of efficiency in clearing troubles on line wires requires close co-operation between the wire chiefs and the section linemen. The test rooms are rapidly being equipped with suitable apparatus for testing and locating troubles in line wires, and as the wire chiefs become familiar with the use and handling of this testing apparatus, locations of troubles on line wires should be made more rapidly and more accurately than at present. The quicker and more accurately a line trouble is located by the wire chief, the quicker it will be found and cleared by the section lineman. Accuracy on the part of the wire chiefs and co-operation between the wire chiefs and the section linemen is essential for the prompt and efficient clearance of troubles. It is believed that the system of reports covered by these instructions is such that the efficiency of wire chiefs and section linemen can be readily determined and improved work on the part of either of such class of employes easily seen.

The reports provided for will be of great value in determining the necessity for the renewal of iron wires. When troubles per mile of wire on iron wires equal the troubles per mile of wire on copper wires, it indicates that the iron wires are approaching a condition requiring replacement. Troubles per mile of wire on No. 9 B. & S. gauge copper wires should be the standard by which to judge iron wires and when the condition of iron wires becomes such that the number of troubles per mile of wire exceeds those on copper wires, the iron wires should be renewed.

As a result of the routine maintenance and trouble analysis systems described, very great improvement, over average conditions, in the reliability of the wires may confidently be expected. I will not attempt to say just what percentage improvement will be found, but I know that as a result of such methods one telephone company doing a large toll line business, while doubling its wire mileage in eight years, and working all the time under practically the same construction specifications, made a steady reduction in the total number of line troubles. At the end of the period the troubles per mile of wire were less than half what they were at the beginning.

The rivalry developed among the linemen has been a very real factor in bringing about these results. The men take a keen interest in the elimination of any hazard which may impair their record, and in making sure that whenever they do anything they do it so that it will stay.

ALTERATIONS IN CONSTRUCTION.

An influence that has in many cases decreased the speed or the reliability of the wires has been the tendency, when changes have had to be made in lines, to replace or piece out the specification construction with something not quite so good. The height of the wires may have been increased by splicing out an existing pole with something not nearly as strong as the pole itself —I have seen a crossarm used for this purpose. Every change of this kind leaves a weakness which may start a break or be the cause of a minor trouble.

The use of somewhat higher poles may have been avoided by the insertion of a length of rubber cable. While it is true that one piece, of average length, may not noticeably impair the working of the wires, yet the amount inserted in the aggregate has been sufficient to account for much of the difficulty that has been found in wet weather working.

The manner in which a necessary change should be made should be decided not from the standpoint of the ease and economy of the moment, but with a realization of what the effect on the whole service is going to be if the solution accepted in the case under consideration should be made the standard method of meeting similar subsequent cases.

While more or less temporary work is unavoidable, a good rule is to do work of a temporary nature only to meet a temporary condition. If the condition to be met involves a permanent change which it is practicable to make at once, that change ought to be made in a permanently satisfactory manner.

UNHEEDED CHANGES IN SURROUNDING CONDITIONS.

One of the most serious changes we are finding in surrounding conditions is the erection of high tension lines alongside the railroad right-of-way. A power company, wishing to transmit power at high potential from one point to another, quite naturally finds, in many cases, not only that the railroad has the shortest and most feasible route between the two points, but that the right to set its poles or towers can be more easily and cheaply obtained close to the railroad right-of-way than at some distance away. Hence, unless something is done about it, the close paralleling of railroad rights-of-way by high tension lines is one of the things naturally to be expected.

In so far as this practice results, as it usually does, in the presence of a high tension line and a telegraph line nearer together than the height of the taller pole, the telegraph company objects strongly to it, and the railroad company, in my opinion, ought also to object. The telegraph company's position in this matter is as follows:

Except in special cases where it is impracticable to secure a location at a safe distance away, it is a violation of good practice to locate a high tension transmission line in close proximity to a telegraph line, irrespective of the grade of construction which may be employed in the high tension line.

Where it becomes necessary to construct a high tension transmission line so that at certain points it comes into proximity with the commercial telegraph line, either through parallelism or through a crossing, good practice requires that extra precautions be taken in the construction of the high tension transmission line to minimize the liability of the high tension transmission wires coming into contact with the telegraph wires by reason of accidental conditions.

The special conditions which are generally accepted by the best engineers as necessary in order to safeguard the exposure so far as is reasonably practicable where the exposures are necessary, are contained in the high tension crossing specifications of the National Electric Light Association endorsed and accepted by your Association, by the American Institute of Electrical Engineers, American Electric Railway Association, American Railway Engineering and Maintenance-of-Way Association, etc. These specifications prescribe such margins of mechanical and electrical strength for the high tension structure as to reduce to a very low degree of probability the liability to a breakdown.

The reason why the telegraph company takes the position that a high tension transmission line of ordinary construction should never be built in close proximity to a telegraph line is that a needless hazard to life and property is thereby created.

The hazard is there because of the real liability to a great variety of accidents and failures to which any ordinary pole line is subject, and which may result in contact between a high-tension wire and a telegraph wire; and because of the serious and unpreventable nature of the results that may follow from such contact.

Some of the accidents to which the ordinary high-tension line is subject are as follows:

Breaking of a pole.

Uprooting of a pole.

Shattering of a pole by lightning.

Burning of pole, either from arcs or from external sources, such as fires due to sparks from locomotives.

Breaking or burning of crossarms.

Breaking or burning of insulator pin.

Failure of an insulator, either from mechanical forces, such as storms, shot, or the mechanical strain from the wire, or inherent defects, or by electrical strain, such as surges or lightning.

The burning of a transmission wire from a defective insulator, by lightning, or by contact with a piece of foreign wire, branches of trees, kites, etc.

The breaking of a line wire, due to a flaw or inherent defect in the material, nick, scar or defective joint, or by reason of the wire being overloaded from ice, sleet or snow, or by wind pressure in times of storms.

By the sagging of the transmission wire combined with swinging due to the force of the wind.

The breaking of line wires and the crossing of high tension and telegraph wires due to roofs of freight cars being blown off and falling on these wires.

Any of the above or similar accidents may result in imposing upon the telegraph wires the voltage and large power of the high-tension line. The impracticability of constructing the telegraph plant to withstand such voltages, in view of the multitude of wires and pieces of apparatus, the delicacy of the contacts, and the necessary fineness of the wires, is evident from the elaborate precautions taken in their own stations by the power companies themselves. There is no known protection system that affords any real safety against these voltages. Therefore, the presence, even momentarily, of these voltages in the telegraph plant, endangers, possibly over a wide area, the lives of employes and patrons, and is liable to disrupt the telegraph system and to cause fires at points near to and remote from the source of the trouble. The railroad company is very liable to suffer also.

As a high-tension line is merely a means of carrying power from a generating center to one or a few points usually at some distance, the precise route for it is from the power company's standpoint merely a matter of practicability, convenience and economy. If proper representations are made to the power companies, before their right-of-way is secured, of the telegraph company's position, they will often avoid building in locations unsatisfactory to us, and the controversy and litigation which result when the question is taken up after the power line is built in a location imperiling the telegraph property will be avoided. This is the important thing—to take action in the early stages of the power project.

A high-tension line paralleling a telegraph or telephone line, even far enough away to prevent danger of contact, is sometimes an undesirable neighbor because of the inductive disturbance it creates. Transpositions in the power wires, when parallelism is of any length, should be held by telegraph men to be a necessity. Many power lines are transposed anyway, but the practice is not universal, and it is well to make inquiry relative to proposed lines. The great importance of it is illustrated by a recent case, when the insertion of transpositions in a 30-mile parallelism of a 140,000 volt line reduced the induced potential, largely electrostatic, in the telegraph wires from 2,500 volts to 25.

RECONSTRUCTION WORK.

Principally because of decay of poles at the ground line, a time comes when even a pole line kept in the best of condition as regards minor defects must have something radical done to it.

While the strength of a new line is determined by its construction, a line is not new for long, and its strength as time goes on is determined by the amount to which the poles in it are permitted to decay before being strengthened or replaced. For the reason that some lines are more important than others, and that some are subject to more severe weather conditions than others, it seems best systematically to maintain lines at different strengths under different conditions.

A simple system for doing this has been devised, and the specifications will soon be issued. Under this system the lines will first be consistently graded with reference to their importance and to the storm conditions to which experience has shown that they are liable to be subjected. Subsequent inspection to determine what work should be done on any line will be done in accordance with the specified requirements of the grading indicated.

The plan of replacing poles by building a complete new line of poles and abandoning the old poles has its advantages, but it has the serious disadvantage either of wasting a lot of good material in the poles or of allowing the line to be in a very weak condition for some years. A better plan seems to be to do some work, after the line gets to a certain age, every three years or so.

With regard to the organization for doing reconstruction work, a plan which is in effect on many railroads under which the railroad company, although obligated by its contract to furnish the unskilled labor for such work,asks the telegraph company to obtain the labor and bill the railroad company for it, has worked very successfully. The telegraph company is thereby enabled to handle its whole gang as a more permanent unit, to organize it better and get more efficient work out of it. It is believed that in many cases this plan will be most economical for both the railroad company and the telegraph company.

The Use of the Portable Telephone in Railroad Service.

In a paper on the use of portable telephones in railroad service, read before the Association of Railway Telegraph Superintendents, at its recent convention in New York, Mr. J. F. Caskey, of the Lehigh Valley Railroad, in referring to the association's part in the development of railroad operation, said:

Automatic signals, whose first installation and earlier years were invariably under the charge of the superintendent of telegraph, and to whom was committed the difficult task of working out the bugs and inaugurating a reliable system of maintenance, has also largely outgrown the telegraph department and is now in charge of men specially trained in signal matters. Electric car lighting, now an established and satisfactory method of car illumination, was also the child of this association's earlier cares, discussed and debated pro and con, and gradually moulded into a thing of usefulness by the constant attention received from telegraph men.

These are some of the revolutions in which this association has had a large and influential hand and we take pride in the fact that these revolutions have been for the benefit of the companies which we serve and of the public at large, who are enjoying the results of many days of anxious thought, sleepless nights, and untiring zeal on the part of telegraph men.

The members of this association are now in the midst of another revolution which is fully, if not more, important than any of the others. I feel that it is safe to say that to the discussions in this association and the interchange of views of the members, is due primarily the inauguration of telephone train dispatching circuits, telephone message circuits, together with all the benefits and possibilities resulting therefrom. The discussions, suggestions, hopes and fears have been thrown into the cauldron of experiment and trial and out of it has come a revolution of vast importance to the railroads and public at large, so that the prediction is freely made that in the course of some years, as far as the railroads are concerned, the old Morse telegraph, which we all love, and which we will part with, with many a heartache, will be relegated to the scrap heap of discarded appliances and methods, in the same manner as the steam locomotive has superseded the canal boat, and as the electrical locomotive will eventually supersede the steam locomotive. This revolution will be gradual, fast in some localities and slower in others, but come it will, as it is the logical solution of many questions.

It requires but a very short memory to cover the change from telegraph to telephone in railroad train dispatching, and as yet we have only made a beginning.

Upon the successful inauguration of telephone train dispatching, carrying with it may advantages, which have been frequently mentioned and with which railroad managers are becoming daily more familiar, the installation of portable telephones on passenger, freight, work and tool trains was a perfect logical result.

The beneficial results of such an installation is patent to any one, as they realize the time wasted by heavy traffic and crews of stalled trains and the very often more important delays to other traffic awaiting arrival of stalled trains, of which no word has or can be received.

Mr. Caskey pointed out the value of having trains equipped with portable telephone appartus and cited several instances of the practical use of such equipment on his road.

Telephone Pioneers of America.

JAMES T. MORAN.

Mr. James T. Moran, vice-president and general manager of the Southern New England Telephone Company, New Haven, Conn., is one of the best known and most popular telephone men in the country. He is a leader of men and in progress and his nature and experience well fit him to conduct the duties of the high office which he occupies.

Mr. Moran is yet in the prime of life, having been born in North Haven, Conn., September 19, 1864, and in the same month, twenty years later

JAMES T. MORAN,
Vice-President and General Manager Southern New England Telephone Co., New Haven, Conn. (1884).

(1884), he entered the telephone service in the same city, and with the same company that he is still connected with. His first position was that of general utility man and attorney, and he afterwards became the company's general attorney.

In the natural order of progress he was elected a director and then vice-president, finally becoming general manager in addition to his duties as vice-president.

Mr. Moran is a man of great force of character, and of a genial nature, and has a host of friends in and out of the telephone business.

Audible Wireless Signals at Sea.

Signor G. Marconi in giving evidence on June 18, at the "Titanic" inquiry in London, intimated that a device was forthcoming that would ensure wireless signals being heard on vessels at sea. He stated that a member of the crew of a ship who was not an expert in wireless or other telegraphy might, if the international regulations allowed, "stand by" the instruments when the operator was off duty and give the alarm in the event of a danger signal being sent.

"But," added Mr. Marconi, "I have a certain feeling that in many cases that would not be altogether reliable. I have another suggestion to make, and that is to cause the wireless apparatus to ring a bell, thereby giving warning that a ship was in distress and needed assistance.

"In order to make this system effective, it would be necessary to alter the regulations of the international convention to enable the danger signal to be accompanied by a long dash or sequence of waves, which would last for a period of fifteen, twenty, or thirty seconds. This would cause the bell to give a prolonged ring, and they would be able to know that a ship required assistance.

"Some tests have been made with apparatus," said Mr. Marconi, "and I have considerable confidence that this plan can be employed."

New Books.

TOLL TELEPHONE PRACTICE. By J. Bernhard Thiess and Guy A. Joy, with an introductory chapter by Frank F. Fowle. New York: D. Van Nostrand Company. 418 pages; 273 illustrations.

The telephone art has become such a large one that one volume cannot now cover it completely and satisfactorily, and the authors of this volume recognizing this fact, have departed from the custom and confined themselves to the treatment of one branch of the subject—toll line practice—which, in itself, is sufficiently large to make a volume of goodly proportions.

The authors have handled their subject admirably, and it is surprising how large it proves to be when it is considered in detail. An idea of the scope of the work may be obtained from the table of contents, which includes chapters on rural telephone equipment, toll cut-in stations, toll switching systems, small toll and other types of switchboards, simplex and composite systems, phantom lines, line construction, electrical reactions in lines, methods of testing, maintenance, and the telephone repeater. In all there are twenty-two chapters.

The illustrations are clear and well drawn, and will be found a great help in the study of the work, and the sixteen tables give information of much practical value on as many different subjects. The price of this work is $3.50, and copies may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

New York Electrical Society.—At the annual meeting of the New York Electrical Society on June 12 the following officers were elected: President, H. L. Doherty; vice-presidents, A. L. Doremus, Frank W. White and Edward C. Titus; secretary, George H. Guy; treasurer, Herbert S. Spencer. Mr. Augustus Post delivered a lecture on his experiences in ballooning, and Mr. L. L. Ovington lectured on aeroplane wireless and the problem of the modern flying-machine.

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New York, July 16, 1912.

Mr. Vail's Gift of a Library.

The Massachusetts Institute of Technology at Boston is fortunate in coming into possession of one of the most complete electrical libraries in the world through the munificence of Mr. Theo. N. Vail. Libraries of this character are very few indeed, among the principal ones being those of the Institute of Electrical Engineers at London, and the American Institute of Electrical Engineers at New York, and now must be placed in the same category the acquisition of the Massachusetts Institute of Technology.

It is interesting to note in this connection that all three of these libraries are of English origin, the one owned by the American Institute of Electrical Engineers having been purchased from the estate of the late Latimer Clark, the well-known English electrician, by Dr. S. S. Wheeler of New York, and presented to the Institute.

It has often been stated, and it is a fact, that a telegraphic training broadens the mind of those engaged in it and it does not require any wide search to find abundant proof. The heads of the principal telegraph corporations in the past have as a rule been public-spirited, and have left behind them enduring memorials. Of the living benefactors Mr. Andrew Carnegie stands at the head of the list. His great fortune was built upon his telegraphic experience. Ezra Cornell accumulated his fortune in the telegraph service and expressed his philanthropic spirit by establishing a great university of learning, and Jeptha H. Wade, a former president of the Western Union Telegraph Company presented to the people of Cleveland, Ohio, a beautiful park, which is known by his name. Hiram Sibley and other pioneers of the telegraph did much for the welfare of the city of Rochester, N. Y., which was for several years the headquarters of the Western Union Telegraph Company, and the engineering school of Cornell University is named after Mr. Sibley in recognition of his benefactions toward that institution. Coming down to the youngest of the telegraph magnates, Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Company is entitled to a place in the first ranks for his public spirit and generosity in aiding in the furtherance of education and philanthropic movements, the Nevada State University particularly being the beneficiary of his liberality.

The gentlemen mentioned, however, are not by any means the only ones connected with the telegraph who have thus expressed the broadening influence of their telegraphic experiences. The few named are pioneers in the true sense of the word and each one realized that pioneer work meant hard work and that their fortunes came originally from the people to whom they felt that they owed a debt of gratitude.

Mr. Vail's magnificent gift has been placed where it will do the most good—in an institution of learning—to aid in the education of future engineers. The greatest service a man can render to mankind is to promote the education of his fellow men. Knowledge is what the world needs.

Reporting Convention Proceedings.

We wonder if it has ever occurred to the managers of the two great national political parties that the undue mental and physical strain placed upon those who report the proceedings of national conventions is detrimental in many ways?

When the two principal conventions are held so close together as were the recent Republican and Democratic gatherings, those engaged in the telegraph and press services are taxed to the limits of endurance during so long a period of strain, and when men are tired out, individually and collectively, they cannot do their best work. There should be a greater period of rest between the two meetings in order to give the telegraphers and reporters a chance to refresh themselves.

Another point worth considering is that the people should be afforded an opportunity to think over the work of the first convention before plunging them into another period of excitement. Naturally the second event must suffer somewhat in lack of public interest.

The political parties of course desire to give their convention proceedings all the publicity possible, but human endurance and best interests should be taken into account in the arrangement of their plans.

The telegraph, telephone and newspaper staffs at such meetings are among the most important parts of the complex organization and it should be the aim to maintain these forces at the highest standards of efficiency in order to obtain the best results. At the two previous presidential conventions a heavy tribute in the telegraph ranks was exacted, due to the strain, some well-known officials of the telegraph companies sacrificing their lives in their devotion to duty.

Underground Conduits.

In the course of time all progressive communities are confronted with the question of placing telegraph, telephone and other electric wires underground. The best solution of the problem was found in Baltimore, where the city built the electrical conduits and rents the space therein to the different electrical companies. This seems to be a fair way of dealing with the questions involved and all companies are placed on an equal footing as far as their rights to utilize the conduits are concerned.

The municipality of Chattanooga, Tenn., is constructing underground conduits, to be rented to the different electrical companies, and in Canada the problem has come up in Hamilton and Ottawa. In the two Canadian cities there does not seem to be any definite idea as to how the problem should be approached. The interests concerned should investigate the Baltimore plan before committing themselves.

Telephone Service at Chicago Convention.

The telephone service during the recent Republican national convention in Chicago was divided into four distinct varieties:

First—Private leased-wire facilities for press associations, newspapers, and committees and individuals representing candidates.

Second—A bulletin service from the convention itself for the benefit of those all over the country who have come to depend on the telephone for such information.

Third—General long-distance facilities and private terminals to be used in connection with long-distance service.

Fourth—Local Chicago telephone service both in and out of the convention and in and out of the various headquarters.

The first two classes of service were principally the task of the American Telephone and Telegraph Company. William E. Bell, division commercial superintendent, was in general charge of the convention service. With him were C. H. Fuller, of New York, in the leased-wire division of the general commercial superintendent's staff, and R. E. Russell, plant engineer of the American Telephone and Telegraph Company in Chicago. For a week before the convention leased telephone wires were maintained from the Congress Hotel to the White House in Washington and to Sagamore Hill, the home of Theodore Roosevelt at Oyster Bay, N. Y. These wires were manned by operators in the service of their chiefs exclusively, and the telephone company's sole concern was to see that they were kept working perfectly at all times, day and night. This was done without a hitch. When the convention opened another circuit to Washington was run in to the Coliseum, and was set aside for those whose business it was to communicate directly with President Taft. The leased wires of the press association terminated in their headquarters in the hotels and their offices in the Coliseum basement.

The telephone company was assigned two places at the press tables in the convention hall for the purpose of getting first-hand information for the bulletin service.

Mr. W. E. Bell dictated the bulletins to Mr. David D. Roberts, who was equipped with Morse key and noiseless sounder. The bulletins were transmitted to the Morrell Park switching station of the American Telephone and Telegraph Company, where a staff of six Morse operators and an editor was located. The bulletins were rapidly manifolded and put on six wires, two of which went east, two south, one southwest and one northwest. Within a few seconds from the time a bulletin was dictated by Mr. Bell it was ready to be read by telephone to waiting thousands in distant cities and towns.

New York Telephone Company Ordered to Discontinue Use of Word "Telegram."

The New York Telephone Company has been ordered by the New York Public Service Commission to discontinue the use of the word "telegram" as a call word for the Western Union, or any other telegraph company in New York State. The telephone company is directed to assign to the Postal Telegraph-Cable Company and the Western Union call numbers as is usual with other subscribers to its service. In addition the word "Postal" is to be assigned as a call word for the Postal Company, and the words "Western Union" for the Western Union Company.

The call word for each company is to be printed in the subscribers' directories of the telephone company hereafter issued in such manner as to show clearly that a person desiring to send a telegram over the lines of either telegraph company may call that company by the call word.

The order resulted from a complaint made by the Postal Company, alleging that the use of the word "telegram" as a call word for the Western Union was unjust, unreasonable, and discriminatory. The commission upheld the contention.

Money Transfer Forgers Sentenced.—Reeves Wood, Thomas Wynn, Owen T. Brennan (alias Joseph E. Duskin) and Edward J. Reed, on trial in Washington, D. C., for frauds in connection with money transfers, were found guilty of forgery and sentenced, Wood to three years, Wynn to eighteen months, Reed to one year and one day's imprisonment. Brennan failed to appear and his bond was forfeited and a warrant issued for his arrest. Reed was placed on probation as he had been in jail practically the length of the time of his sentence.

Course of Instruction in the Elements of Technical Telegraphy—XIX.

(*Copyrighted.*)

(*Continued from page* 431, *July* 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order. The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples will be given in order to illustrate the application of the rules to practical cases, and each chapter will be followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

The earth is in itself a huge magnet whose magnetic poles almost coincide with the geographical poles, and whose lines of force consequently run north and south.

A magnetic needle, fitted at the middle with a little brass cap by means of which it can rest upon a sharp point and turn freely, will, when not influenced by surrounding iron or magnets, assume the direction of the earth's lines of force and point N. and S. Such a needle is called a compass. If the needle be placed in the vicinity of a magnet, it will assume the direction of the lines of force emanating from the magnet, as in Fig. 12.

If the north pole of a magnet be brought near the north pole of another magnet, one pole repels the other; but if a north and south pole are brought together, there is attraction. In general like poles repel; unlike poles attract.

Magnetism may be communicated to a piece of iron without actual contact. If a bar of soft iron be placed near some iron filings and a magnet be brought near the iron bar, a certain amount of magnetism will be induced in the latter by the presence of the magnet, causing it to attract the filings. This is called magnetic induction.

An iron bar thus magnetized has for the time being all the properties of the inducing magnet, but on the withdrawal of the latter resumes its non-magnetic condition. It will be found that when magnetism is induced in a piece of soft iron the end of the soft iron bar next to the pole of the inducing magnet will be of opposite polarity to that of the inducing magnet pole.

The magnetic field is the space around the magnet pervaded by the lines of force. The field is most intense near the magnet pole and weaker at greater distances from it.

QUESTION PAPER.

(1) If a bar magnet be dipped into iron filings will the filings adhere to all parts of the magnet?

(2) Sketch a magnetic circuit showing some of the lines of force.

(3) Where are the lines of force thickest?

(4) A compass placed in the magnetic field of a strong magnet assumes a certain position. Is this any indication of the direction of the lines of force at that point?

(5) Fifty gravity cells are joined up in two parallel sets of 25 cells each.

(*a*) What is the internal resistance of the battery?

(*b*) What is the current generated in each set?

(*c*) What is the total generated current?

(*d*) A copper and zinc partly immersed in acidulated water develop a certain difference of potential. When the unsubmerged ends are connected what happens?

(6) A circuit has a line 300 miles long. The resistance of the line wire is fifty ohms to a mile and

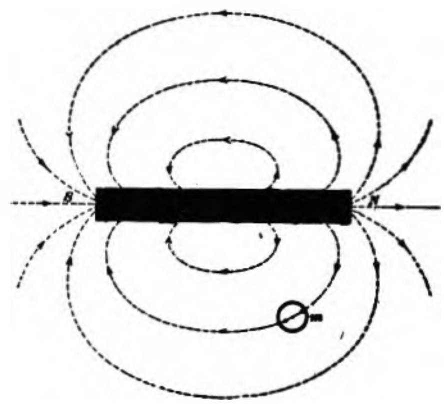

FIG. 12.—DIRECTIVE EFFECT OF LINES OF FORCE ON COMPASS NEEDLE.

the resistance of the relays and leads at each end, 160 ohms. Allowing one gravity cell for every forty ohms, how large a battery would be required for the circuit?

(7) A circuit of 800 ohms resistance has a battery of twenty cells. If another set of twenty cells be connected in parallel with the battery, what will be the difference in current?

(8) Which arrangement of battery is used for telegraph circuits and why?

(9) A circuit has an external resistance of four ohms. Using six gravity cells, what arrangement would give the greatest current strength in the circuit?

(10) A battery joined up as in Fig. 8, has six ohms resistance in each set or branch. The current in each branch is .5 ampere. Prove by the laws governing derived circuits that the potential between the points marked + and — in the figure is three volts. [Fig. 8 was used in this department June 16].

(11) What becomes of a line of force after it leaves the north pole of a magnet?

(12) Why does a compass needle point north and south?

(13) The north pole of a compass points to the north. What magnetic law does this apparently contradict?

(*To be continued.*)

Some Notes on the Polarized Relay and the Polarized Sounder in Telegraphy.*

BY WILLIAM MAVER, JR., NEW YORK.

In introducing his subject, Mr. Maver stated that he had recently learned that a modification of the Hughes polarized relay, which was used largely as a sounder in wire telegraphy in Great Britain and elsewhere, and that this fact was not generally known in this country.

I understand that 4,000 of these polarized sounders are now in use in British Postal Telegraph service, largely as a main line sounder, and also as a polar duplex receiver, displacing the ordinary duplex polarized relay there.

The polarized sounder may be wound to the resistance of the ordinary main line relay or to that of the neutral relay of the quadruplex, two coils of say 210 ohms each, which may be placed in series, giving 420 ohms, or in multiple giving 105 ohms. In appearance the polarized sounder closely resembles the ordinary giant sounder. It employs in its operation the principle of the well-known Hughes relay, which differs somewhat from the ordinary polarized relay of the polar duplex. In the latter the cores of the electro-magnet and its armature are connected to one end of a permanent magnet, while the armature is pivoted at the other end of the same permanent magnet, the free end of the armature playing between the poles of the magnet.

The chief advantage of the Hughes relay is its sensitiveness to weak currents and its quick action. In wet weather, when the received current is reduced by escapes on the line, the pull on the armature may be increased somewhat by increasing the induced lines of force, although the gain to be obtained by this means is limited by the added pull necessary to be given to the retractile spring to withdraw the armature of the relay when a distant key is open.

It is apparent that a main line sounder that could be placed directly in a telegraph line with a number of other sounders, each giving forth a sound equal to the ordinary local sounder, might be of considerable utility, as the local battery and the ordinary main line relay would thereby be dispensed with. It is claimed for the polarized sounder to which I have briefly referred that it may be advantageously employed under the conditions and with the results just stated. I have on the desk before me a polarized sounder based on the principles just outlined and I believe of practically the same pattern as that used in the British Postal telegraph service. It is known as the Vyles sounder. My friend, Lieutenant G. R. Guild, of the United States Signal Corps is also employing this polarized sounder in single impulse signaling and finds it very sensitive and reliable. One of the claims made for this sounder is that it is less responsive to inductive influences than the ordinary Morse relay. Another is that in duplex telegraphy it will stand a much greater variation in the main line resistance without affecting its operation than will the ordinary polar duplex relay. My own observations at Lieutenant Guild's laboratory appear to bear out this claim. When used as a main line sounder I should rather expect and in fact my limited practical experience with this instrument indicates that it would require more frequent adjustment on leaky lines to meet variations in the character of the arriving signals than the ordinary Morse relay, but improvements in the methods of adjusting the armature spring might be devised to simplify variations on the adjustment that may be required and assuming that the sensitiveness and other claimed advantages of the polarized sounder would warrant its more or less general employment.

It appears that in actual practice the polarized sounder has been found less sensitive than the ordinary polarized relay in duplex telegraphy. This result is probably due to the greater inertia of the moving parts of the polarized sounder. The instrument also lends itself readily to an adjustment which will render it quiescent in the presence of comparatively feeble extraneous disturbances, while remaining responsive to the regular signaling currents.

In Great Britain the open circuit method of operation for way wires has been largely employed. This method requires the use of a main battery at each station, a double contact Morse key being employed; the connections being so arranged that when the key is open the receiving instrument is in the main line circuit, and when the key is closed the main battery is in the circuit. (A full description of the open circuit method is given in the author's American Telegraphy, p. 55). Ordinarily, however, the number of offices on a way wire in the British post office telegraph service does not exceed six or eight. By means of the polarized sounder the main batteries in the way office have been dispensed with, at a saving it is said of about $25,000 per annum, and without any diminution in the efficiency of the service, but rather the reverse. In this use of the polarized relay, briefly described, one grounded main battery of eighty volts is placed in the way wire circuit at a terminal station, the distant end of the wire being left open. An inductance resistance of say 1000 ohms is inserted in the line wire just outside of the main battery. At each way station a tap from the way wire is led to the lever of a Morse key and between this lever and the ground a polarized relay and a two microfarad condenser are inserted in series. The lower front contact of the key is connected directly to ground. By this arrangement the condenser at each way station receives a charge due to the terminal battery. When then any one of the keys is closed a sh rt circuit is provided for the discharge of the condenser, which discharge operates all the polarized sounders.

*Abstract of paper read at the convention of the Association of Railway Telegraph Superintendents, New York, June 4.

When the key is again opened the condensers receive a charge in the opposite direction, the current accompanying which operates the sounders reversely. On way circuits of fifty or sixty miles in length comparatively little adjustment of apparatus is required. Imperfect insulation of the line will of course affect the amount of charge received by the respective condensers.

Military Telegraph Lines Using the Polarized Sounder as Receiving Instrument.*

BY GEORGE R. GUILD.

It is well known that, in time of war, the army has considerable difficulty in keeping up its overland telegraph lines, and especially so if these lines are operated on the ordinary Morse system and with wet cells. In actual warfare, in the field, all impedimenta must be reduced to a minimum, and consist of as little perishable material as possible. If, for example, it is desired to operate a closed circuit line of say 300 miles in length about 150 gravity cells would be required, and if the line were to be operated on open circuit it would require about 100 dry cells per station. On the other hand induction telegraphy, so called, allows such a line to be successfully operated with from four to six dry cells per station. This fact and other features of simplicity which it possesses explains the existence of army field induction telegraphy.

Ordinarily the United States Army induction telegraph kit consists of a polarized relay, a four-ohm sounder, key, induction coil, and four dry cells. These instruments are installed in a portable box weighing about 12 pounds. The induction coil is small and the ratio of the winding ot its coils is as one is to one hundred, the primary coil consuming about 12 watts at four volts. New sets are being experimented with by the United States Signal Corps with a view of simplifying the present set by replacing the polarized relay and the four-ohm sounder by a polarized sounder, and as the results obtained so far have been very successful it is believed that a new type of kit will soon be adopted somewhat along the lines described in this paper. The writer has conducted a series of tests with induction telegraph circuits with the object in view of obtaining suitable kits and circuits in order that induction telegraphy may be used more extensively in the field than heretofore to displace some, or many, of the closed circuit lines which must now be used.

The paper describes some of the important phases of single impulse induced current circuits, and the instruments found to be best adapted to these circuits.

Of course it is known that current in the secondary circuit exists only while there is an increase or decrease of intensity of current in the primary coil, and further, that the direction in which the current flows in the secondary at the closing of the primary circuit is opposite to that at the opening or breaking of the primary circuit. Consequently, in order to operate a telegraph relay or sounder by a momentary induced or secondary current of reversed polarity it is necessary that the armature of the instrument respond to direction of current flow, and the armature having thus responded it must remain at rest until a current in the opposite direction passes through the instrument and causes the armature to reverse its position. In other words, the relay or sounder must be a polarized instrument.

To overcome resistance of any considerable amount and yet have sufficient current on a line to operate relays, a comparatively high electromotive force is necessary. One way to obtain this electromotive force is to use sufficient cells in series with the line. Another way is to use an induction coil and a few cells with more frequent renewals, drawing a heavy current from these cells at low voltage and increasing the voltage and decreasing the current in the secondary circuit, thus obtaining enough voltage to overcome the considerable resistance of the line and sufficient current to operate polarized relays. For example, the army field kit previously referred to will operate well through a non-inductive resistance of 50,000 ohms with three dry cells, and can even be made to operate, under favorable conditions, through 100,000 ohms.

A type of telegraph sounder employing the well-known principles of the Hughes relay lends itself so readily to induction telegraph circuits that the writer has used it exclusively in his experiments, either as a sounder, main-line or local, or as a relay.

There appears to be nothing that the ordinary sounder will accomplish that cannot be equally well accomplished with the polarized sounder, while on the other hand the position of the lever of the latter will be reversed by reversals of current flow, which is not the case with the ordinary sounder. This feature makes the polarized sounder desirable for the following reasons.

Due to the fact that the sounder is polarized and may be differentially wound, the instrument can be readily duplexed, responding to a current flowing into it from the line, but not responding to a current flowing through it from its own station, provided the non-inductive balancing resistance equals the resistance of the line and that the capacity of the line is also balanced in accordance with the usual arrangement of duplex circuits.

It will respond to a current flowing for an instant in one direction, and its armature will remain attracted (or repelled) until acted upon by an instantaneous current in the opposite direction. Such a current would be produced by the secondary coil of an induction coil when the primary circuit is made or broken. It will operate in the same manner on certain lines in series with a condenser.

It can be placed directly in the line circuit without a relay or a local battery, and will give

*Abstract of paper presented at the annual convention of the American Institute of Electrical Engineers, Boston, Mass., June 27.

firm, readable signals similar to those obtained in a local circuit, with line currents of the ordinary strength used for operating ordinary relays. It gives excellent results on underground lines. As it can be adjusted to operate perfectly through a condenser it is a valuable instrument on lines subject to disturbances by earth currents.

Tests of this sounder seem to show that it is superior in action to an ordinary main-line sounder; that it can be used as a local sounder with good results; that it can be operated equally well on closed or open circuit lines, condenser lines, and induction lines; that used as a polarized relay it is very sensitive.

The writer has devised two induction telegraph sets designed to displace the induction telegraph set now used by the Signal Corps. One of these sets is intended for simplex working only, and is composed of the least number of instruments possible for efficient working. The other set is more complicated and is intended as a general repeater and also as an induction telegraph duplex set, both of which sets are described.

The simple set consists of one polarized sounder, one key, one induction coil and three dry cells, all suitably and compactly boxed. This set will operate on simplex only, and has a range of about 300 miles on a line strung on poles, and will operate a few miles over a line of bare wire laid on the ground.

The induction repeater set is so constructed that it may always be ready for use on the following circuits, by merely throwing certain switches:

As the terminal station of a simplex induction line.

As the terminal station of a duplex induction line.

As the repeater station of a simplex induction line repeating into a simplex closed circuit line, one set used at the repeater station.

As the repeater station of a simplex induction line repeating into an open circuit line, one set used at the repeater station.

As the repeater station of a simplex induction line repeating into another simplex induction line, two sets being used at the repeater station.

By using the instruments of the set and slightly altering the wiring these sets may be used as follows:

As the terminal or intermediate station of a closed circuit line, simplex.

As the repeater station of a simplex closed circuit line repeating into another simplex closed circuit line, two sets used as a repeater.

As the repeater station of a simplex closed circuit line repeating into a simplex open circuit line, two sets used as repeater.

As the repeater station of a simplex open circuit line repeating into another simplex open circuit line, two sets used as repeater.

Mr. Guild's paper contains several illustrations showing the various kinds of circuits on which the polarized sounder may be employed.

To Measure an Open Wire.

BY J. S. CREEGAN, MANAGER POSTAL TELEGRAPH-CABLE COMPANY, WILLIAMS, ARIZ.

The following method of locating an open wire by means of an alternating current I have found to be very satisfactory. If it will only enable us to measure approximately, so we will know which lineman to send out, that will be a big help, especially in this western country where offices are from 30 to 160 miles apart and linemen's divisions sometimes end between them.

Bring the alternating current from the phantoplex machine to the board on a double cord. There should be no resistance coil in circuit. Remove the direct current from the wire to be tested and ground the wire at the board. Insert the alternating current wedge and an alternating current milammeter in the wire. Open the wire at the nearest office to the break and note the reading of the milammeter; then close the wire and note the reading to the break. Suppose the reading to the office is 35 milliamperes and the distance 100 miles, and to the break 55 milliamperes, then 35:55::100: to the break—in this instance 157 miles. If a further comparison is desired open a similar size wire at the office beyond the break and take a reading. Now we have three readings to compare and from them it is an easy matter to compute the distance, approximately at least.

It happens occasionally that a wire opens in a fuse or a jack at a way office, and through a misleading test, will show open beyond or this side of the office. By taking a reading to that office on the open wire and comparing it with a similar wire opened there, if the readings are both the same, the wire is undoubtedly open there. I have used this method for the purpose mentioned and find it is reliable.

I am using a 60-cycle machine at 75 volts for this purpose because it is more convenient, although I believe 150 cycles will do just as well.

As this is a method of comparison, it does not matter what voltage is used so long as it does not change during the measurement, and gives a reading within the range of the instrument. Owing to the distributed capacity and resistance on a long wire the readings to the nearest and farthest offices will not be proportional to the distance, or at least only roughly so, but from one station to another it is so near that it may be considered proportional for this purpose, without greatly affecting the measurement.

The wire must, of course, be free of relays and of escape at the break, and the insulation should not be low, to obtain the best results.

This method may not work well at offices where the wires are in cables, say, a mile or more in length, although it may be made applicable by measuring the capacity of the cable and making allowance therefor.

Henry as the Inventor of the Telegraph.

Mr. J. C. Barclay, formerly assistant general manager and electrical engineer of the Western Union Telegraph Company, New York, was the author of a paper entitled, "Henry As the Inventor of the Telegraph," which was presented at the meeting of the American Institute of Electrical Engineers in New York, May 21.

He gave a brief sketch of the rise of the telegraph from 1753, when Marshall and Morrison introduced static electricity circuits, and paid "tribute to the man entitled to the credit for the invention of the telegraph"—Joseph Henry.

Mr. Barclay said, in part: "During the year 1831 he (Henry) arranged around one of the upper rooms of the Albany, N. Y., Academy, a wire of more than a mile in length through which he was enabled to make signals by means of a galvanic battery so as to excite a magnet at the distant end of the line and thus move a steel bar which struck a bell, and demonstrated the possibility of ringing a bell at a distance of many miles by the use of the electromagnet which he had discovered previous to that time. 'This memorable experimental telegraphic arrangement included the following significant and important novelties.' It was the first electromagnetic telegraph arrangement employing an 'intensity' magnet capable of being excited at a very great distance, and there can be no doubt that a similar combination of 'intensity' battery, with a very long coil galvanometer had previously been found inoperative and was alone wanting, to have rendered the early telegraph of other experimenters a commercial success.

"This experimental arrangement was the first electromagnetic telegraph employing the armature as a signaling device, or employing the attractive power of the intermittent magnet as distinguished from the directive action of the galvanic circuit—strictly speaking, the first 'magnetic telegraph.'

"It was the first acoustic electromagnetic telegraph.

"It was the first successful telegraph which could be extended indefinitely without failure; it was the first telegraph constructed in accordance with principles which time has proved to be unfailing; it was constructed upon principles which rendered it indifferent to length.

"In 1832 Henry went to Princeton. There he illustrated the principles of telegraphy by stretching wires from his dwelling house to the College Philosophical hall and communicated in the presence of his class with Mrs. Henry on the other side of the college grounds. In these experiments a metal triangle or hoop was sometimes used in place of the bell.

"Henry's claim is the claim of a discoverer and not of an inventor and his principles in electromagnetism were applied by Dr. Gale in 1836-37 to render Professor Morse's apparatus effective at a distance. Henry's principles have also been applied in every successful commercial form of telegraphy and telephony invented or introduced since 1831-32.

"Never let it be forgotten that he was the absolute creator of the 'intensity' magnet; that magnet which alone is able to act at a great distance from its exciting battery—that magnet which by the very reason of its lower quantity, is alone applicable to the uses of telegraphy; nor should it be forgotten that he who created the magnet discovered the law, equally indispensable to the telegraph, of the projectile force and proportional resistance which bound magnet and battery together."

Telegraph Line Maintenance.*

BY W. S. MELTON, SUPERINTENDENT OF TELEGRAPH, QUEEN & CRESCENT ROUTE, DANVILLE, KY.

With every perceptible drop in temperature the telephone and automatic block signal circuits, located on telegraph pole lines, are menaced by iron telegraph wires breaking due to contraction. If these wires fall across the telephone wires they "short" the circuit. When they fall upon automatic block wires, it is possible to cause a signal to indicate a clear block when the block is actually occupied by a train, or other obstruction; or the interference may indicate directly the opposite and necessitate a train flagging a block section when there is no obstruction on the track.

Not only are telephone and signal systems affected by breaks of this character, but it is possible for a single break in a telegraph line to complicate both the telephone and signal systems, and at the same time render unserviceable a large number of telegraph circuits.

The signal department of a railway operating in the South, which uses a considerable number of iron wires, has found a partial remedy for the trouble of this kind by requiring linemen to test the tensile strength of the wires of each span early in the fall of the year, and it is believed that similar practice by telegraph linemen would prove beneficial. For this purpose a hook made of No. 6 galvanized iron wire is provided, secured to the end of a light pole of sufficient length to enable a man to stand on the ground and reach the wires, and the test is made by putting a steady pulling strain of approximately fifty pounds upon each wire to be tested. The strain, however, should not be so severe as to damage or disarrange the tie wires. In the majority of cases a wire that will hold up under this test will withstand the effects of expansion and contraction during the entire winter season.

*Abstract of paper read at convention of Railway Telegraph Superintendents, New York, June 7.

The Indians Were Too Loyal.

BY JEFF. W. HAYES.

There are but few oases in the great Arizona desert, and that part of our glorious country offers few allurements to the American youth, hence it was a surprise to the friends of young Clarence Vincent when he took his departure from the fleshpots of San Francisco to take up his line of march to Maricopa Wells, where he accepted the position as manager for the telegraph company at that point.

Besides the white inhabitants of Maricopa, which numbered twelve men and one woman, there were a goodly number of Indians who, following a migratory inclination, made the Wells a starting, as well as a finishing point, in their junketings on box cars and flat cars throughout the territory of Arizona.

These native sons and daughters were ardent admirers of the telegraph and sometimes of the operator of the telegraph, and male and female would cluster around the tiny office, watching young Clarence as he sat at work at his key.

Many of these aborigines were interesting characters, and as the weeks glided by, Vincent acquired enough of the Indian tongue to make himself intelligible to the pretty maidens of the cactus territory. These shy maidens were not unlike their white sisters, and a little flattery was gratifying to their vanity, and when Vincent in his Indian monosyllabic dialect told Miss Mahala that her new pink blanket was very becoming, and when he assured Mahala's cousin, Cahecha, that the blue ribbons in her hair made her look like a queen, he entirely won their hearts.

During the two years and more that Clarence Vincent tarried at Maricopa Wells, he made the acquaintance of pretty nearly the entire Indian tribe in that section and when he left to accept the managership of the Phoenix office he was given a genuine Indian farewell.

A year or so later Clarence Vincent had become one of the leading citizens in Arizona's metropolis; he had renounced the frontier garb worn by the denizens of the Wells, and donned in its stead a faultless tailor-made suit, and he was quite a Beau Brummel in Phoenix society, where he was thought the "proper caper" by the young ladies.

The Indians of Maricopa Wells still took advantage of the indulgence of the railroad company and pursued their migratory practices. One day Clarence Vincent started for lunch and noticed at a nearby fruit and confectionery store a crowd of some twenty-five Indians, mostly squaws with papooses swung over their backs and some young Indian maidens. He passed them by without giving them any attention, but not so the Indians; they had recognized in him the telegraph operator of Maricopa Wells, and with many guttural "Ugh, Ugh, Ugh's" they followed him down the street single file to his favorite restaurant, where they stood on guard on the outside, varying their watch by pressing their noses to the window panes in true Indian style.

Young Vincent was greatly chagrined with so much attention and consideration from his former playmates of the oasis, but he was reluctant to introduce these simple children to the select society in which he moved, and he compromised the matter by buying them one and all, a box of bon bons at the nearest confectionery store.

This incident occurred many years ago, but Mr. Vincent, now the dignified and courteous manager of the Western Union Telegraph Company, of Oakland, Cal., loves to linger over the memory of the happy days he spent in Arizona.

New Book.

Modern Illumination Theory and Practice. By H. C. Horstmann and V. H. Tousley. Chicago: Frederick J. Drake & Company. 273 pages, 41 illustrations and several tables. Price $2.00.

The art of illumination is one of growing importance and the time has come when the user of artificial light should know something about its principles and its most advantageous use, and not depend altogether upon the so-called illuminating engineer for advice and direction.

This book is intended to meet such a need and should fulfil its mission very satisfactorily. The matter has been so treated that it may be serviceable not only to electricians, but to architects, superintendents or managers of commercial or industrial establishments as well. The book is practically devoid of mathematics and tells its story in English so plainly that no one can fail to understand.

It is conceivable that this work may be the first step in the career of many future illuminating engineers, as it certainly does open up a field that many will find attractive enough to engage in.

The book contains many useful tables on lighting, and even to the average householder it should be helpful because it teaches him how to get the greatest amount of good from artificial light.

Copies of this book are for sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Salting Telegraph Poles.—In Russia the life of telegraph poles is greatly increased by soaking the poles in brine for three or four months, in which time the wood absorbs 70 to 100 per cent. of its weight of salt solution.

Mr. Geo. E. Young, an old-time telegrapher, of Brownsville, Pa., in renewing his subscription, writes: "My! How you have grown since first we met, over twenty-five years ago, and changed your name, too. Seems coupling up agrees with you, judging from your healthy appearance, etc. The name sounds well in print also. You are certainly filling your place well. Enclosed find year's renewal. We sure do need you in our business. May your influence never wane, and your subscription list increase."

The Use of the Main Line Relay in Telephone Selector Operation.*

BY W. W. RYDER, GENERAL SUPERINTENDENT OF TELEGRAPH NEW YORK CENTRAL LINES, CHICAGO, ILL.

In the early development of the selector in telephone train dispatching work, a main line relay was used to receive the signals, the selector mechanism being operated off the local points of the relay. Later several types of selectors were brought out in which the signaling current directly actuated the step-up mechanism. While this arrangement reduced the number of parts in the selector and its cost as well, it also reduced its effectiveness. The moving parts of the directly operated selector has a greater inertia than the light armature of the relay, and a much greater current was required to satisfactorily operate it; then, too, the margin of operation was considerably lessened varying with the different types.

Attention was first drawn to this matter about a year ago when installing a dispatching circuit on the Michigan Central "cutoff" between Jackson and Niles. The dispatching circuit over the old road between these two points was equipped with selectors of the relay type with local step-up operation, while the "cutoff" circuit was equipped with those of the directly operated type. Both circuits terminating in the same dispatcher's office, afforded a good opportunity to compare details of operation, and it soon developed that the new selectors were not nearly as satisfactory as the older type, this being particularly noticeable when there was a considerable change in the volume of signaling current by reason of offices cutting out at night and in again in the morning, the operating range of the selectors not being wide enough to work successfully on the varying current. This trouble was so serious it became necessary to issue instructions that offices must not cut out when closing for the night. As this trouble had not been experienced with the older selectors, it was evident the cure lay in the introduction of a sensitive relay in the circuit, particularly as the similarity between the selector circuit and the ordinary Morse telegraph circuit was so clearly apparent. Accordingly arrangements were made with the manufacturers of two different types of selectors to furnish some of their apparatus equipped with relays, and while some experimenting has since been done in varying the relay resistances, the results in every instance have been greatly improved; in fact, the change has been so marked it has been decided on all New York Central lines west of Buffalo to replace all those not so equipped with main line relay selectors. This involves some additional expense both in the increased cost of the equipment and labor expense of making the change, but this expense is clearly justified—first by reason of the greatly improved service, and, second, because of greater economy of operation.

Contrast for a moment the amount of current required by the two types of selectors: In the installation of the direct operating selectors, at least six milliamperes of current must be furnished per selector and effectively distributed. The usual specifications call for ten milliamperes to provide sufficient margin for battery deterioration, the maximum current range being between six and fifteen milliamperes. The local battery selector being operated through the medium of a very sensitive high wound (4,700 to 7,000 ohms) main line relay, with very light armature, requires only a light retractile spring tension, and is consequently very quick acting on a minimum current. These relays only require four milliamperes, and will operate without readjustment on from one-half milliampere to eighteen milliamperes, thus insuring satisfactory operation under practically all conditions. Line changes due to varying weather conditions also have a much smaller influence on this type, which is an extremely important feature.

This lessened current requirement means cutting the voltage of the signal battery in half at least, with all the naturally attendant benefits of lessened leakage, etc., while the widened margin of operations means less failures, thus avoiding many trips of the inspectors for the purpose of adjusting selectors reported as failing to operate. It also means longer circuits, and more stations can be successfully operated than is otherwise possible.

It is true with the relay selector the local battery is required to do double duty, that is, to operate the selector mechanism as well as to furnish current for operating the vibrating bell. This increases battery consumption in the local circuit to some extent, figures showing the average life now to be five instead of seven months. However, this increase in local nowhere near offsets the saving through reduction in main signaling battery.

Reducing the signal battery has made it possible to do away with extra equipment, such as retardation coils and expensive high voltage condensers at the dispatcher's terminal. It also lessens the original installation cost, has practically eliminated trouble of breaking down condensers, and has minimized possible injury to dispatchers.

The following actual figures illustrate the comparative merits of the two types of selectors mentioned. A dispatcher's circuit 183 miles long has twenty-six stations equipped with direct operated type of selector. This circuit requires 398 volts, and a current of 310 milliamperes. A paralleling circuit between the same points used for message service has forty-three stations equipped with relay selectors. This circuit requires 150 volts and a current of 172 milliamperes. Thus the latter circuit with seventeen more stations than are on the dispatcher's line, is actually worked with 248 volts and 138 milliamperes less than is required to operate the dispatcher's line. Not only this, but the general service has been infinitely better, and this through a period of about one year.

Another pair of circuits are 143 miles long. The dispatcher's line has thirty offices equipped with old selectors, and requires 350 volts and 320 milliamperes of current. The message circuit with thirty-two offices equipped with relay selectors is

*Paper read at Annual Convention Association of Railway Telegraph Superintendents, New York, June 5, 1912.

worked with 135 volts and 135 milliamperes, a reduction of 215 volts and 185 milliamperes.

Mr. W. E. Harkness, of New York, in discussing Mr. Ryder's paper, stated that the selector connected directly to the line will, on account of its more numerous and heavier parts, require a larger line current than certain types of relays, but there are, however, other factors which must be considered in determining which of the two is the more efficient and effective device.

It is evident, from the statements made in Mr. Ryder's paper, he said, that the type of selector connected directly to the line on the circuit in question was not satisfactory from a service standpoint and that the introduction of line relays improved the service.

To arrive at the source of trouble we must go beyond the question of the use or non-use of a relay, to the root of the whole matter, namely, the principles upon which the operation of the selector is based. These include the mechanical and electrical design of the selector itself and the electrical circuit combinations with which it is used.

The mechanical design of one selector may be such as to reduce the weight of the moving parts to one-half that of the corresponding parts in another type of selector, but this apparent gain may be entirely eliminated by the increased speed at which the selector is operated and the number of current impulses required.

Exactly the same thing may occur in the electrical design of the selector, i. e., the selector may be designed to produce certain results under certain conditions of current flow, both as to time and quantity, but when either of these factors is altered, the device will fail to function properly.

Or, the selector may be designed to be operated under certain line conditions and be employed on line circuits to which have been added other service conditions, the result obtained being poor service for one or both. As an example of this, the application of simplex telegraph or phantom telephone circuits to lines upon which certain types of selective equipment are used may be cited.

The only valid reasons which can be advanced today for the use of a line relay for the operation of selectors are:

(1) The reduction in the current sent over the line, which, in turn, causes a reduction in the battery voltage, or (2) to increase the operating margins of selective systems now in service which will not render reliable and uniform service under the varied conditions to which such systems are subjected in railway operation.

The reduction in line current and voltage is desirable from reasons of economy provided the method employed does not affect adversely the reliability of the system nor transfer the expense of current supply from one part of the system to another where it is more expensive to maintain.

In considering the efficiency of a selective system from the electrical standpoint, the fact must not be lost sight of that the energy required to operate similar electro-mechanical devices remains constant. Thus the removal of a selector from the line circuit and placing it in the local circuit of a relay does not decrease the energy required, but simply transfers the current consumption from the main line battery at a central point to the local batteries at the individual stations. These, being of lower voltage, necessitate a larger amperage through the selector, to produce similar operation, and, in addition, energy from the line battery is expended in the operation of the line relay.

In view of the general complaints as to the poor adjustment of telegraph relays, Mr. Harkness continued, it is not believed that any railway official will for a moment consider arranging relays operating selectors so that they may be adjusted by station operators.

A most prolific source of trouble with relays or selectors arranged to be adjusted is the wide variation in adjustments made by the inspectors and the trouble caused by such adjustments when changes in battery potential occur. It has been found that where adjustments are provided for, these are the first things to be changed when trouble is reported, rather than determining, by investigation, the source of the trouble and the application of the proper remedy when located. As a result of this practice, continual adjustments are necessary.

If it is assumed that the normal operating current of the relays is to be from .004 to .008 amperes, then there is no advantage in using the relay, as selectors can and do operate with reliability with currents of these strengths.

It may be contended, however, a relay can be designed which will permit of a lower operating current than .004 amperes and with fixed adjustments providing for a range in current as large as .018 amperes. This is feasible, but there is still to be considered the increased first cost of the relays, together with the increased cost of maintenance of the local batteries without a corresponding gain in reliability of operation, and further direct connected selectors can still be operated from .0035 to .025 amperes without readjustment.

The disconnection of selectors from the circuit at night should not be necessary if adequate protection against foreign currents is installed. Nor does it seem advisable from an operating standpoint, as it permits an opportunity for delay by an operator in either intentionally or unintentionally disconnecting his equipment from the circuit. The practice of disconnecting the equipment at night does not seem to be general. Nor does the disconnection of one or all but one selector from the circuit affect the operation of those remaining in service on the majority of the equipments in service.

Signal Equipment on Piedmont & Northern Lines

A telephone and signal installation of peculiar interest to both steam and electric railroad operating men has recently been completed on the Piedmont Traction Company's system, a portion of the Piedmont & Northern Lines.

The initial installation covers 23½ miles of road extending from Gastonia to Charlotte, N. C. The trolley voltage is 1500 direct current and high speed trains are operated over this line. Some are of the multiple-unit type and others are drawn by electric locomotives. The latter make a speed of 70 miles per hour.

With a road of this character an effective signaling system is, of course, a necessity and the Piedmont & Northern Lines settled upon the Western Electric Company telephone dispatching system, in conjunction with which are used selectively operated semaphores, each of which contains a telephone set.

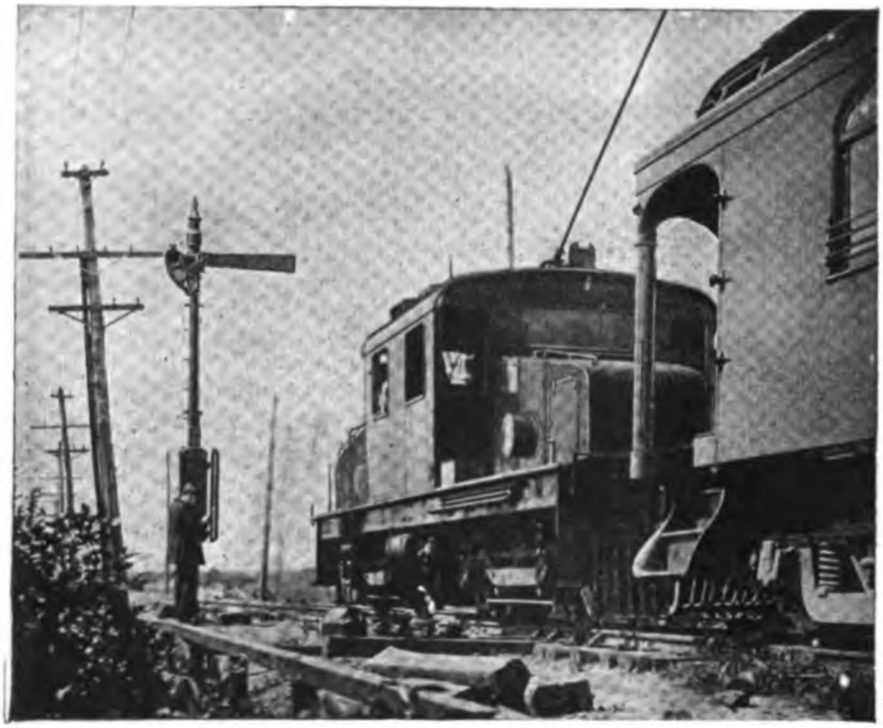

FIG. 1.—SEMAPHORE ON RIGHT OF WAY.

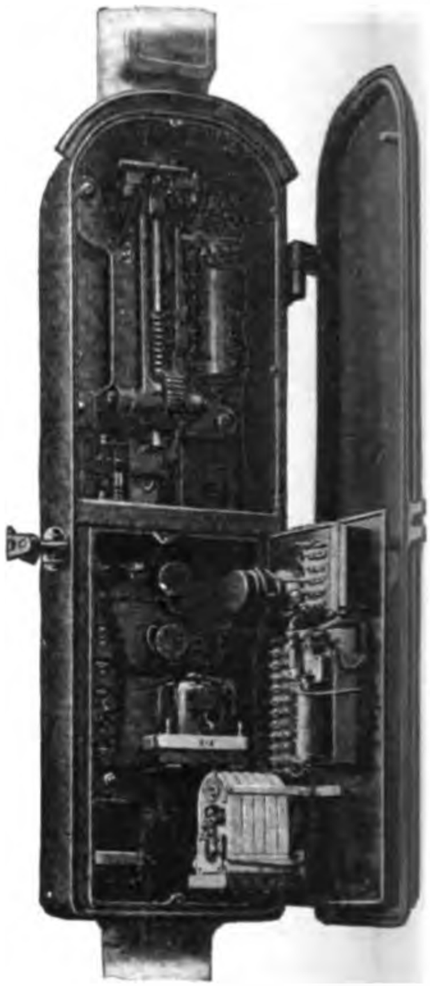

FIG. 2.—SIGNAL AND TELEPHONE APPARATUS IN BOX.

The telephone line is strung along the right-of-way. Seven regular telephone and selector stations are located on this line and the transmission is stated to be excellent.

Eight sempahores are placed at intervals along the road and are under the direct control of the dispatcher. He is thus enabled to stop a train and give orders direct to the crew at these points.

In addition to the telephone set, a selector is provided inside the casting, enabling the dispatcher to control the operation of the semaphore blade. This selector is bridged directly across the telephone circuit and when the dispatcher wishes to throw any particular semaphore to the "stop" position, he operates a selector key.

The semaphore selector and telephone equipment are all mounted on the same iron post. The weather-proof box is locked so that access is possible only by means of keys. All the telephone apparatus is weather-proofed to withstand moisture, and all the woodwork on the inside of the set is oil treated.

In addition to this apparatus fifteen more semaphore equipments and 12 regular selector stations have been furnished for the Greenville, Spartanburg & Anderson Railroad, which is also a portion of the Piedmont & Northern Lines.

China Lowers Telegraph Rates.—The Chinese government on June 1 made a large reduction in telegraphic rates within China. Messages in Chinese cipher, or in any foreign language, will be transmitted between any two points in China at the uniform rate of twelve cents Mexican per word, equivalent to five and one-half cents gold. Ordinary Chinese messages and foreign press messages will be transmitted at six cents Mexican per word (two and three-fourths cents gold), and Chinese press messages at three cents Mexican (one and one-third cents gold) per word.

The Railroad.

Mr. J. H. Shearer of the Pennsylvania Railroad Company, Elmira, N. Y., has served the company at that point for over forty-eight years and it is stated that he will soon be retired.

Mr. C. U. Jellison, who, for several years past, has been engaged in installing telephone train dispatching apparatus on various railroads for the Western Electric Company, New York, recently accepted a position with the Florida East Coast Railway as telephone supervisor, with headquarters at St. Augustine, Fla.

Mr. B. A. Worthington, president of the Chicago and Alton Railroad, Chicago, Ill., began his business career as a telegraph messenger on the Central Pacific Railroad and afterwards became an operator. He filled various important railroad positions in the West and assumed the presidency of the Chicago and Alton on July 10.

Beer on Saxony State Railways.—The Assembly of Notables in Saxony have been called upon lately to consider the problem of fixing the prices of beer in the railway restaurants. The Saxon brewers petitioned that the price of Saxon beer be raised to place it on an equal footing with the Bohemian product, but the Notables refused the request.

Interview With J. B. Sheldon.—The Omaha "World-Herald" of June 13 printed an interesting interview with Mr. J. B. Sheldon, president of the Association of Railway Telegraph Superintendents, on his return to Omaha from the New York convention last month. Mr. Sheldon dwelt particularly upon the visit to the Edison works on June 7, and spoke of the interesting things he saw on that occasion.

Mr. E. E. Hudson.—In the list of attendants at the convention of the Association of Railway Telegraph Superintendents in New York, June 4-7, as published in our issue for June 16, the name of E. E. Hudson was by mistake placed among those of the representatives of the Edison Storage Battery Company. To avoid confusion and misunderstanding, it should be explained that Mr. Hudson is not connected in an official way with the Edison Storage Battery Company, but with the primary battery department of Thomas A. Edison, Inc., as manager of sales.

Telephone Train Dispatching on the Washington and Old Dominion Railways.—The Washington and Old Dominion Railway Company which operates from Georgetown, D. C., to Bluemont, Va., a distance of approximately fifty-five miles as the electrification of a former division of the Southern Railway, has placed an order with the Western Electric Company for apparatus to be used in installing a complete telephone train dispatching system. The system will comprise fifteen selector sets, containing the standard type selector. Four selectively operated semaphores will be placed at points along the right of way. These are controlled by the dispatcher and are located where there are no regular operators. The train dispatcher's office will also be equipped with a sectional unit type magneto switchboard. From this board fifteen telephone circuits will radiate, the arrangement being such that the dispatcher can control the train wire and switchboard lines together or separately.

Delaware and Hudson to Use Telephone Train Dispatching System.—The Delaware and Hudson Railroad Company has lately placed an order with the Western Electric Company for the first telephone train dispatching system to be used by that road. The train wire to be installed will extend from Albany to Troy, N. Y., with the dispatcher at Albany, and will take in the various yard offices and stations between these two points. A total of twelve stations will be equipped within this distance of eight miles. The apparatus to be used is the selector set containing the standard type selector. The telephone equipment will consist of the new No. 147 transmitter arm, designed primarily for railroad work. It is arranged for fastening to the wall and when not in use can be pushed out of the way. A storage battery for furnishing ringing and talking current is also included in the new equipment.

The Passing of Telegraphy on Railroads.

The continued and steady introduction of the telephone on railroad systems for handling and controlling the movements of trains makes it perfectly feasible to do away with the night operator at the isolated way-stations. A Western Electric Company railway specialist recently mentioned the fact that one railway system, to which he had sold telephone train dispatching equipment, had done just this thing and that each passenger and freight conductor has been furnished with a so-called "master key" for the stations along the line to enable him to enter, lift the telephone receiver from the hook, put himself in instant communication with the train dispatcher at headquarters, receive his orders verbally and go on his way.

Annual Meeting of Train Dispatchers' Association.

The twenty-fifth annual convention of the Train Dispatcher's Association of America was held at Louisville, Ky., June 18, 19 and 20. The principal report was that of the train rules committee. This was in the form of a memorial to the American Railway Association, suggesting or recommending certain changes in the standard code of train rules. There was a vigorous discussion on the exclusive use of the "19" form of order, which was strongly advocated by J. P. Finan. Numerous members also testified to their use of the "19" form, both with and without block system; and the feeling of the convention was very largely in favor of its use. The report was adopted.

There was some informal discussion on the use of the telephone for train dispatching, the sentiment of the dispatchers present who had used it being largely in its favor. The argument that station operators could not keep so closely in touch with train movements as with the telegraph was considered a very minor objection, as appliances were now being introduced whereby sound was magnified and the operator able to hear almost as well as when listening to the click of the Morse sounder.

Officers were elected as follows: President, T. W. Kane, Livingston, Mont.; vice-president, J. P. Finan, Needles, Cal.; secretary-treasurer, and editor, J. F. Mackie, Chicago. The date of the next convention was fixed for June 17, 1913, and the place Los Angeles, Cal.

The convention passed a resolution directing the president of the association to appoint a special committee of three members to wait on the committee on Interstate and Foreign Commerce of the House of Representatives at Washington, and protest on behalf of the Train Dispatchers' Association against the passage of H. R. bill 25040 amending section 2 of the present hours of labor law, which would seriously hamper railway operation, without in any manner increasing the safety of employes or the general public. The proposed amendment would prohibit the service beyond eight consecutive hours in each twenty-four, of conductors receiving orders for their own train or carrying orders to other conductors or enginemen at intermediate sidings, or of operators at stations receiving, transmitting or delivering train orders; whereas the present law permits a 16 hours' service in the case of trainmen and thirteen hours' service in the case of station men where but one man is employed.

Municipal Electricians.

Underground Fire Alarm Wires in Brooklyn.—Owing to the lack of appropriations the work of placing the fire alarm telegraph wires in Brooklyn, N. Y., undergound, has been slow and it has not been possible to comply with the law of 1902, which directed the removal of overhead telegraph, telephone and other wires in that borough. The fire department has at present over 1200 miles of wire overhead and only seven or eight miles of underground conduit. Under a recent contract a few more miles of wire are being placed under ground near the Brooklyn Bridge terminus, but the work is limited by the available appropriation.

Convention of Municipal Electricians.—From all indications the next convention of the International Association of Municipal Electricians, which is to be held at Peoria, Ill., August 26-30, will surpass all previous conventions of that body in point of interest and attendance. This association is rapidly growing in importance in its relations to municipal government and as it is in the hands of men with progressive ideas it is destined to take a leading position among semi-technical organizations. Liberal provision has been made for the display of exhibits at the Peoria convention and there is promise that this feature of the meeting will be extensive and interesting. Mr. W. E. Wolgamott, city electrician, Peoria, Ill., has charge of the arrangements for hotel accommodations and exhibits and he will be glad to give any information on these subjects. Mr. Clarence R. George, city electrician, Houston, Tex., is secretary of the association.

Wireless Operator's Pocketbook of Information.

The Wireless Operator's Pocketbook of Information and Diagrams, is the title of a 174-page book recently published. The author is Leon W. Bishop, a well-known authority on wireless matters, and he has given to the student and general reader a book that is well worth careful reading and study. It is a practical pocketbook for the wireless operator, showing all up-to-date apparatus, in theory and practice. Its purpose is to satisfy the desires of the wireless operator and of those experimenters who have already some knowledge of wireless phenomena, for a practical book more suited to their needs than the many elementary ones which deal mostly with the construction of simple apparatus, or the elaborate technical and mathematical treatises which presuppose a technical education to understand them.

Briefly, it thoroughly describes all transmitting and receiving instruments; aerials, giving the types and relative sizes for the best work in transmitting and receiving; the latest methods of tuning both transmitting and receiving apparatus; and it has a full chapter of diagrams, showing the most improved circuits for all sizes and sets, both in transmitting and receiving.

Among other features it gives a table showing how to compute roughly the sending and receiving distances for all types of instruments with all types of aerials and ends with the latest Call-Book containing the calls of the principal land and water-stations in America both government and commercial. A prominent authority on wireless telegraphy states that this is the best book on the subject he has ever seen, and he has purchased them all. The book is very liberally illustrated and the price is $1.00. Postage and insurance of safe delivery are 10 cents additional.

This and other books on electrical subjects can be supplied by J. B. Taltavall, Publisher, 253 Broadway, New York.

Telegraph Transmitting Machine.—Mr. Francisco del Valle Atiles, of San Juan, Porto Rico, is the inventor of a telegraph transmitting machine upon which a United States patent has been granted. The instrument is of the typewriter class, each letter of the alphabet having an individual lever on the keyboard. Each key lever actuates a wheel, having on its circumference contact surfaces corresponding to the Morse characters, and the circuit is closed upon these by means of contact brushes.

Bound Volumes of Telegraph and Telephone Age.

TELEGRAPH AND TELEPHONE AGE for 1911 covers a period of great activity in telegraph and telephone development and contains a complete record of all important events in these lines, besides much other interesting and valuable matter of general and technical interest. The volume is well worth preserving by students and subscribers, as its contents will be frequently referred to on account of their important character.

Bound volumes are now for sale at the publication office of this journal, 253 Broadway, New York, at $3.50 per volume, express charges collect. These volumes are neatly bound in cloth and will be found very handy for the library.

Earth Antennae for Wireless Telegraphy.

BY ANDREW PLECHER, LAS ANIMAS, COL.

Under this title TELEGRAPH AND TELEPHONE AGE of January 16 published a summary of a lecture delivered in Berlin by Count Georg von Arco.

The experiments described in the article referred to were clearly anticipated by United States patent No. 635,099, in which the earth antennae are, with other improvements, made the foundation for a new system of wireless, called "The Resonant System for Wireless Telegraphy." In particular, the discoveries said to have been made by a certain Dr. Kiebitz are old, and years ago wireless experts knew full well that the earth conducted the electrical charges from the sending to the receiving station. A person needs only to open Foster's handbook to see the drawings and read the few but conclusive lines of explanation to understand that Dr. Kiebitz needs to cover up certain other facts.

A similar incident happened in the year 1903, when, on January 17, application was made for the pioneer patent of electrolytic detectors of wireless telegraphy. At once a certain Schlemilch was drummed around as having made the discovery, and he exhibited a device consisting of a fine wire immersed in acid, not being aware, however, that the immersion of a bare wire will cause the fluid to ascend the wire by capillarity and spoil the necessary fine contact.

We, however, forgive the Germans, for in the United States things are done in a raw manner. One need only buy copies at five cents each of United States patents No. 744,936 and No. 727,331 and compare them, to see how they do things at home.

Stocks on the Instalment Plan.

Salaried and wage employes of incorporated businesses are realizing more clearly every day the desirability of owning an interest in the companies for which they are working. The number of small shareholders is increasing rapidly and continuously, as employes become educated to the advantages of owner relationship with important and controlling stockholders.

The owner of one share, five shares or ten shares becomes in a broad and practical sense a partner in the business. As far as he goes he is as big a man as the president of the corporation. But aside from that there is the deeper satisfaction that goes with the thrifty conservation of one's resources. And then there is the feeling that one is showing faith in his employers—taking a vote of confidence in the permanency and durability of the structure that shelters one.

The rapid increase in the number of shareholders in incorporated businesses of the country is one of the most gratifying developments of the time. It makes the growing cementation of mutual interest between employer and employe, a closer union of capital and labor and a better understanding on both sides.

It has become easy to the salaried man and the wage earner to invest in stocks. Not only can a man or a woman buy a fractional lot of shares outright in any listed stock, but under the down-to-date order of things the purchase can be made on the partial payment or instalment plan, the same as real estate or furniture. To buy stock on monthly payments is in many respects preferable to any other method of saving. Furthermore, the owner of an interest in an established and growing business, whether railroad or industrial, has his money in something that is alive, something that has a chance to expand, to increase in value.

Among the first of the prominent brokers to appreciate the development of this enlightened tendency to investment in stocks by the thrifty man on the pay roll was Mr. J. Frank Howell, of the Consolidated Exchange, New York, and a former telegrapher, who has written and done much for its encouragement. Study of the subject has satisfied him that the plan of instalment purchases of small lots of stock is one of material benefit to every employe who takes advantage of the plan for saving money. He is always ready to furnish detailed information on the subject to whoever may be interested with serious purpose to invest.

Transmitter Arm.

The transmitter arm illustrated herewith is of the folding or "ferry-gate" type, and is furnished by the Western Electric Company in three different styles so that it may be placed on top of a flat-top desk, on the wall, or the side of a flat-top desk, or on the side of a roll-top desk.

TRANSMITTER ARM.

The design is such that it may be used with any desk telephone by means of a clamping device at the end farthest from the pedestal. The use of the new transmitter arm is recommended for those telephone users who already have a desk set and find that they either habitually throw the set off the desk or else have trouble in keeping the cord and stand from becoming entangled with their papers.

Mr. A. W. Springer, district commercial manager of the Western Union Telegraph Company, at Wilmington, Del., in renewing his subscription writes:—"I appreciate your thoughtfulness in continuing my subscription as I would feel lost without your most interesting journal."

Old Time Telegraphers' Reunion.

Following is the programme of the reunion of the Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps which is to be held at the Windsor Hotel, Jacksonville, Fla., October 22, 23 and 24, so far as arranged:

Tuesday, October 22—11 a. m.—Business meeting of the Old Time Telegraphers' and Historical Association called to order by retiring president. Address of welcome and response. Installation of the new president, transaction of business, etc.

12m.—Business meeting of the United States Military Telegraph Corps.

2:30 p. m.—Visit to Florida ostrich farm.

8:30 p. m.—Entertainment by the Jacksonville Board of Trade.

Wednesday, October 23.—Morning.—Automobile trip around the city.

Afternoon and evening, trip on St. John's River.

Thursday, October 24.—Morning.—Trip to St Augustine.

Afternoon, go as you please.

Evening, banquet at Windsor Hotel.

Hon. W. S. Jordan, mayor of Jacksonville, and an old-time telegrapher, is the president of the Old Timers' Association, and Mr. F. J. Scherrer, 30 Church Street, New York, is secretary.

The Windsor Hotel is conducted on the European plan and the rates per person are as follows: Single room without bath, one person, $1.00; single room with bath, one person, $2.00; double room without bath, two persons, $1.00, $1.50, $2.00; double room with bath, two persons, $2.00, $2.50, $3.00; suite two rooms, two beds, without bath, two persons, $1.00; suite two rooms, two beds, with bath, two persons, $2.00; suite two rooms, three single beds, without bath, three persons, $1.00; suite two rooms, three single beds, with bath, three persons, $2.00.

Members who intend to be present should notify the chairman of the Hotel Committee, Mr. G. D. Ackerly, Jacksonville, Fla., at the earliest possible date, so that proper arrangements can be made.

Following is the membership of the various committees:

Reception Committee Old Time Telegraphers' and Historical Association: George H. Usher, chairman, G. D. Ackerly, L. J. Amsden, John S. Arnold, John W. Atkins, W. J. Burt, P. J. Casey, Geo. A. Cellar, N. E. Church, W. P. Cline, W. F. Coachman, T. P. Cummings, Geo. W. Davis, W. F. C. Fellers, Wm. T. Gentry, A. B. Hernandez, A. E. Heston, Chas. M. Holmes, F. G. Jones, James W. Kemp, J. Levin, Geo. W. Lloyd, Wm. J. Lloyd, C. W. Maxwell, L. J. Maxwell, W. H. McKeldin, Geo. E. Mundee, M. J. O'Leary, J. E. Peacock, W. A. Porteous, H. G. Reich, Geo. W. Ribble, Harvey D. Reynolds, Benj. Sams, V. G. Shearer, Geo. R. Shultz, E. S. Spencer, J. M. Stephens, J. B. Taltavall, L. R. Taylor, W. F. Williams, Wm. B. Wilson, H. C. Worthen.

Reception Committee, United States Military Telegraph Corps: M. F. Robinson, chairman, Sanford, Fla., J. T. Abernerthy, Jesse W. Crouse, William J. Dealy, Edwin Peel, J. J. Fowler, Chas. D. Hammond, George Henderson, Charles W. Jaques, George E. Jones, Marion H. Kerner, Frank B. Knight, A. C. Lindauer, John Matthews, Dr. J. E. O'Brien, Charles W. Pearson, Victor Rosewater, W. S. Taylor, E. Von Eye, R. T. Weitbrec, John Wintrup, L. W. Wortsman.

Ladies Committee: Mrs. A. E. Heston, chairman, Mrs. G. D. Ackerly, Mrs. L. J. Amsden, Mrs. John S. Arnold, Mrs. W. P. Cline, Mrs. W. F. Coachman, Mrs. Geo. W. Davis, Mrs. W. F. C. Fellers, Miss Lalla Jordan, Mrs. W. S. Jordan, Mrs. J. Levin, Mrs. C. W. Maxwell, Mrs. L. J. Maxwell, Mrs. W. H. McKeldin, Mrs. Geo. E. Mundee, Miss Mundee, Mrs. M. J. O'Leary, Mrs. J. E. Peacock, Mrs. Benj. Sams, Mrs. F. J. Scherrer, Mrs. V. G. Shearer, Mrs. E. S. Spencer, Mrs. J. B. Taltavall, Mrs. W. A. Wiggs, Mrs. W. F. Williams, Mrs. Wm. B. Wilson.

Committee on Hotels: G. D. Ackerly, chairman, Jacksonville, Fla., W. F. C. Fellers, J. E. Peacock, E. S. Spencer.

Committee on Badges: John S. Arnold, chairman, Jacksonville, Fla., G. W. Davis, Chas. M. Holmes, Benj. Sams.

Committee on Banquet: L. J. Maxwell, chairman, Jacksonville, Fla., C. W. Maxwell, Geo. W. Ribble, Geo. R. Shultz.

Committee on Finance: W. F. Coachman, chairman, Jacksonville, Fla., Wm. T. Gentry, Geo. E. Mundee, Paul R. Wiggs, H. C. Worthen.

Members desiring to go by the Clyde Steamship Line between New York and Jacksonville, Fla., will find it to their interest to communicate with the secretary, Mr. F. J. Scherrer, 30 Church street, New York, in regard to rates, etc.

Practice Telegraph Service for War.—The telegraph service, as far as the public was concerned, was suspended throughout France for some time, one evening recently, the wires being requisitioned by the Minister of War in order to carry out a mobilization movement as if hostilities were about to be declared. The manœuvre, which is intended to keep the personnel on the alert for a call at any time or hour, stops the public telegraph service for an hour or two and is supposed to be carried out three or four times a year.

Losses on English Press Telegrams.—The British post-master-general stated recently that the loss incurred by the postoffice on press telegrams during the years 1907-8 and 1908-9 was about $1,025,000.

Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railway Company, St. Louis, Mo., in renewing his subscription, states: "I am always willing to make it a point to talk for Telegraph and Telephone Age, and I shall continue to do so."

Western Union Tariff Book.—The July edition of the Western Union tariff book, comprising 60,000 copies, is being distributed. Reduced rates and better routes have been entered for many telephone, delivery and "other" line telegraph offices, and many new stations have been added to the lists. Instructions as to the new cable services: cable letters, week-end letters and deferred cable service are also given. At the back of the book are presented the usual maps showing the cable systems of the world, and another feature is the information on wireless service to steamers at sea. The work is very complete and reflects great credit upon Mr. Wm. Holmes, superintendent of tariff bureau.

Mr. Thomas D. Costello, of Houston, Tex., has had a wide experience as a telegrapher, having worked in most of the principal offices in the United States, Canada and Mexico. He was born in Memphis, Tenn., September 4, 1865, and entered the telegraph service in Memphis, in June, 1879, as operator. He has worked in various places for the commercial telegraph companies, the different press associations, several railroads and brokerage concerns, and is now operator for The Texas Company at Houston.

LETTERS FROM OUR AGENTS.

NEW YORK POSTAL.

The following acting assistant chief operators have been advanced to the positions of assistant chief operators: J. A. Meade, R. G. Post, E. B. Hagerty, F. A. Crippa, W. H. Kelly, G. H. Wiser, E. C. Leseur, A. P. Kranshaar, F. J. Connolly, A. Bitter, R. Carr.

PHILADELPHIA POSTAL.

Vice-president C. C. Adams and L. L. Howell, of New York, were recent visitors.

Henry Riskey has gone to Mt. Gretna to take care of the press file during the National Guard Encampment.

Quadruplex chief C. A. Currier, traffic chief J. E. Zecher and repeater chief C. S. Almes, have returned from Baltimore, where they were assisting during the convention.

Wire chief M. A. Baker is enjoying a well-earned vacation.

BALTIMORE WESTERN UNION.

Eugene S. Anderson, general traffic chief of this office, whose death on June 20 was briefly announced in Telegraph and Telephone Age dated July 1, was forty-four years of age. He entered the Western Union service in 1883 as operator at Union Station, Baltimore, and was transferred to the main office in 1885. He was appointed all-night chief in 1901; was promoted to day wire chief in June, 1910, and made general traffic chief in November the same year. Deceased was prominent in church and fraternal order circles, being past master of Cassia Lodge of Masons; past grand master Independent Order of Odd Fellows of the State of Maryland; past grand representative to the Sovereign Grand Lodge of the United States, I. O. O. F., and grand patriarch of Maryland of the Patriarchs Militant, I. O. O. F. He was also a member of other fraternal orders. Mr. Anderson was very popular with the force and his loss is felt deeply by all. The cause of his death was Bright's disease.

OMAHA, NEB., WESTERN UNION.

Mr. J. C. Nelson, general superintendent, and Mr. W. C. Titley, division plant superintendent, Denver, Col., were recent Omaha visitors.

District plant superintendent Mr. W. Salisbury, is receiving the congratulations of his associates and friends on the arrival of a son at his home.

RENO, NEV., WESTERN UNION.

Mr. E. D. Edwards, chief operator of this office for several years past, has resigned to engage in the service of the Lander Electric Light and Power Company at Lander, Wyo. The friends of Mr. Edwards wish him every success. Mr. E. P. Hearn has been appointed acting chief operator, Mr. O. L. Holloway, night chief operator, and Mr. C. C. Ferguson, all-night chief.

Telegraph and Telephone Age

No. 14. NEW YORK, AUGUST 1, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The "Mark of Merit" of Instruments.

By "mark of merit" is meant (a) the minimum amount of current an instrument can be operated with when it is given closest adjustment, and (b) the maximum volume it will withstand without injury and still be responsive.

A knowledge of these facts tells us just how far we can go in either direction when installing apparatus, and establishes the range between minimum and maximum. In other words, the mark of merit of any given instrument is its ability to operate under certain conditions which are prescribed for a test. In testing apparatus, therefore the "merit test" or conditions required, should first be ascertained, otherwise results may be misleading.

This knowledge is absolutely necessary in testing new instruments from the shop, but not necessarily required by operators for determining their practical workability under ordinary conditions, yet he would find it a great help if he knew in advance what to do.

Take, for example, a polarized relay, such as that used on duplex and quadruplex circuits. If it was suspected of being "lopsided" or deficient in magnetic strength, or otherwise defective, the usual test applied is to center the armature and pass a current through the coils differentially or oppositely in series. If the fault is not serious, a haphazard adjustment of this kind may not disclose its real proportions, that is to say, indicate its inability to meet more exacting requirements, and if a relay is originally passed as O. K. under such a test, an inferior instrument will have been added to the equipment.

The mark of merit demanded by a polarized relay is that it shall be able to operate when tested under the following conditions. If it meets these, it possesses the greatest degree of efficiency. If it does not, it may be condemned and returned to the manufacturer:

With the armature centered between cores and the magnetic air gap thirty-five to forty-thousandths of an inch on each side, and the travel between contact points three-thousandths of an inch, a 300-ohm enameled wire wound relay should work in proper direction on reversals of current of three milliamperes through either set of windings.

This test would also apply to 400-ohm instruments wound with silk-covered wire, as the latter possesses very few if any more turns of wire than the former, the difference, if any, being due to the thickness of the insulating material.

The reader will probably ask, "But how can I regulate the air gaps so accurately?" Of course it cannot be done accurately by guesswork, but near enough for an attendant's practical test. There is a multi-blade pocket knife manufactured for this purpose, each blade of which is of a different thickness, marked in thousandths of an inch. There should be at least one of these for common use in every quadruplex or other department where it would be required. One might just as well be as thorough as practical while testing even where great accuracy is not required, especially when facilities are available.

To illustrate the difference between a thorough and a practical test, let us again take that of the polar relay. Assume that in the practical or guesswork-adjusted instrument the air-gap is much wider than specified, what is the result? One result is that possibly it may not respond to the reversals of a current of three milliamperes, which might be taken to indicate an undue magnetic weakness. An unequal distance of the contact points on either side of the magnetic center may also require more current to move the armature in one direction than in the other, which also might be taken to indicate a fault that does not necessarily exist. Of course this is drawing the line pretty close, but it should always be borne in mind that it is the multiplicity of little defects that make up a large percentage of the facts to be considered in computing the final rating.

In like manner, certain different conditions and values are specified for testing each class of instruments, and it will be found that in every case they are arranged, as a rule, to give results that will insure a degree of efficiency in operation sufficient to override the barriers actually encountered in working circuits. The maximum degree attainable is not always desirable. An oversensitive instrument may prove more detrimental than beneficial.

Recent Telegraph and Telephone Patents.

ISSUED JULY 2.

1,030,872. Telephone Receiver. To N. Church, Camden, N. J.

1,030,915. Telephone Transmitter. To G. R. Morris, Buffalo, N. Y.

1,031,667. Telephone Switchboard Apparatus and Circuits Therefor. To H. J. Roberts, Evanston, Ill.

ISSUED JULY 9.

1,031,752. Telegraph Transmitter. To R. Welty, Sudbrook Park, Md.

1,031,947. Telephone Receiver. To C. T. Mason, Sumter, S. C.

1,032,360. Telephone Receiver Holder. To F. H. Goss, Coraopolis, Pa.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange July 27:

American Telephone and Telegraph Co....	145¾
Mackay Companies	87
Mackay Companies, preferred	69⅛
Western Union Telegraph Co.............	81¾

Personal.

Mr. Frank A. Munsey, the well-known publisher, and an old-time telegrapher, is in Europe.

Col. A. B. Chandler and Mrs. Chandler are spending the summer at their home in Randolph, Vt.

Mr. H. H. Hall, a prominent citizen of Ashtabula, Ohio, and identified with the telegraph service at that point for over fifty years, was a recent New York visitor.

Mr. Clayton D. Lee has been re-elected president of the United Press, and Mr. Roy W. Howard was elected chairman of the board of directors, vice C. B. Clark resigned.

Mr. S. M. English, president and general manager Postal Telegraph-Cable Company of Texas, Dallas, Texas, was a recent New York visitor on company business.

The friends of Mr. James F. Gormley, one of the oldest employes in the Western Union service, now living in retirement at Canton, Mass., will be pained to learn that he has become blind from cataract and owing to his advanced age, the oculists have decided against an operation. Mr. Gormley was one of the original House printing operators. He was prominent in telegraph circles from 1850 until 1905 in Baltimore, New York, Philadelphia, Boston and Washington. Mr. Gormley is on the Western Union pension roll and, notwithstanding his misfortune, he is happy and contented, and takes much pleasure in hearing from his old friends.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. P. Bruch, third vice-president of the company, is again at his desk after an absence of four weeks on vacation.

Mr. J. F. Creegan, manager of the Williams, Ariz., office has been advanced to the managership at Albuquerque, N. M.

Mr. Howard L. Krum, of the Morkrum printing telegraph system, Chicago, is in New York on business.

The library on the tenth floor has been changed to more commodious quarters and a new costly bookcase filled with rare editions of standard works, the gift of Mr. and Mrs. Clarence H. Mackay, has been added to the collection.

A three days' outing and conference of the Western Division managers of the Postal Telegraph-Cable Company was held at Chicago, commencing July 24, and there were about sixty in attendance. The meeting was closed with a banquet and other entertainments, in which all participated. A full account will appear in the August 16 issue.

Telegraph Combination in Philadelphia.—The stockholders of the Postal Telegraph and Cable Companies Nos. 1, 2 and 3 and the Postal Telegraph and Cable Company unanimously voted to combine all the individual companies into one unit, the Postal Telegraph-Cable Company.

The Cable.

Gutta Percha in Existing Cables.—The amount of gutta percha utilized in the construction of existing submarine cables is placed at over 20,000 tons.

Reward for "Mackay-Bennett's" Crew.—Mrs. Astor, widow of John Jacob Astor, who lost his life on the "Titanic," and Vincent Astor, son of the deceased, presented $2,000, through Captain Larnder of the Commercial Cable Company's steamer "Mackay-Bennett," for distribution in gratuities to the officers and crew of that vessel who assisted in the work of recovering bodies of the lost passengers. Captain Larnder received a handsome gold watch from Vincent Astor.

Improvement in Cable Balancing.—The late J. Kajiura, of Japan, invented a method of balancing a submarine cable for duplex work, using an artificial cable of only half the capacity of the cable itself. It is called the "Semi-Bridge Duplex System" and on several long submarine cables belonging to the Imperial Japanese Government the new system has given very good results. In 1909 it was applied to a cable of 672 miles and in 1910 to another cable of the same length, only 320 miles of artificial cable being used in each case. The results have given much satisfaction.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager, on July 27 returned from a business trip to Denver.

Messrs. G. M. Yorke, engineer; M. C. Allen, division plant superintendent, and H. A. Emmons, of the traffic engineers' office, New York, have returned from a business trip to Nova Scotia and Newfoundland.

Mr. J. McRobie, general manager of the American District Telegraph Company, New York, has returned from a business trip to the Pacific Coast. He was accompanied as far as San Francisco by Mr. M. E. Barrett, superintendent of construcother Northwestern cities in the interest of his tion, who is now visiting Tacoma, Seattle and company.

Mr. R. B. Ferguson, manager of the Chamber of Commerce office, Buffalo, N. Y., has been appointed district commercial manager in the territory in New York state west of Albany, vice J. B. Wooster, deceased. Mr. Ferguson's headquarters will be at Buffalo.

Among recent executive-office visitors were Mr. C. E. Davies, supervisor of equipment, Great North Western Telegraph Company, Ottawa, Ont., and Mr. S. R. Crowder, Philadelphia, Pa.

Mr. E. P. Kerwin has been appointed manager of the Keene, N. H., office of this company, vice F. H. Gove retired on a pension after forty-five years of service.

Mr. Ralph E. Bristol, formerly identified with the supply department of this company, but for the past five years in the cement manufacturing business at Ogden, Utah, together with his wife and son, were recent New York visitors. Mr. Bristol is a son of Mr. Chas. H. Bristol, formerly general superintendent of construction of this company in New York, who is now retired from active service.

Mr. J. S. Calvert, district superintendent, Richmond, Va., reports the following appointments of managers in his district: W. T. Lamm at Wilson, N. C., vice W. T. Tignor; T. C. Greer at Abbeville, S. C., vice J. L. Duffell, transferred to Clio, S. C., as manager, to succeed Miss Ruby Bowden, who leaves the service; T. F. Barbie at Camden, S. C., vice Miss M. A. Gann; J. W. Jones at Beaufort, S. C., vice Miss C. A. Richardson.

Mr. W. R. Chapman, district commercial superintendent, St. Louis, Mo., reports the following appointments of managers in his district: H. C. Weston, formerly assistant cashier at Kansas City, Mo., at Springfield, Mo., vice E. A. Rippey, transferred to the traffic department, St. Louis; J. B. McLeod, at Helena, Ark., vice O. O. Horner, transferred as manager to Joplin, Mo., to succeed J. F. O'Donnell, resigned. Mr. McLeod was succeeded as manager at Jonesboro, Ark., by W. A. George, transferred from Blytheville, Ark., Miss Pauline Kennedy being appointed at Blytheville. J. P. Hoeft, formerly at Hannibal, Mo., manager at Rogers, Ark., vice F. R. Spurgin, resigned to go to the 'Frisco system. Miss Flora E. Lane, formerly manager at West Plains, Mo., transferred as manager at Excelsior Springs, Mo., vice Mrs. M. Dively, resigned. W. L. Tucker, of Lamar, Mo., succeeds Miss Lane at West Plains, Mr. C. D. Lautzenhiser going to Lamar. S. L. McCloughan, manager at Chillicothe, Mo., vice P. A. Kaufman, resigned. Miss Nettie Franks, manager at St. Charles, Mo., vice Miss B. Amrhein, transferred to the traffic department at St. Louis, Mo.

Mr. J. C. Nelson, general superintendent, Denver, Col., announces the following changes in his Division: Mr. H. W. Deneke, chief clerk to commercial superintendent U. G. Life, of Salt Lake, has been appointed district special agent, with headquarters at the same point. Mr. M. J. Hyland, manager at Miles City, Mont., succeeds Mr. Deneke as chief clerk in superintendent Life's office. Mr. Frederick Ott, formerly of Axtell, Kan., has been appointed manager at Miles City, Mont., vice M. J. Hyland. Miss Helen E. Sawyer, former manager at Provo, Utah, has been promoted to the position of manager at Coeur d'Alene, Idaho. Miss Z. M. Moore, formerly of Morey, Kan., has succeeded Miss Sawyer as manager at Provo. Harry Taylor, manager at Coeur d'Alene, has been transferred to other service. Miss Mabel A. Bird, formerly employed as operator in the Spokane Hotel, Spokane, Wash., has accepted a position as night manager at the Hotel Utah, Salt Lake City.

Mr. William Thurman Austin, who was recently appointed manager of the Western Union Telegraph Company at Savannah, Ga., was born at Williston, S. C., February 23, 1877, and began his telegraphic career in Macon, Ga., June 1, 1898, as operator for the Western Union, afterward going to Tampa, Fla. Later he entered the service of the Postal Telegraph-Cable Company as night chief operator at Savannah, of which office he became manager in March, 1908, after serving as manager of the Cotton Exchange at Savannah and manager at Augusta, Ga.

Mr. John Madison Clement, who has just been appointed manager of the Western Union office at Waco, Tex., was born in Richland Parish, La., September 26, 1881, and entered the telegraph service as messenger in Waco, in 1897. He has advanced through various positions in the Waco office until he has finally reached the head.

Messenger Uniforms in Denver.—The Western Union Messenger boys of Denver, Col., have been fitted out with new uniforms, and manager J. F. Reade has employed three tailors to make a daily inspection of the uniforms, press them and keep them in good condition.

Unique Telegram Blank.—The telegraph companies are producing neat and attractive message blanks, but the one lately furnished by the Postal Telegraph-Cable Company of Texas is unique It is free from the usual bewildering conditions, etc., which appear on blanks, and is decidedly distinctive in its simplicity. On the back of the blank the company's trade-mark appears in the centre, with information at each side regarding letters by telegraph and by cable at reduced rates.

Reduction in Western Union Rates.—In 1866 the maximum rate between places now offices of the Western Union Telegraph Company was about $15.00 for a message of 10 words, date, address and signature free. By frequent changes this maximum has been reduced until it now stands at $1.00. From time to time intermediate rates have also been reduced and on July 1 a square rate of 30 cents was introduced. It covers night messages, night and day letters as well as other forms of service now based upon the day rates.

The Telephone.

Teaching Telephone Enunciation in France.—The French government has established a school of pronunciation for telephone girls.

Telephone Pioneer Membership.—The membership of the Telephone Pioneers of America which was organized in Boston last November is now 800, and it is constantly increasing.

Telephone Work in Pittsburgh.—Eighty thousand dollars will be expended by the Central District and Printing Telegraph Company in improvements and additions to the plant in the Pittsburgh district.

New Telephone Shares Issued.—The board of directors of the New England Telephone and Telegraph Company has ordered that 39,178 shares of capital stock of the company be offered to stockholders for cash at par.

Absorption of Wisconsin Independent Company.—The Wisconsin Telephone Company has taken over the entire system of the Fox River Valley Telephone and Telegraph Company, the largest independent system in Wisconsin.

Telephone Receivership Ended.—The property of the Interstate Independent Telephone Company, of Chicago, which has been under receivership for nearly two years, has been returned to the control of the corporation.

Bond Issue Application Denied.—The New Jersey State Public Utility Commission has denied the application of the Interstate Telephone and Telegraph Company of New Jersey to issue $1,525,000 of five per cent thirty-year first refunding mortgage gold bonds.

Telephone Cables in Highest Building in the World.—In the new 55-story Woolworth Building, on Broadway, between Barclay street and Park place, New York, 5,500 feet of telephone cable containing 460 miles of copper wire will be placed, connecting with a distributing frame having a capacity of 4,000 lines. There will be a total of 2,700 cable pairs.

Long Telephone Line Span.—What is stated to be the longest span of telephone wire in the United States crosses the Susquehanna River between Millersburg and McClellan, Pa. There are two talking circuits—four wires—in the span, which is 5,600 feet long, and has a dip of 460 feet. These wires form part of the system of the American United Telephone Company.

Telephone Operators in Buenos Aires.—The telephone girls in Buenos Aires, Argentine, requested permission to work one hour over regulation time so as to increase the wage day, but the National Department of Health has refused to grant the permission on the ground that the work is too worrying and fatiguing to the nervous system. The Department recommended that the girls be better paid.

Canadian Notes.

Mr. W. F. Ryan, assistant manager of the Montreal office of the Canadian Pacific Railway's telegraph, has resigned to accept the position of secretary-treasurer of the National Bond Company, Inc.

James Stephenson, aged 75 years, a former Canadian telegrapher and railway official, died at Clevedon, England, recently. Deceased entered the service of the British-American Telegraph Company, in Canada, in 1855. This company was the land connection for the first Atlantic cable.

Printing Telegraph Machines on Canadian Pacific Lines.—The Canadian Pacific Railway is installing two duplex Morkrum printing telegraph circuits between Montreal and Toronto.

Canadian Telephone Statistics.—The first report of the Canadian Department of Railways and Canals, dealing with telephone operations in the Dominion, states that the total number of telephone organizations. is 537. Of these, Ontario contributes 319, Quebec 32, New Brunswick 16, Nova Scotia 14, and Saskatchewan 143. In Alberta and Manitoba, practically all the separate companies which existed a few years ago have been merged under Government control, and in Saskatchewan the process of absorption is under way. The total number of telephones in use is 302,759. The gross earnings of all the Canadian companies amounted to a little over $10,000,000; operating expenses were almost $7,000,000, leaving net earnings of slightly over $3,000,000. The equipment of all the companies' lines includes 687,728 miles of wire. The total number of employes reported was 10,425, who received $915,636 per year.

Improvements in Toronto Office of the Great North Western Telegraph Company.

Several improvements have been effected in the Toronto, Ont., office of the Great North Western Telegraph Company.

The multiplex section of the room has been entirely re-wired and a new system adopted, all apparatus being moved to new repeater tables, similar in design to the Western Union standard, but which contain several additional features. These tables are divided in the centre for convenience in wiring and the location of trouble, being so arranged that they close together in one table upon completion of the work. This permits the placing of a permanent rack to hold the condensers, etc. The tables contain cabinets at the ends for fuse and terminal connections, all outside connections being made in these cabinets.

Other features of the work are the steel frame for the main line and loop switchboards, which hold the switches and marble panels for table jacks, a double-ended cord being used, and the steel, combined protector, terminal and transfer rack.

A new feature will be the use of a flush type telephone lamp for ground signal on the main lines, resistances being employed instead of lamps.

The multiplex portion of the room has been equipped with Western Union new type resonators and message clips, the whole making one of the best equipped offices in Canada.

The work was done under the supervision of Chas. E. Davies, supervisor of equipment, and Jas. Murdock, electrician of the Great North Western Company.

Radio-Telegraphy.

Wireless Forest Fire Alarms in Vermont.—Wireless telegraph stations for use in transmitting messages to rangers when forest fires are discovered are to be built on mountain summits in various sections of Vermont.

Phillips Memorial in Godalming.—The citizens of Godalming, England, have started a project to erect a fountain in memory of Jack Phillips, the wireless operator who lost his life in the "Titanic" disaster. Phillips was a native of that town.

Lecture on Wireless.—Mr. W. E. Russell, chief scout of the National Guard, New York, delivered a lecture before the Aeronautical Society, New York, on July 11, on wireless telegraphy and its application to aeroplanes; also wireless transmission of power. He was assisted by Mr. Clyde W. Powers.

Wireless from Aeroplanes.—The shore station of a wireless system designed to secure communication between aeroplanes and either vessels or the shore, has been completed at Annapolis, Md., for the United States Navy. The apparatus for the aeroplane will weigh about 38 pounds. The work is in charge of Lieut. C. H. Maddox of the United States Navy. Lieut. Maddox is now pursuing a special course in wireless engineering at Harvard University.

Wireless Bill Adopted by Congress.—The bill affecting wireless arrangements on sea-going vessels has passed both houses of congress and has been signed by the President. The measure requires all vessels carrying fifty or more passengers to carry at least two wireless operators, so that the service will be continuous and uninterrupted day or night. It is further required that the wireless apparatus be powerful enough to receive and transmit messages at least one hundred miles, and that each vessel have an auxiliary power supply independent of the ship's main electric plant to maintain communication. The operators are to be under the direct orders of the master of the vessel, and the bill provides a fine of $100 on the operator for every violation. The law would apply to all vessels entering or leaving American ports and to cargo-carrying steamers on the ocean and the Great Lakes.

Interference With Telegraph Lines by Wireless.—A curious phenomenon in connection with wireless telegraphy has been observed in the neighborhood of the Clichy-Levallois Railway station, near Paris. In proximity to the railway line some telegraph lines were recently erected on columns fitted with ordinary insulators. The workmen occupied on the section experienced severe shocks when they touched the wires. Experiments were made to discover the cause of this phenomenon and, as a result, it was found that the currents were produced by Hertzian waves originating from the wireless telegraph station at the Eiffel tower.

High-speed Wireless.—A London dispatch states that a high-speed wireless system across the Atlantic Ocean and to other parts of the world will be instituted in four months. The inventor claims to be able to transmit at the rate of 200 words per minute. Stations are to be erected at Lyons, France, and Washington, D. C. The improvement, the dispatch states, consists in "being able to control a continuous wave, as compared with intermittent waves by the present system." Reference was made in these columns June 16 to the Poulsen high-speed system which was recently tested between Cullercoats, England, and Lyngby, Denmark, a distance of 550 miles.

The English Imperial Wireless Scheme.

The agreement between the Marconi Wireless Telegraph Company and the British postmaster-general for the construction of long distance wireless stations for Imperial service, was published in London, July 24. It provides for the immediate erection of wireless stations in England and Egypt, and at Aden, Bangalore, Pretoria, and Singapore. They will be high-power stations, working day and night, each having a radius of 2,000 miles.

The terms of the agreement provide that the stations shall be operated by the company on account of the Government for the first six months, and thereafter by the Government. The company will receive $300,000 for each station, exclusive of the sites, foundations, and buildings, and it will receive ten per cent of the gross receipts of all stations so erected for a term of twenty-eight years from the date of the opening of the first three stations.

The Government will have power to end the agreement at the expiration of eighteen years, but in that event it would cease to have the right to use any of the company's patented processes.

Reminiscences of Forty-Six Years Ago.

BY FRANK B. KNIGHT, DALLAS, TEX.

With more than passing interest, I read the article of Mr. E. W. Collins in your issue of June 16 regarding the telegraph thirty years ago. What a flood of memories it revives, although it treats of a period so recent as only thirty years ago.

It was in 1866, forty-six years ago, that I joined the Western Union force in the office at the corner of Clark and Lake streets in Chicago. A half-partition separated the office from that of the Illinois and Mississippi Telegraph Company, or, as the latter was more familiarly known, the "Caton Lines." Messages to be transferred from one line to the other were passed through an opening in this partition, and with quite as much facility and more rapidity, apple cores and other junk found their way through the same aperture, and, depending on the accuracy of the aim of mischievous "forwarders," the missiles found lodgment on various parts of the anatomy of the persons aimed at, and others, too, much to their consternation and disgust.

Who of those days will not call to mind Leonard Huyck and the Mason boys, Stephen and John; Cass G. Sholes, David S. Anderson and Edward P. Whitford, old war horses, commanding the admiration and affections of all who knew them; Jas. E. Pettit, who served so long and faithfully as secretary of the Society of the United States Military Telegraph Corps, and who endeared himself to all with whom he came in contact in those days and in all the years that followed; Edward Angell, always amiable and entertaining, who, while still in the vigor of youth, succumbed to the small-pox epidemic in Chicago in the early eighties, and Louis H. Korty, who afterwards succeeded John J. Dickey as superintendent of the telegraph lines of the Union Pacific Railroad, and gained the confidence and respect of the officials of that great system to such an extent that for some time he has been in honorable retirement.

The suave and courteous George C. York, who, in his capacity of assistant chief operator, smoothed the way and quieted the passions of a number of the younger men, myself included, who often felt they were being mercilessly tyrannized over by other officials "higher up." It was something of an experience on a Sunday morning to attend the services at Trinity Episcopal Church, then one of the most frequented and fashionable in the city, and see this same George York garbed in white surplice, his face illumined with an expression of saintliness, read from the lectern the gospel lessons of the day. His demeanor was reverent and his earnest purpose could not be mistaken. His daily life in those days was an exemplification of all he professed, and he was an object, almost of adoration by all of his associates. Many an operator in the old Chicago office found his way into that church at times because of George's beneficent influence. And there was "Dug" Burnett, George York's most intimate friend; a star operator who worked the Pacific circuit, sometimes through to the coast, but oftener only as far as Salt Lake City. The task was a hard one, and attended with much responsibility, for the wires were of iron, of low conductivity and defective insulation, and the highest priced and most important traffic of the telegraph company passed over them. Nor were there then in existence the devices that have since rendered the operator's lot much more tolerable.

And who remembers George B. Cowlam, to my mind one of the most marvelous operators the business ever developed. A market report was started in those days from Cleveland at about five in the afternoon. I was assigned to take this every other day from that hour until six. Cowlam was the regular night operator on that circuit, and would saunter in a few minutes before six, remove his coat, get out his pipe and tobacco and tell me to go. Without breaking, he would deliberately light his pipe from a taper made of a piece of paper and stuck in

A GROUP OF WELL-KNOWN OLD TIMERS.

the stove nearby, and then sit down and proceed to put on paper what had been coming over the wire at an astonishingly lively clip. Considering that this report was largely made up of figures and fractions, I have always regarded Cowlam's feat of copying behind the most extraordinary performance that ever

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The accompanying illustration was made from a photograph loaned us by Mr. Knight. It was taken forty-four years ago, and Mr. Knight says: "If it lacks interest as to the persons represented, it should attract attention as an example of the fashions in wearing apparel those days. Note the broad stripes on the trousers of Earl Rudd and Dave Anderson and the very narrow tie around the neck of Lou Korty. You may be certain that it was all *au fait*, for much attention was paid to dress by the dudes herein depicted." The persons shown are: standing, left to right, L. H. Korty and F. E. Angell; sitting, left to right, E. J. Rudd, F. B. Knight and D. S. Anderson. The photograph was taken on October 10, 1868.

came under my observation. He afterwards became private secretary to General Benjamin F. Butler when the latter was serving as congressman from and Governor of Massachusetts. The years appear to have since swallowed him up.

Mr. Collins refers to seeing in St. Louis "Tom" Wheeler's copy for the first time in thirty-eight years. How well I recollect Tom and his unexcelled copy. He was with me in the Western Union office at Omaha when I was chief operator, the year of the Modoc war. It was in May, I think, that all traffic was interrupted on the Union Pacific railroad by a terrific snow-storm. The wires and poles of both the railroad and the Western Union companies were prostrated for hundred of miles, and it became necessary for the Omaha force to take everything from the East and hold it until an opportunity offered to forward the accumulated matter by train. The messages were recorded in ink, so that copies might be retained at Omaha. Much of this work was done by "Tom" Wheeler, and well I remember with what a feeling of pride I sent this copy forward that others might share with me the pleasure of seeing something truly artistic.

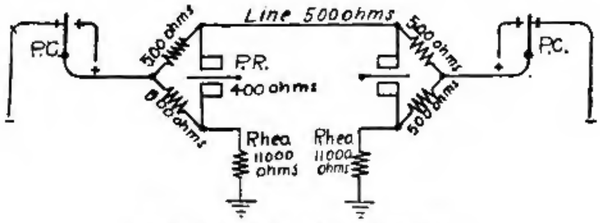
Perhaps I have taken up too much of your space; but as the years flit by there is a temptation to retrospect and to call to mind old times and old associations. I believe the inclination to do this is more pronounced among old telegraphers than among the members of other professions. Just why, I do not attempt to explain, but the early associations seem to have established friendships that time cannot dim nor age destroy.

Some of the old timers have attained high positions and opulence, but not so many as deserved those rewards; and others have passed to the great beyond. Those who still plod the weary way rejoice in the prosperity of the fortunate and fondly cherish the memories of their departed brothers.

A Bridge Duplex Problem.

BY D. B. GRANDY, ST. LOUIS, MO.

In the course of a lesson on balancing which was being given to a beginner recently by one of our duplex men, a singular fact was developed. Two bridge duplex sets were connected together through resistance (see diagram), and the beginner, in trying to balance his set while the duplex man was writing on the other, removed plug after plug in his artificial line, until he had them all out. There were



BRIDGE DUPLEX PROBLEM.

then 11,000 ohms in the artificial line, against 500 in the "main line," and yet his dotting on his pole-changer did not break up the sending from the other end, which, though somewhat "wobbly," was still readable.

A study of the theory of the bridge duplex will show why it acts in that way. If a line wire is substituted for the resistance, the effect is the same, so long as the insulation is good. An escape on the line wire, of course, alters the conditions, and it will not work.

Old Timers' Reunion.

The publication in our issue for July 16 of the programme of the Jacksonville reunion of the Old Time Telegraphers and Historical Association and Society of the United States Military Telegraph Corps has aroused considerable interest in the event, and from present indications there will be a large attendance. The president of the Old Timers, Hon. W. S. Jordan, is mayor of Jacksonville, and will stir up interest in his city in behalf of the visitors. Being an old-time telegrapher himself he is in thorough sympathy with the object of the organizations and will not neglect anything that will tend to enhance the enjoyment of the party while in his city. The hospitality of the South is not only an idea; it is a tangible fact, as the members have good reason to know from former experiences.

The programme as published is an interesting one and it is sufficiently wide in scope to insure an enjoyable time for everyone who attends the reunion.

Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old Timers' Association, and has charge of matters pertaining to transportation, etc.

New Book.

WIRELESS TELEGRAPHY AND TELEPHONY, By C. I. Hoppough, Valparaiso, Ind. This work has just come from the press and is the most up-to-date and complete treatise on these subjects. It contains about 200 pages of descriptive and illustrative matter pertaining to wireless and more than 150 illustrations. There are sixteen chapters describing in detail the development of wireless telegraphy and telephony from its inception to its present state of efficiency. The book embraces the following subjects: Matter, Motion and the Ether; Electricity and Magnetism; Quantitative Electricity; Dynamo Electric Machinery; Electro-Magnetic Induction; Capacity and the Oscillatory Discharge of Condensers; Electro-Magnetic Waves; Early Experiments in Wireless Telegraphy; Detectors; Receiving Circuit and Tuning Apparatus; Transmitters; Spark Gaps; Aerials; Wireless Equipment and Telegraph Stations; Wireless Telephony; Wireless Operating.

Mr. Hoppough, the author, has been in the wireless field for six years, having held some of the most important positions with the United Wireless Telegraph Company. This work is not only an invaluable treatise for the amateur, but a most valuable book of reference for the wireless telegrapher.

The price of the book is $1.50 per copy and copies may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

The Part the Telegraph Played at the Recent National Political Conventions.

The national political conventions of 1912—Republican in Chicago, June 18-22 and Democratic in Baltimore, June 25 to July 2—called for extraordinary telegraph facilities, says the *Journal of the Telegraph.* The number of words of press dispatches relating to the convention sent out over Western Union wires from Chicago was as follows:

Highest single day (June 19)	747,523
Convention week (June 17-22) ...	3,465,562
Average per day	577,593
Total for period, June 12-23, including the preliminary meetings	4,636,336

So many political conventions have been held in Chicago that the organization and operations were in charge of experienced veterans. The enormous press traffic load was handled with scarcely a ripple, although it was superimposed on a very heavy load of regular commercial traffic.

In charge was Mr. T. P. Cook, general superintendent Western Division, with his division aides: M. T. Cook, commercial superintendent; W. J. Lloyd, traffic superintendent, and R. W. Whitehead, superintendent of plant. A trained corps of experienced assistants had been assembled in each department, resulting in systematic operations producing best results.

Baltimore, however, presented new and difficult problems requiring the installation of special plant facilities and the transfer of a large administrative and operating force from other cities. The amount of matter handled fell below that of Chicago, but still exceeded the records of other conventions.

The day following that on which it was decided the convention would be held in Baltimore, plans were ready for an underground cable between the main office at Calvert and Fayette streets, and the Fifth Regiment Armory, a distance of approximately one and one-half miles, and for additional equipment at the main office. So well were these plans worked out that they were not deviated from in any way save the most trivial particulars, and the completed work represented the fruition of the plans agreed upon.

The underground cable carried 202 conductors, some of No. 14 gauge and the others of No. 16 gauge copper wire, made especially for the occasion by the Western Electric Company. Eighteen of these conductors were used for battery supply, four were set aside for two telephone circuits as an additional means of quick communication between the main office and the convention hall, and the remaining 178 were assigned to handle the heavy business expected.

A large operating room was installed just back of the rostrum at the convention hall, and equipped with seventy-four operating positions, sixty-six of these positions being standard operating tables without typewriter cuttings. Fifty positions were so arranged that by the simple action of reversing a plainly marked switch the set could be worked either single or duplex. The remaining twenty-four positions were equipped for single Morse line service. A spacious customer's lobby with a standard blind-top counter was provided, and ample arrangements made for messenger boys. Electric lights, fans, fire-extinguishers and water coolers were provided.

The main office was originally equipped with 132 operating positions (some not equipped), of which about seventy-five were nominally in use. This was later numbered to 186 positions fully equipped. Six old-style duplex sets were increased to twenty-four standard sets equipped for interchange of circuits with the telephone company, and ten old-style quadruplex sets were increased to thirty-four of the Athearn type.

An additional loop switch with 132 jacks was also installed at the main office and connected by means of "fly" loops to the regular loop switch and seven-section main line switchboard. The operating positions at the convention hall offices were numbered and connected directly with the special loop switch at the main office, where they terminated in plugs bearing the same number. By this means the man in charge of the loop switch, being in direct communication with the hall by telegraph and telephone, was in complete control of the situation and could make promptly any change desired.

The Belvedere Hotel, situated about six blocks from the hall, was the gathering place for the newspaper men, and in order to afford them ample and convenient telegraphic accommodations, a three-story dwelling at No. 1104 North Charles street was rented and converted into a large branch office. The first floor was used as a customers' lobby, being equipped with a counter and convenient tables and chairs, and an operating room with nineteen operating positions, four of which were arranged for either single or duplex work. One of the press associations had the second floor, and the company installed nine operating positions for its use. To reach this office it was necessary to pull in two 19-conductor cables each 3000 feet long.

Several other branch offices were opened in hotels and office buildings, etc., and all offices put in first class condition.

The traffic department arranged to transport to Baltimore's aid cars for over one hundred operators from various parts of the country, while the commercial and plant departments had competent forces on hand for any emergency.

Great credit is due to the local and district employes of the three departments for the excellent work of preparation they performed, but special credit is given district supervisor of equipment S. R. Crowder and district foreman J. O. Edmondson, who with their forces accomplished the trying and difficult task set them in so creditable a manner.

Mr. Dooley Visits a Telephone Factory.

"Ye know what a tillyphone is, Hinnessy—the little dingus ye lie to yer woife through when ye want to stay downtown av an avenin'? Yez call it a "phone,' but 'tillyphone' is the roight name fer ut. It comes from the Grayk wurrd 'tilly,' manin' 'to tell,' an 'phoney,' meanin' somethin' bogus; so whin ye tell them little fibs to yer woife, ye're usin' it accordin' to Hoyle. If I was a married man, Hinnessy (which, thank the Lorrd, I am not), I wud starrt a movement to raise a monymint to the man that invinted the tillyphone. Wid a tillyphone an' six moiles av capper wire, a man kin lay down the law to his woife in a dignified way, widout havin' to go to the ixpense av buyin' a new rollin' pin afther-wards.

"I was out to Hawthorne last wake, visitin' the Westerrn Aylictric Comp'ny's place, where they make thim things. Man, man, but it's a foine place! Whin ye go in at the gate, ye are shtopped be a felly ye take fer a polaceman, until ye see thot he ain't Oirish. He wants to know who ye are an' what yer business is. I tol' him I wanted to see the place.

"'Have yez a pass?' siz he.

"'Past is it?' siz I. 'Shure, do ye have to exhibit yer family skiliton to git through these worruks?'

"'No, no,' siz he, 'Oi don't care about yer past. Oi siz "pass"—a permission to go through the plant.'

"'No, I ain't,' I siz. 'But, maybe ye could git me wan; I'm perfissor av applied electricity (which I am, Hinnessy, fer don't I turn on me own electhric loights'?)

"So I got me pass an' a guide to show me through the worruks. Wan av the things thot struck me furrst was the big clocks shtanding around iverywhere, so's the help will know whin to stop worruk. They looked loik an orthinary toimepace, except thot they had a big circle around thim, wid numbers on it, an' a handle thot ye tuk an shtabbed at the numbers wid; if yez hit the bull's-eye, ye rung a bell. An' they shure have some marksmin over there, Hinnessy. Wan after another walked up to thim clocks, an' divil a wan missed the bull's-eye.

"Siz I to me guide, 'Phwat do they all crowd in so fast for?'

"'Why,' sid he, 'the 8:30 whistle has blew, an' they want to poonch in before the clocks register 8:31. Fer if they're a minnit late, they're fifteen minnites late.'

"'Wud ye moind doin' thot on paper fer me?' I asked. 'Me arithmetic ain't as spry as it was some years back.'

"'Shure,' he siz. 'I don't know how it's figgered. Thot ain't my job, but I know thim's the rooles.'

"No it luks to me, Hinnessy, loike they was infringin' on me frind Billy Bryan's copyroight. Thrue, *he figgered* sixteen to wan instid of fifteen to wan, but the principle's the same, an' afther all, what difference does a figger make, as the ossified man said whin he married the fat lady.

"'An' pwhat kapes track av the night force?' I asked.

"'Why, thim same clocks,' siz he.

"'Thin,' siz I, 'why the divil have they got 'em labeled "Dey Time Registers?"'

"'Ye kin search me,' he siz.

"It's a moighty big force they got over there, Hinnessy—hunderds an' hunderds of gurruls, an' ivery wan chewin'.

"'Phwat are they all atin?' I asked the felly.

"'They ain't atin',' he answered. 'They're only chewin'. Ye see, we don't allow thim to chew the rag durin' wurrkin' hours, so they takes to gum. It takes six gum factories, workin' noight an' day, to supply the T. A. buildin' alone.'

"'It's nice woide aisles ye have here,' I remarked, 'but ain't they afther bein' woider thin necessary? Ye waste space.'

"'Yis,' siz he, 'they're pretty wide now, but they was laid out whin hair was in style. Why, a few months back a man had to go through these aisles sideways an' push his shadow through ahead av 'im, to git past the coiffoors widout takin' home enough av thim on his coat to git him in throuble wid his woife. But the comp'ny cudn't git along widout the girruls. Ye know the fair sex complately outclasses us min whin it comes to conversayshun, so the comp'ny hires thim to learn the baby 'phones to talk. Why a man thryin' to butt into the conversation av our gurrul experts wudn't shtand as much chanct of gittin' a hearin' as an echo at a deaf mutes' convintion.'

"An' there's the Worruks lab'ratory, Hinnessy. Thot's a quare place. They've got all kinds av shtrange infernal machines, ay-lictrical an' chimical, to help thim in their business, which is to call an all-wise but sometimes onrooly Providence up on the cyarpet an' make it explain itsilf whin some conthraption or ither rafuses to come up to 'spec.' 'Spec.' is short for 'specifications,' which is a sort of a Bible iverywan has to live up to, over there. It's diffrunt from the old wan, though. It cuts out the Prophets intoirely. Still, it makes up fer thot by bein' extry shtrong on Commandments. But, as I was sayin', av all the quare conthraptions yez iver seen, they've got the quarest. Oi don't want to brag, but ye knows yersilf, Hinnessy, I've been in some of the foinest bar-rooms in this conthry, but niver annywheres have I seen a colliction av glassware to aqual theirn. Why, if a man took a drink of wake tay out av wan av thim twisty bottles they have, it wud take him six wakes to git his legs straightened out agin.

"But, shpakin av twistin', Hinnessy, did ye iver see an insultin' machine puttin' insults on wires? Well, ye don't want to. It luks loike sivinteen attacks of delirium tremens thryin' to bust up a Maypole dance. If I had to luk at wan of thim machines all day, I'd sign the plidge.

"But don't ye be gittin' the notion in yer head thot machines is all there is over there. They've got a libr'y an' a band an' orchesthry, not to mintion the Men's Club, which kapes the mimbers supplied wid lectures, voddyville an' nickel shows free of charrge.

"An' they've got ball grounds an' tinnis coorts an' sick-likes fer thim as wants to amuse thimsilves at noon, an' a rist'rant fer the old-fashioned wans thot wants to ate. An' take it from me, Hinnessy, as the b'ys say now-a-days, it's *some* rist'rant. There's a siction upstairs, where ye ate on pay-day at not less thin twinty cints a throw; an' the rist av the wake ye kin ate downstairs on the Open Board, where the ante runs from a penny up to whativer you've got. Things shure are fixed up foine. Ye kin git a piece av pie wid decorayshuns on it for tin cints, an' they aven kape burrds for the eddyfication av the guests. An' mind ye, it ain't none av yer quick-lunch joints. It's genteel. I waited half an hour before I got a bite to ate at all. I made wan bad break, Hinnessy, an't it's ashamed av it I am. I ordered a steak, an' afther a bit the young lady sits down a plate befure me. I looked at it, an' thin I siz to her, 'Beggin' yer parrdon, Miss, but it's a dirthy plate ye've brought me.'

"'Dirthy?' siz she. 'It looks clane to me. Where's the dirrt, plaze?'

"I pointed out the spot to her.

"'Why, bless yer soul,' she siz, 'thot ain't dirt. Thot's the steak!'

"An' may ye stroike me dead, Hinnessy, if it wasn't."

"An' was the steak good?" asked Mr. Hennessy.

"Sh-sh-sh," said Mr. Dooley. "I promised on the worrud of a gintlemin not to divulge any company secrets."—*Western Electric News.*

What Are Earth Antennae?

BY ANDREW PLECHER, LAS ANIMAS, COL.

Earth antennae, being the latest development of the wireless art, ought to be highly interesting to the reader; and, since the main points were published by a German company the very moment the American inventor sought to arrange for foreign patents, and, since any publication deprives the inventor of most of the foreign rights, thus nothing more can be lost by publication. Following is a popular and yet scientific explanation of what is meant by the new earth antennae in contradistinction to air antennae in use at present.

On approaching a wireless station, the first object which meets the eye is the huge mast supporting a wire having a dead end in the air, the other end being grounded through the spark-gap when sending and through the minute detector-gap when receiving. In larger stations this one wire branches out into many wires having so many dead ends in the air and perhaps necessitating more masts to support them. This is the old way of arranging antennae, the new way differing only by doing away with the dead end in the air.

For the sake of popular explanation, picture the earth as a metal ball having radially a needle protruding from its surface. Charge the ball with electricity and it will be found that most of the charge will run up the needle. This is really the principle upon which wireless telegraphy is based. The fact, that the charge will accumulate in the needle and, so to speak, will try to get away from the ball, makes long-distance wireless receiving possible. When sending, this dead end wire acts as an accumulator, which is immeasurably first charged and then discharged into the earth many hundred thousand times a second, constituting wave-length, which action is reproduced in the receiving wire, much weakened, however, as the distance becomes greater. Naturally, this reproduction is favored and more faithful when the receiving wire is exactly like the sending wire and therein lies the meaning of syntony, which is a balancing of two wires or systems according to capacity and inductance, or, size and shape of wiring. So much to elucidate the mysterious wireless.

At all times engineers have attempted to improve wireless by sending enormous charges, but there seemed to be a limit. Although they used still more powerful engines, not very much more was effected. Many drawbacks of the present system were recognized and promptly excused because nothing better could be invented. First, many maxima of energy are proven to exist in the dead end wire while sending out charges; second, syntony has little elbow-room, since after all a dead end wire has no essential departures; third, wave lengths of 500 feet and 1000 feet can only be laid off on a wire running that high up in the air and then, last but not least, the higher the wire the more charge it will hold back. In a word, air antennae are good enough as far as they go, but they are not the thing for wireless. It remained for the American inventor to point out that a complete electrical circuit was possible by using earth antennae; that with earth antennae perfect syntony could be had; that all energy would be radiated and not only that, but another great advantage, resonance, was attainable.

All this was accomplished by running the insulated antennae wire parallel to the ground and grounding it at regular intervals according to the requirements of perfect syntony, in place of running the antennae wire into the air.

It will be seen that by the invention of earth antennae, in order to obtain the best results, stations will have to be built according to a predetermined wave-length, and that one wave-length will serve a particular purpose. For instance, all coast craft may have one wave-length, whereas sea-going vessels may have another.

This brings us face to face with resonance and its particular benefits. This idea opens a new and large field of invention and will be considered in another article.

How the Telephone Transmits Sound.*

Sound is a vibration or series of waves in the air set up by a vibrating solid body. When these waves reach any other solid body, which is capable of vibration, they start it to vibrating in tune. When one person speaks to another a vibration is set up in the speaker's vocal organs, air waves issue from his mouth, and striking upon a tightly stretched membrane in the listener's ear, called the ear drum, set that into corresponding vibration. The vibration of the ear drum is conveyed to the listener's brain by the nerves, and there translated into what we feel as sound.

The telephone is an instrument for taking air waves, translating them into electrical waves, and then at the other end of the line translating them back into air waves just like the original. The telephone transmitter turns air waves into electrical waves, the telephone receiver turns the electrical waves back into air waves.

Fig. 1 shows a standard transmitter cut through the middle to show the internal parts. It consists essentially of three parts: the receiver of air waves, the transmitter of electrical waves, and the containing case holding the parts together and excluding dirt and moisture.

The sound-receiving part is somewhat similar to the human ear. It consists of the conical mouthpiece (a), corresponding to the outer ear; and the diaphragm (b), which is a flat disc of thin metal clamped around the edge and free to vibrate in the middle, corresponding to the drum.

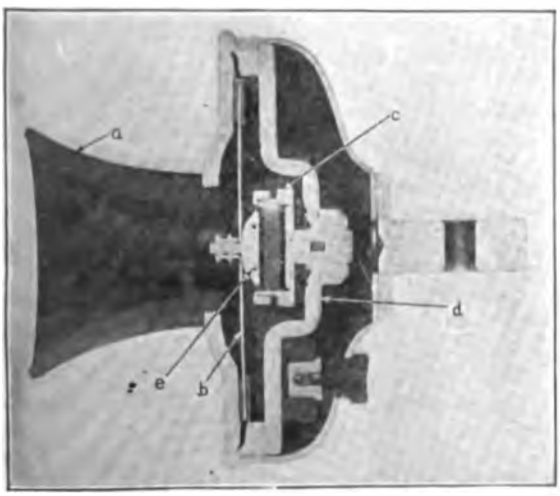


FIG. 1.—CROSS-SECTION OF TRANSMITTER.

Shown in cross-section, it appears as a thin vertical line.

The air waves from the speaker's mouth pass in through the mouthpiece and beat upon the surface of the diaphragm, setting it into vibration.

The transmitter of electrical waves consists of a small round box (c), like a pill box, partly filled with fine grains of hard carbon. This is known as the button.

As shown in the picture, the back of the button, or the pill box proper, is firmly attached to the frame (d) of the instrument, which is heavy and so cannot vibrate. The front (e) of the button, or the pill box cover, is attached to the middle of the diaphragm and vibrates with it. This alternately presses the carbon granules together very slightly and then relieves the pressure.

The two wires bringing in current from an electric battery are connected respectively to the front and back of the button, and the current must flow through the carbon granules. Now as the carbon is poured in loosely and the grains touch

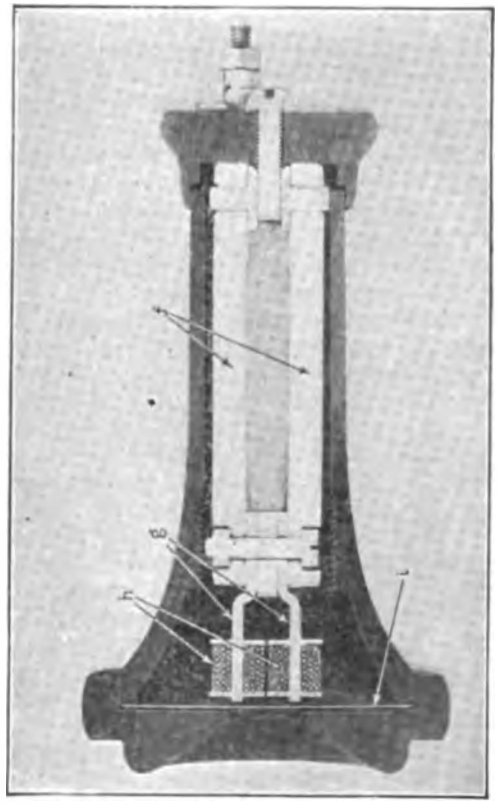


FIG. 2.—CROSS-SECTION OF RECEIVER.

each other lightly, the electrical path is not a very good one, and therefore the current which flows is less than the battery would be capable of supporting were there a good solid connection.

If the diaphragm is pushed in to the right, however, the grains of carbon will be pressed together and the current will flow more freely. That is just what happens when one speaks into the mouthpiece; that is, the button cover moves rapidly in and out and the strength of the current varies correspondingly. Thus electrical waves are sent out over the wires.

The vibration of the diaphragm is very much less than one-thousandth of an inch at most, and the rapidity of its vibration varies from about 200 movements per second to something like 3,000. It is marvelous that this simple, crude-appearing little device, the carbon button, should be able to translate the sound waves into electrical waves so faithfully that when translated back into sound waves in a telephone receiver, perhaps hundreds of miles

*Western Electric News.

away, we are not only able to understand words, but even to recognize the voice of a friend; but such is the fact.

Fig. 2 shows a standard receiver cut through the middle to display the internal parts. The principal parts are the magnet, the diaphragm and the containing case. The magnet consists of two sidepieces (f) which are of hard steel permanently magnetized, two soft iron polepieces (g), one of which is a north pole and the other a south pole, and which are wound with fine wire (h).

The two wires of the telephone line are connected to the fine wire windings so that the electrical waves received from the transmitter at the other end of the line pass around and around the polepieces.

The diaphragm (i) appearing in the picture as a straight line, because it is seen on edge, is a round, flat disc of thin sheet iron, clamped around the edge by the case, but free to vibrate in the middle. It is seen to lie very close to the ends of the polepieces of the magnet. Being of iron, it is attracted by the magnet and therefore bends in towards it very slightly.

If a current of electricity is made to flow through the wire wound around the polepieces, it will either strengthen the magnetic pull and draw the diaphragm a little closer, or if it flows in the opposite direction it will weaken the magnetic pull and allow the diaphragm to spring back a trifle.

Now, the electrical waves coming over the line consist of very minute currents, first in one direction and then in the other, and the result is that the diaphragm vibrates back and forth in tune with the electrical waves. In other words, the receiver diaphragm faithfully reproduces all the vibrations of the distant transmitter diaphragm.

It is apparent that the receiver diaphragm is like a drum head or banjo head, and as it vibrates it beats on the air and sends out air waves or sound waves which are in every way similar to the sound waves issuing from the distant speaker's mouth, except that they are not so loud. Therefore, when the listener presses the receiver close to his ear, he hears the speaker's voice just as if he were in the same room.

To give some idea of the very minute currents which are used to transmit speech over a telephone line, the currents which give understandable speech in a receiver at the end of a very long distance line are something like one five-thousandth of an ampere. From this the currents go up as much as one-hundredth of an ampere, right near a transmitter into which one is talking in a very loud tone. One ampere is about as much current as is taken by two ordinary sixteen-candle-power incandescent lamps.

New Timber Preservative.—Aczol is the name of a new patented timber preservative. It is composed of metallic ammoniates with an antiseptic acid having no deleterious action on wood or metals. When facilities are not available for vacuum and pressure impregnation, cold immersion in aczol is stated to give satisfactory results.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What is a Wheatstone bridge, and why is this particular arrangement given this name?

Is it necessary that the Wheatstone bridge should be arranged in the shape shown on page 76 of Schneider's book on Electrical Testing?

Under what conditions does the current divide equally between the two arms A and B?

Upon what fact is the Wheatstone bridge based?

What is meant by points of equal potential?

Referring to Fig. 58 on page 76 will any current flow through the galvanometer if the points of connection with the two sides of the circuit are at the same potential?

If they are not of the same potential what will be the effect upon the galvanometer?

If, on closing the key in the galvanometer wire there is no deflection of the galvanometer needle what does that fact indicate?

What is the relation of the Wheatstone bridge to arithmetic?

There are two keys in a Wheatstone bridge set; why should the battery key be closed before closing the galvanometer key?

What is the "Postoffice" bridge?

If it is desired to measure the resistance of a coil of wire what is the procedure?

If in measuring resistance a certain amount of rheostat resistance is unplugged and there is no deflection of the galvanometer needle what does that fact indicate?

If the deflection is on the + side of the scale what does it indicate?

If the deflection is on the — side, what does it indicate?

If there is a deflection of the needle, how is the needle brought back to zero?

What is the general rule to be observed in unplugging resistance, with reference to the resistance to be measured?

The student should study carefully the examples and explanations given on pages 81, 82, 83 and 84 in connection with the illustration, Fig. 59, on page 78, and it is advised that tests be actually made if a testing set is available.

Study well the formula on page 84, and the distinctive features of the various testing apparatus described and illustrated should be understood.

London Radio-Telegraphic Congress.

At the International Radio-Telegraphic Conference held in London June-July, it was decided to hold the next international conference at Washington, D. C., in 1919.

Among the leading points of the recommendations adopted at the London conference were the following: Regulations to prevent interference in crowded areas and designed to make wireless telegraphy of the greatest possible use in saving life and property at sea, and making it also more valuable commercially. Every hour all ships must remain silent for ten minutes, listening for distress calls. A distress ship is to control the magnetic field of her radius, and should many ships answer her distress call she shall determine which is to remain silent, thereby avoiding confusion.

The proposals submitted by the United States were received with great interest, and were generally accepted, particularly the provisions tending to insure safety at sea, compulsory inter-communication between all systems, and the reporting of meteorological data. Weather observations are to have the right of way over commercial dispatches.

The following wave lengths were adopted for commercial business: Short and medium distances, 300 to 600 meters; longer distances, 1,800 meters. The military interests of Great Britain and France prevented the adoption of the American proposal for a general commercial wave length of 800 meters.

The congress adopted an elaborate code governing the interchange of business between rival wireless companies, which are no longer to be permitted to disregard each other.

At future congresses the United States, Great Britain, Russia, Germany and France are each to have six votes, Italy three, Spain and Portugal two each and the other nations one each.

The following countries were represented at the conference: Argentina, Austria-Hungary, Belgium, Bosnia - Herzegovina, Brazil, British Colonies (Union of South Africa, Australia, Canada, India, anl New Zealand), Bulgaria, Chili, Denmark, Dutch Indies, Egypt, France, Germany, Great Britain, Greece, Holland, Italy, Japan, Mexico, Monaco, Morocco, Norway, Persia, Portugal, Roumania, Russia, Siam, Spain, Sweden, Turkey, United States, Uruguay—a total of 36, including the British Colonies separately.

Telephone Statistics of the World.

In a pamphlet giving telephone statistics of the world, prepared by Mr. W. S. Gifford, statistician of the American Telephone and Telegraph Company, New York, it is stated that there were approximately 12,453,000 telephones and 29,566,000 miles of telephone wire in use in the world January 1, 1912. Compared with January 1, 1911, this is an increase of 10% in telephones and 9% in wire. A careful estimate places the world's telephone investment January 1, 1912, at about $1,729,000,000, which is very nearly the value of all gold coin and bullion in the United States. The annual number of telephone conversations may be placed at 22,000,000,000, which is about five times the annual number of passengers carried by all the railroads of the world.

During the past year the long distance telephone service of the world has received notable extensions. In the United States commercial service was opened between New York and Denver, 2,160 miles, this being now the longest distance over which oral communication is given commercially. In Europe long distance service has been greatly extended by utilizing both the new loaded cable between Great Britain and Belgium—by which telephone service is expected to be given between London and Berlin—and the new telephone cable, constructed also on the Pupin principle, between Dover and Calais. The latter enables conversation to be carried on between Glasgow, Edinburgh and Paris, and also between Aberdeen and the French capital, a distance of 910 miles. Successful trials have also been made between London and Geneva, a distance of 560 miles, and from London to Basel, a distance of 600 miles.

Recent progress in the art of submarine telephone cable manufacture will have far-reaching consequences. At the present time there are over 400 miles of submarine telephone cable in use in the world, and of this total about one-half is represented by the four cables between France and England, and the two between Belgium and England. The longest submarine telephone cable lies between La Panne (Belgium) and St. Margaret's Bay (England), a distance of 55 miles.

The European international long distance land line systems have likewise received important additions, due to the opening of the line between Paris and Madrid, 900 miles, and the direct line between Berlin and Rome still under construction, a distance of over 1,000 miles. As regards the Continent, there is now scarcely any important city that cannot talk with any other important city. By far the largest interurban or toll telephone plant in Europe has been built by the German Government, which, according to the latest official statistics, had about one-half of the total interurban or toll telephone wire of Europe.

Finally, it is worthy of note that during the year 1911 the great United States railway systems have made rapid advances toward the general use of the telephone for train despatching. Since the introduction of the use of the telephone for that purpose, over 200 of the United States railroads have adopted that system. In fact, the telephone has supplanted the telegraph on over 50,000 miles of railroad, which is over 20 per cent of the total railroad mileage of the country. A careful estimate places the miles of wire used by railroad companies for train dispatching at 120,000, and the corresponding number of telephones at 10,000.

Mr. J. J. Barnett, manager of the Postal Telegraph-Cable Company at Knoxville, Tenn., in renewing his subscription, writes: "To say that your journal never wears out its welcome with me is putting it very mildly. You have my very best wishes for its continued success."

Ground Connections.

The establishment of a ground connection which shall permanently serve its purpose under all conditions is of the greatest importance, but is by no means so simple a matter as might at first appear. The ohmic resistance of the contact between the ground plate and earth must be as low as possible. Its value will increase as the surrounding soil dries—slowly if under the action of atmospheric changes, quickly if under the heating action of a heavy ground current. The ordinary laws of resistance no longer apply, thus the section of a ground connection may be doubled without reducing the total resistance more than a few per cent. The inductance of the ground connection is governed by the length, number and disposition of the conductors employed. Whereas aerial lines are little affected by oxidation and electro-chemical action, even after several years in service, ground plates or rods are more or less rapidly corroded by chemicals in the adjacent soil, direct chemical attack being accelerated by electrolytic action. The presence of electrolytic salts in the earth surrounding grounding conductors, greatly reduces the overall resistance of the grounding path, and, if no naturally damp soil, in which such salts are present, can be found, the ground should be artificially moistened with an electrolytic solution at such intervals as are found necessary.

Experience shows that iron tubes, one inch to two inches in diameter, and not less than six feet long, form very satisfactory ground contacts when driven vertically into suitable soil. A few inches of the tube should remain above ground in order that the joint between it and the copper leads from the circuit grounded may be protected from electro-chemical action. Joints should be as few and as perfect as possible. If sufficient depth of soil cannot be prepared to allow of the above arrangement, a shorter tube of larger diameter may be employed or a number of strips radiating to form a "star" may be buried as deeply as possible. Wire netting forms a serviceable ground connection when only small currents have to be carried, and corrugated sheet iron has also been used in many cases.

The space in which the ground conductor is to be placed is generally filled round with coke, and, if there is any doubt as to the sufficiency and conductivity of natural moisture, the coke should be saturated with a solution of sea salt, carbonate of soda or sodium chlorate. Deterioration of the electrodes is more rapid with the chlorate than with the carbonate of soda, but the resistance is lower in the former case. Sea salt gives the best all-round results and to maintain a supply of electrolyte, an annular basin should be formed round the head of the grounding rod and into this a few handfuls of salt should be placed from time to time. The bottom of the bowl is, of course, perforated to allow leakage of the salt solution.

Useful practical observations on the resistance of earthing circuits are as follows: Beyond a depth of a foot or two, the resistance of the grounding path provided by a vertical rod diminishes in inverse proportion to the total length embedded. The greater part of the resistance of an earth circuit lies in the soil immediately adjoining the ground conductor; the net resistance of *n* earthing conductors in parallel (placed six feet or so apart), is approximately the eleventh part of the resistance of a single conductor. The resistance between two grounding conductors becomes practically constant when the distance between them exceeds six feet, and has then a value practically equal to the sum of the individual resistances of the conductor earth paths; within a separation of twelve inches, the total resistance increases rapidly. It naturally follows that the maximum fall of potential is observed in the immediate neighborhood of the grounding rod and the "concentration" of potential increases with the dryness of the soil. For every ground conductor, there is a critical current above which the resistance of the earth contact rapidly rises if the current be sustained; the maximum current which the conductor will carry without appreciable increase in resistance to ground depends on the contact surface exposed and on the quantity and nature of the moisture available in the neighborhood. Two grounding rods placed close together offer little less resistance than either alone, and, for the same reason, rods of two-inch and four-inch diameter show little more than ten to twelve per cent difference in ground resistance.

In order to reduce the inductance of grounding circuits to a minimum, angles and loops should be avoided, all connections being as straight and therefore as short as possible. High frequency conductors are practically confined to the surface layers of conductors in which they flow ("skin" effect), and it therefore follows that a metallic tube offers practically the same impedance to high frequency currents as a solid conductor of the same periphery. Minimum inductance and weight of material are alike secured, in such cases (including wireless telegraphy circuits), by the use of separate wires in parallel. Ordinary iron wire offers considerable impedance owing to its magnetic nature, but if galvanized iron is used greater durability is secured, and, owing to the skin location of high frequency currents, the impedance is much less. Copper offers minimum impedance and is yet more durable.—*L'Industrie Electrique.*

The Telegraph and Telephone in Campaigning Tour.—On his campaigning tour President Taft's "flying squadron" of automobiles made some fast runs between several New Jersey towns. The Newark joint telephone-telegraph office of the New York Telephone Company had its car close on the heels of the party at all times ready to give quick service, which was greatly appreciated, especially by the newspaper men. According to the New York *Telephone Review,* nearl.y 30,000 words of "press" were filed. Instead of having to hunt up a telephone or telegraph office the newspaper reporters flocked to this car at the end of each speech by the President, and the messages were rushed by messenger to the nearest Western Union or New York Telephone Company office for transmission.

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New York, August 1, 1912.

How a Telephone Transmits Speech.

There is considerable haziness in the minds of many people as to how the telephone transmits the sound of the human voice over a wire hundreds of miles in length. Some think that the sound vibrations are actually transmitted over the wire and magnified at the other end, and many others do not think at all on the subject, and probably care less, so long as they can converse by telephone when they want to. There may be a few of those ignorant souls left who believe that the telephone works in the same way that the telegraph does, that is, there is a hole through the wire and the messages are blown through the hole. However, to those who are willing to know how the interesting act is performed, the illustrated article on another page in this issue, telling how a telephone works, will be welcome. The users of the telephone should know how this highly interesting and useful instrument does its work and the article in question is written in such plain language that no one can fail to understand. There is no mystery about it.

Telephone Pioneers Meeting in New York.

The choice of New York as the meeting place of the next reunion of the Telephone Pioneers of America is a happy and sensible selection. There is no more delightful place in the East at that season than New York, and being the headquarters of the great interests represented by them the very best will be placed at the disposal of the members.

At gatherings of this character it is always the aim and desire to secure the presence of leaders and there is every reason to believe that the Telephone Pioneers will bring out a notable gathering of prominent telephone men next November. It is not the time of the year when there is a yearning to travel abroad; it is, in fact, a month when most everyone is at home at work and business in general is normal, so there should be no difficulty in getting all the greater lights together for the occasion. After the reunion those who have come from a distance will have ample time to rejoin their families for the thanksgiving festivities.

Earth Connections.

In late years telegraph and telephone engineers have discovered that a reliable and safe connection with the ground is not so easy to secure as was formerly thought to be, and much investigation and attention have been given to the subject.

All the books on electricity state that the earth is a natural reservoir of electricity, but old mother earth seems to be particular as to how man shall dump his surplus electrical energy into her reservoir. If he does not obey certain definite rules he will experience trouble, because a natural law cannot be violated with impunity. We have had our troubles and now we are endeavoring to determine the cause, and thus be able to avoid them in future.

We publish, on another page, an excellent article on the subject of ground connections, taken from a French contemporary, which will point the way out of the wilderness of difficulties. In this country much attention has been given the subject by many investigators, and the rapid rise of wireless telegraphy and wireless telephony has given the subject an added importance which points to the necessity of securing a reliable working arrangement with the earth for the exchange of electrical supply.

To Avoid Strikes in Massachusetts.—The Boston Chamber of Commerce has prepared the draft of a bill which provides that it shall be unlawful for any public service corporation, including telegraph and telephone companies, to declare a lockout, or for the employes to strike until the board of arbitration shall have made its investigation and filed its report. Heavy fines are to be assessed for violations of any of the provisions.

Engineer Editors.—Brigadier-General James Allen, United States Army, Washington, D. C., and Mr. J. J. Carty, chief engineer of the American Telephone and Telegraph Company, New York, are among the eighteen engineers selected to form the contributing and directing staff of the *Journal of the Franklin Institute*, Philadelphia, Pa.

Use of the Telegraph.—The English people make the greatest use of the telegraph, it being estimated that 194 messages are sent for every hundred persons. France follows with 152, next comes Denmark with 118, Belgium 104 and Germany 91. The record telegram, it is stated, consisted of 20,000 words, while others of 10,000 are mentioned.

Telephone Pioneers of America.

N. MILLER.

Mr. Norton Miller, manager of the Bell Telephone Company of Canada at Prescott, Ont., is one of the real telephone pioneers of the Dominion, and is an active business man in his home town. Prior to entering the telephone service, he was a telegrapher, having begun his telegraphic career as an operator for the old Dominion Telegraph Company in 1872. He afterwards worked at various points in Western Canada and in September, 1884, he became the manager at Prescott for the telephone company which position he still holds, besides being city telegraph and ticket agent for the Canadian Pacific Railway. Mr. Miller is also interested in various other business enterprises in Prescott and is a very busy man. During his telegraph service, Mr. Miller gave instruction in telegraphy

N. MILLER,
Prescott, Ont. (1884).

to several young men who have since become well known and made records for themselves. They include former state senator Walter C. Burton of New York, now a state civil service commissioner; Mr. Donald McNicol of the electrical engineers staff of the Postal Telegraph-Cable Company, New York; Mr. Wesley Small, formerly president of the Telegraphers' Union, and others now in the Canadian Pacific Railway service.

Mr. Miller is a native of Canada, having been born in Brockville, November 5, 1853, and his entire business life has been identified with the country of his birth. He is now one of the leading citizens of Prescott.

The Telegraph in Argentine.—According to the annual report of the Argentine postmaster-general for the year ended March 31, 1912, the personnel of the telegraph department numbered 1,670. The number of telegrams dispatched was 13,529,258, an increase of 827,093 over 1910-11.

Copper Clad Wire.

The Duplex Metals Company, Chester, Pa., has just issued a new hand book of its copper clad steel wire, which contains, in addition to the usual trade matter, a good deal of information of general interest concerning this product.

In the manufacture of the wire pure copper is welded to steel through intervening layers of iron-copper alloys. Steel billets are rolled to a bar, which is cut into other billets. These are then passed to a machine, where the ends are drilled and tapped. After pickling and washing, the billet is heated to a given temperature and drawn up into a mold (also previously heated) by means of a rod, screwed into one end. This rod slides up and down in the center hole of a three-jawed chuck which holds the mold and centers the billet in it. The mold and billet are then carried to a furnace of special design, which contains molten copper. The billet is lowered out of the mold and into this copper, and kept there for a time sufficient to form an alloy on the surface of the steel. It is then drawn up into the mold and the whole carried to a second furnace containing the pure commercial copper. This copper is poured into two openings in the top of the mold (the bottom of which is closed by a flange), and unites the alloyed area and fills the mold. When the copper has set the chuck and rod are unscrewed, and the copper-clad billet taken out of the mold, and after the necessary preliminary heating it is rolled to any desired size or shape.

The wire used with or without insulation is always drawn so as to obtain the highest possible tensile strength. The drawing of the wire is carefully supervised so as to produce the best wire possible.

Since the introduction of copper clad wire, careful tests, both in laboratories and in actual service, have been made. The information derived from these tests has been carefully tabulated, and the various factors upon which telephone transmission depends, can be found in this handbook.

The book will be of great interest to telephone and telegraph men, as it contains much useful and valuable information about a wire which has so rapidly come into favor as an electrical conductor.

Interesting Telegraph Stories.—Telegraphers as a rule are serious minded, but there are times in their daily lives when the reading of light literature is refreshing. "Lightning Flashes and Electric Dashes," is the title of a book of humorous telegraph stories and experiences that every telegrapher should have at hand to divert his thoughts when he is looking for a few moments' entertainment and pleasure. The book includes an interesting and authentic account of Prof. Morse and his work. The enjoyment one can get out of this volume is worth much more than the cost of the book, which is $1.00 per copy, post free. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Course of Instruction in the Elements of Technical Telegraphy—XX.

(Copyrighted.)

(Continued from page 464, July 16.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of test questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress.]

Electro-Magnetism.

If a wire carrying an electric current be placed near a magnetic needle, the latter instantly shows the effect of some force acting upon it by being deflected to a position nearly at right angles to the wire.

The reason of this is that every conductor in which a current of electricity is flowing is surrounded by lines of force which form a kind of magnetic whirl around the wire, decreasing in density as the distance from the conductor increases. As the needle has a tendency to place itself parallel to the lines of force (see July 1 issue) and the direction of the lines of force is across the wire, the needle is deflected in the same direction.

If you form a helix by twisting a piece of wire around your pencil, and then send a current through the wire, the helix becomes a solenoid. The lines of force around each loop now coincide with the lines of force of the adjacent loop, forming in effect lines of force which thread through the entire length of the solenoid.

Here we have conditions similar to those of a magnet, since lines of force are entering at one end and passing out at the other; in fact, the solenoid is a magnet for the time being, with a north and south pole, the positions of which are determined by the direction in which the current is flowing.

If you wind a string round a top, and set the top spinning, what governs the force of the spin? It is obviously the strength with which the string is pulled and also the number of turns through which the strength is applied. Similarly the magnetizing force, or that which produces the lines of force in a solenoid, is governed by the strength of the current and by the number of turns through which the current passes. The total number of turns multiplied by the current strength in amperes, gives the magnetizing force in ampere-turns, thus:

Current $\times$ Turns $=$ Ampere-turns.

The facility to the passage through it of lines of force offered by any substance is called permeability.

The permeability of non-magnetic substances such as air, copper, wood, etc., is taken as 1 or unity. If therefore a piece of soft iron, whose permeability may be as much as 2,000 times that of air, be placed in the solenoid, the number of lines of force will be greatly increased, and the iron become strongly magnetized.

As the soft iron offers an easier path for the lines of force, it may be regarded as lessening the resistance of the magnetic circuit, and causing a corresponding increase in the magnetism.

A magnet produced by inserting a magnetic substance in the magnetic circuit of a solenoid is an electro-magnet, and the magnetic substance around which the current circulates is called the core.

In the ordinary form of electro-magnet the coil consists of a large number of turns of insulated wire, that is, wire covered with some insulating material, such as cotton or silk, otherwise the current would take a shorter and easier path from one coil to the adjacent one, or from the first to the last coil through the iron core without circulating around the magnet.

Self Induction.

INDUCTION BETWEEN PARALLEL WIRES.

The lines of force around a wire in which a current of electricity is flowing are said to "cut" the conductor.

The number of lines of force cutting a conductor is governed by the E. M. F. of the battery, the higher the potential the greater number of lines of force, or the greater the density of the magnetic whirl, and vice versa.

Now while variations in the current cause variations in the lines of force around the conductor, it is also true that any change or variation in the lines of force causes a change in the current, for at the moment of increase or decrease of lines of force, due to changes of potential, momentary induced currents are set up in the wire which strengthen or weaken the original current as the case may be. For instance, if the E. M. F. be suddenly increased, the lines of force cutting the conductor will also be increased, but at the moment of change will induce a momentary current in the wire which flows in the opposite direction to that of the original current and consequently opposes and retards the rising current in the wire in reaching its full value, that is, the value corresponding to the increased E. M. F.

Again if the E. M. F. be suddenly decreased, the lines of force cutting the wire will be diminished, and in changing will induce a momentary current which flows in the same direction as the original current, and by adding its strength to it tends to retard the diminuation of current resulting from the decreased E. M. F.

The effect of the induced or secondary current on the primary or inducing current is summed up by Lenz as follows: *In all cases of electromagnetic induction the induced currents have such a direction that their reaction tends to stop the motion which produces them.*

In a straight wire, where the lines of force only cut the conductor around which they are circulating, the induction resulting from variations of potential and consequent variations in the lines of force is slight, but when the conductor is coiled as in a solenoid, the lines of force around each loop extend to and cut the adjacent loops, and the resulting self-induction of the circuit is very much increased.

In a Morse relay, which is simply a solenoid of many convolutions provided with a soft iron core to increase the number of lines of force, the existence of self-induction is clearly shown by the spark obtained at the key on breaking circuit.

The spark is due to the high E. M. F. of the induced current which increases the strength of the original current just at the moment when the latter ceases. There is no spark at making circuit because the induced current is opposed by the original current and is therefore weaker than in the former case. The spark at breaking may be regarded as the sum of the induced and original currents and the spark at making as their difference.

The Induction Coil.

The induction coil consists of a bobbin having an iron core surrounded by a short inner or "primary" coil of stout wire, and by an outer or "secondary" coil consisting of many turns of very fine wire carefully insulated between its different parts. The battery and a self-acting interrupter whose object is to make and break the primary circuit in rapid succession, are placed in the primary circuit. The result of this is at every "make" to induce in the secondary coil a momentary inverse or opposing current which is partly suppressed on account of its direction, and at every "break" to induce a powerful direct current.

As induced currents have in general enormously high electro-motive forces, and are able to spark across spaces that ordinary battery currents cannot cross, the induced direct currents manifest themselves in a brilliant torrent of sparks between the ends of the secondary wires when brought near enough together.

QUESTION PAPER.

1. Explain how lines of force cutting a conductor are affected by variations of potential.
2. Explain how variations in the lines of force around a conductor affect the current.
3. Is the polarity of a solenoid affected by a change in current direction?
4. How can a current be obtained in the secondary of an induction coil, seeing there is no connection between it and the primary?
5. When a circuit is closed, what prevents the current from reaching its full value instantaneously?
6. When a circuit is opened, what prevents the relay cores from immediately losing their magnetism?
7. Why is a magnetic needle deflected when placed under a wire in which a current is flowing?
8. Would the needle be deflected if placed over the wire.
9. What is a solenoid?
10. What is the difference between a solenoid and a permanent magnet.
11. What is magnetizing force, and how is it expressed?
12. Why does a soft iron core, inserted in a solenoid, increase the lines of force?
13. What is an electro-magnet?
14. Why is the self induction in a solenoid greater than in an equal length of straight wire?
15. What is the spark at breaking due to?
16. Why is there no spark when circuit is closed?
17. Why is an interrupter placed in the primary circuit of an induction coil.
18. Why is covered wire used in the construction of an electro-magnet?
19. Is a spark the result of a low or a high potential?
20. Prove by means of a magnetic needle that a current is flowing in a wire.

(To be Continued)

The High Cost of Platinum.

BY J. A. HULIT, CHICAGO, ILL.

As regards the high cost of platinum used in the electrical industry, which has created such a demand for a cheaper substitute, I offer as a suggestion that the wire be covered with copper or some other desirable metal similar to the manner in which steel wire is now coated with copper for field work. A good, thick shell of copper over, say, No. 20 platinum would give the platinum rigidity, and at the same time the platinum being in the center would offer a good contact.

Of Interest to Telephone People.

TELEGRAPH AND TELEPHONE AGE of November 1 and November 16, 1911, are essentially special issues and contain a great deal of information of interest and value to telephone people.

The November 1 issue contains photo-gravures of Dr. Alexander Graham Bell, the inventor of the telephone, and Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company. This number, which was prepared on the occasion of the organizing in Boston of the Telephone Pioneers of America, contains an interesting account of the development of the telephone and gives the names of all the pioneers in the work. It is an exceedingly interesting and valuable number from an historical point of view and everyone connected with the management and operation of telephones should have a copy.

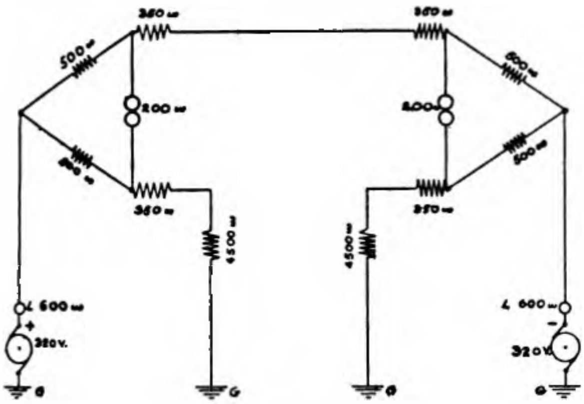
The November 16 issue contains a full account of the organization of the Telephone Pioneers. Dr. Bell's address on the birth of the telephone is an easy and charming recital of his early work and shows the enormous difficulties and obstacles he had to overcome. This story, coming as it did from first hand, is of exceeding interest and value, and should have a place in every telephone man's library and among his cherished possessions. This number also contains the portraits of nearly 100 of the telephone pioneers, which add greatly to the value of the number.

We have in stock a few of these two numbers, copies of which no doubt many telephone men would like to preserve. Copies will be mailed to any address on receipt of price, 25c. per copy.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(99) Q.—I send herewith a theoretical sketch of the new Western Union quadruplex, the two 500-ohm values representing the resistance of the impedance coil, the 350-ohm values corresponding to those in the main and artificial lines of the neutral relay, the polar relay is represented by the 200 ohms in the bridge, while the 4,500 ohms represents that of the rheostat. Obviously the joint resistance of the distant end, plus the resistance



THEORETICAL DIAGRAM OF WESTERN UNION QUADRUPLEX.

of the line and that of the main line windings in the neutral relay at the distant terminal must equal 4,500 ohms in order to balance the set in this case. Will you kindly advise (a) what the joint resistance of the apparatus at the distant terminal is, and what the current values in the different branches are with (b) like and (c) unlike poles to the line and (d) how the same are arrived at. J. C. K.

A.—(a) The joint resistance of the apparatus at the distant terminal is 1,128 ohms.

(b) The current values in the different branches, with like poles to the line, are:

56 milliamperes through the resistance lamp.
23 " " " upper bridge arm and polar relay.
33 " " " lower bridge arm.
56 " " " artificial line.

No current in the main line.

(c) The current values in the different branches, with unlike poles to line, are:

140 milliamperes through the resistance lamp.
75 " " " upper bridge arm.
65 " " " lower bridge arm.
23 " " " polar relay.
98 " " " main line.
42 " " " artificial line.

(d) The values given above are largely the results of calculations based on Kirchoff's laws, a detailed explanation of which would require more space than can be conveniently spared at this time.

The San Francisco Western Union Office Forty Years Ago.

Forty years ago the San Francisco, Cal., Western Union office was located in a three-story building on California street, between Montgomery and Kearney streets, Mr. James Gamble being general superintendent and Geo. S. Ladd, superintendent. The personnel of the operating force was as follows: James S. Urquhart, manager; Chas. Hoag, chief operator; Chas. Thomas, night chief operator, and John Yontz, Wm. Foley, A. L. Baker, Con. Dwyer, E. L. Reese, A. Venton, N. H. Brown, John I. Sabin, Geo. Campbell, Geo. Sawyer, T. S. Cunningham and Horace Jones, operators.

There was one eastern circuit, called the "Overland," which terminated at Corinne, Utah, business being further relayed at Cheyenne, Omaha and Chicago; one Portland wire with repeaters at Yreka, Cal., and one circuit each to Los Angeles, San Diego, Sacramento and Virginia City, all of which were worked single, the duplex and quadruplex being unknown. After "30" on local press report there was only one operator on duty, and he looped the "Overland" downstairs to the business office where he waited on the counter between messages. After "Good Night" from the East at midnight, the office was closed till morning. Sunday hours were from 8 a. m. till 10 a. m. and 4 p. m. to 6 p. m., the office being closed the rest of the day.

The tariff to New York was $2.50 for ten words, but to most other eastern points it was $4.00.

The Central Pacific Railroad wires were operated in connection with the Atlantic and Pacific Telegraph Company (in opposition to the Western Union), connecting with the Union Pacific at Ogden operated by the same company. The railroad ended at Redding on the north and at Merced on the south.

Today the operating force comprises 250 persons, with Mr. H. S. Converse as chief operator; A. A. Marlatt, traffic chief, and Messrs. C. A. Rawlinson, C. E. Payne, S. N. Shaplin, W. E. Smith and R. L. Marr, division chiefs; C. E. Donnelly, night chief operator, assisted by T. McGuinness, C. F. Woodward, J. B. Lecompte and W. R. Melville. O. D. Walters is late-night chief-operator.

The printer department, with its three circuits to Los Angeles and one each to Portland, Seattle, Denver and Salt Lake, is looked after by W. L. Glasheen, J. E. Mifka, supervisor of traffic, and Geo. Hohenschild, mechanician, while E. C. Davis takes care of the printer circuits to Los Angeles, Portland and Denver at night. E. W. Midlam oversees the Wheatstone circuit with Chicago.

The force of the quadruplex department is made up of T. J. Crow, G. H. Gilbert, W. A. Warrensford and W. H. Wilson, days, and J. A. Lowery, L. A. Dickinson, G. F. Wilson and S. B. Mills, nights.

Great things are expected of the regular night Wheatstone circuit with Chicago, which was resumed July 1, it being made necessary by the ever-increasing night-letter file.

Improved Weiny Repeater.

BY J. F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The engineering department of the Postal Telegraph-Cable Company has recently improved the Weiny type of repeater, which is the company's standard for single lines. The improvements consist in the use of so-called "noiseless" transmitters in place of the sounding transmitters, and changes in the construction of the relays.

No change in the principles of the repeater is involved, and the instruments are interchangeable with those previously used, except that where the transmitters are used to replace the old style of transmitter, a sounder must be added. A switch is provided for cutting out the sounder when it is not required for reading.

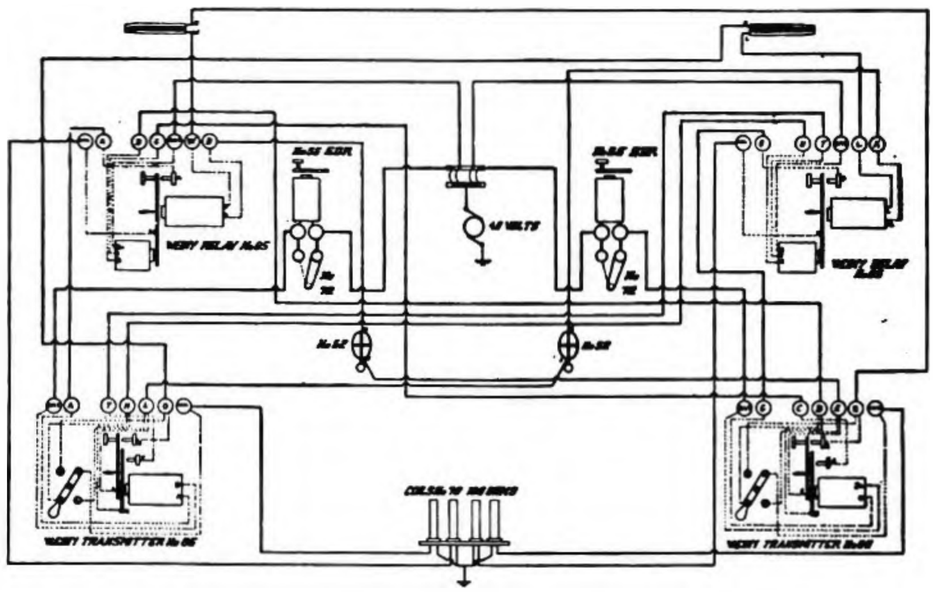


DIAGRAM OF CONNECTIONS OF IMPROVED WEINY REPEATER.

The improved form of relay has the holding magnets below the trunnion of the armature. These magnets consist of a standard pair, and the construction of the relay is such that it is responsive to signals at very high speeds. The transmitters are of the relay type, all parts being made as light as possible, so that they will respond to rapid impulses. The trunnions in both instruments are of the Postal improved type.

The resistance of the main line magnets is approximately 250 ohms and of the holding magnets twenty ohms. The resistance of the transmitters where forty volts are used is twenty ohms, and where 110 volts are used the resistance is 150 ohms. Six-hundred-ohm resistance coils are used in series with the holding magnets where 110-volt locals are used and 1500-ohm resistances in the transmitter circuits. When 110-volt locals are employed, the coils are placed next to the fuse block instead of next to the ground, as shown in the illustration.

Subscribe for TELEGRAPH AND TELEPHONE AGE. It is the leading paper of its class in America.

Next Reunion of Telephone Pioneers to be Held in New York.

At a meeting of the executive committee of the Telephone Pioneers of America held in New York, July 17, it was decided to hold the next annual reunion in New York on Thursday and Friday, November 14 and 15. A general committee of arrangements was appointed, consisting of H. F. Thurber, vice-president of the New York Telephone Company, Gerard Swope, general sales agent of the Western Electric Company, Angus S. Hibbard, executive relation American Telephone and Telegraph Company; H. S. Brooks, general commercial superintendent, and Henry W. Pope, secretary of the association. This committee is empowered to increase its membership as may be necessary and to report its findings to the executive committee for approval and adoption.

It is expected that in view of the late date of the reunion it will be possible to have all the prominent telephone officials present, including Prof. Alexander Graham Bell, Prof. Francis M. Blake, Messrs. Theo. N. Vail, Union N. Bethell, E. M. Barton, Thos. A. Watson, Thos. A. Edison and others.

Telegraphers Settle Down to Business.—It is often stated that many telegraphers regard their telegraph position as a stepping stone toward something better. A manager of a telegraph office in a small city resigned recently to open a bowling alley and another telegrapher quit the business to raise hogs and chickens.

Telegraphic Apparatus Contraband of War in Turkey.—Telegraphic apparatus of all kinds has been placed on the list of articles regarded by Turkey as contraband of war and subject to seizure.

The Evolution of the Telegraph.*

BY PRESTON D. CALLUM, COMMERCIAL AGENT, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

The close association now established between the Bell Telephone system and the Western Union Telegraph Company has caused many questions to arise in the minds of the forces of each company regarding the history, methods of operation and mechanical apparatus used by each company in the performance of its business. Because of our daily association with the telegraph and telephone, we are inclined to accept them as a matter of course, forgetting the marvelous ingenuity employed in the construction and perfection of the mechanical apparatus. With the indifference bred by constant familiarity, we fail to give serious consideration to the really wonderful feats accomplished each day. Only at times of dire catastrophe, when some locality is cut off from the outside world, do we fully appreciate either the telegraph or telephone.

It is my desire, to-night, to give to you a condensed history of the evolution of the telegraph, believing that you will be interested in knowing more intimately the new addition to the "Wire Family."

When we are told that some certain man invented the telegraph, we are very apt to suppose that he originated both the idea and the instruments embodied in the invention and that no one before had thought of such a thing. As a matter of fact, this great invention, the telegraph, is the perfected product of many minds working during many centuries.

So, in discussing the telegraph, let us first consider the word itself. We find that the word telegraph is a combination of two Greek words, *tele*, meaning afar-off, and *grapho*, meaning "to write." Since to telegraph means "to write afar," it will be seen that it is any system of conveying intelligence to a distance other than by voice or writing sent by messenger.

It is obvious, then, that the idea embodied in telegraphy is as old as man. Indeed, the necessity of transmitting intelligence to a distance with rapidity and certainty has been felt in every age of man, and we find that in order to accomplish this the ancients resorted to many expedients under different circumstances. It is interesting to note that this desire to eliminate space has existed not only among civilized peoples, but the want has been equally felt among even the most barbarous savages.

Telegraphing in a general sense includes all modes of communicating intelligence to a distance, and the means employed necessarily follow in three classes, namely: visible, audible and tangible. Thus, because of their rapidity of motion, sound, light and electricity form the most convenient agencies. Among the ancients who made use of nature's forces and among semi-civilized and savage peoples only the lowest forms of the visible and audible methods have been used. We experience a feeling of deep interest in the fact that the ingenious use of smoke and signal flags by day, beacon fires, flambeaux and torches by night have conveyed intelligence that has not only changed the history of the world, but has destroyed armies and swept entire tribes out of existence.

Among the cannibal tribes of interior Africa, where prior to the coming of the explorer a white man had never been seen, there is a system of telegraphy found that possessed a remarkable efficiency and required marvelous cunning to construct. By use of rubber and bamboo twigs an instrument is constructed which, when struck by a small mallet, gives out a musical note of wonderful clarity and sweetness. So ingenious is the device that it lies within the power of the manipulator to vary the tones of the instrument through an entire scale, thus providing a musical code for the transmission of intelligence. In the stillness of the African forest, notes from this instrument are said to be audible distinctly for a distance of from five to seven miles. It is interesting to note that in the operation of this contrivance the sender experiences no discomfort to the ear, as might be presumed that he would experience with a contrivance of this character.

It is impossible, of course, to say when the first message was ever transmitted through space, nor yet what intelligence it conveyed. It is reasonable to presume, however, that the means employed was visible. If we turn our eyes back to those distant ages of which only crumbled and meagre records exist, we find that Menes I, who reigned over Egypt 5865 B. C., found it necessary to establish in his government a department of intelligence. It would be interesting to know just what duties this office called for, or what messages were sent, and to whom. I have been unable to collect any data on this point and my memory does not serve me well enough after 7777 years, else I should be able to tell you the name of the gentleman who really deserves the distinction of having served as the first president of a telegraph company.

It took the human race four thousand years to devise some plan of telegraphing other than that of signal fires and the like. During this time we hear of but little progress made in this direction. However, it is interesting to note that the one point that stands out clearly in the evolution of the telegraph is the fact that, from the time that electricity was realized to be of practical worth in the world, there were men at work on the idea of producing contrivances for the electrical transmission of intelligence. These patient scientists, who were silently directing their energies on that mysterious force called electricity, were paving the way for the practical fulfillment of a thought which, in their time, was scarcely more than the fleeting phantom of a dreamer.

So varied, however, were the ends sought for and so numerous the problems to solve, that it excites small wonder that the undivided attention of an individual should produce only one of the many features needed for electrical telegraphing. One great point stands out above all others as a testimonial to the endeavors of the early savants, and that is that

* Address delivered before The Telephone Society of Baltimore.

the electrical laws propounded by them are as true to-day as when first advanced.

Interest is added to the subject of telegraphy by considering the features of early inventions which are most closely allied to the telegraph service of today, and by noting that it was by assembling the proved theories which were advanced that has given to us the highly perfected service of the present.

Now let me lay before you the principal experiments which are most closely associated with the telegraph.

Electricity having been found to be of practical value, the first thought then was to devise some means of conduction, and at the early date of 1729 we find Gray experimenting with conductors. His contemporary, Nollet, shortly after that time, succeeded in sending a shock along a line of men and wires about nine hundred feet in length. Nobody seems to know just what the men were doing in the line. I suppose Nollet thought that if he could send a shock through a man he could send it through anything else on earth.

After this, little progress was made until 1745, when this interesting subject was taken up in ecclesiastical circles, and Watson, Bishop of Llandoff, sent a shock through 12,000 feet of wire and proved that transmission was practically instantaneous throughout its length. This discovery gave us our first intimation of the wonderful speed with which electricity travels. Having established these vitally important points, scientists eagerly grasped the opportunity for utilizing them and industriously attacked the task of creating a mode of electrical telegraph. Nothing of value, however, was produced by this labor.

In 1753 a letter written to *The Scots Magazine* suggested the first idea of any practical value regarding a mode of electrical telegraph. The writer proposed a series of insulated wires equal in number to the letters of the alphabet, and from the end of each wire to suspend a light ball or a bell, the balls bearing the letters of the alphabet, and, if bells, that they be of different tones. The sending of a shock through a wire would cause the vibration of the appendage, and by this method the message was to be read. However cumbersome the apparatus suggested, this was the first idea advanced regarding electrical telegraph, and it is keenly to be regretted that the author's name has never been satisfactorily determined. Twenty-one years after the publication of this article, Le Sage, at Geneva, constructed the first electrical telegraph, and it was practically a realization of this idea.

From 1774 a multitude of theories were advanced regarding electrical telegraph, most of which is of little interest, but in 1787 Lamond employed a single-wire telegraph, a fact worthy of consideration, for his ingenious work had succeeded in reducing the number of conductors from thirty-six to one, an accomplishment that made subsequent theories possible.

While the electrical telegraph was slowly but surely progressing, it remained for a Frenchman named Claude Chappe to invent the first system of telegraphing to be adopted and used in our own era. The invention, while scientific, was in reality nothing more than a perfected application of ancient and primitive telegraphs. It was, of course, a visible system and was termed the semaphore. The plan consisted of mounting an upright post upon a high tower. This post bore pivoted horizontal bars which could be placed at various angles. Usually the towers bearing this apparatus were placed at a distance of from four to five miles apart. By independent movement of the arms the apparatus was susceptible of ninety-eight distinct positions exhibiting the same number of different signals, which represented letters, numbers, words or sentences.

Under the most favorable circumstances the operators obtained a speed of about three signals per minute, but though much ingenuity was employed by Chappe and others to arrange a system of lights for enabling the semaphore to be used by night, they met with only partial success, while in fogs and snowstorms the apparatus was useless.

In 1794 the French Assembly (or whatever that body was called during that bloody period of the French Revolution) adopted the semaphore system for government use. It is claimed that the first telegram ever spelled out by the stationary apparatus was transmitted during that period.

After adoption by the French, every nation in Europe constructed semaphore systems leading from their capitals to their principal seaports. The most important line of this nature was constructed by Nicholas I of Russia, from the Austrian frontier through Warsaw to St. Petersburg. The line, about 1,000 miles in length, consisted of 220 stations, the semaphores being erected upon lofty and substantial towers and in all costing several millions of dollars.

The semaphore telegraph being firmly established, little interest was taken in electrical telegraphing, but we find from history that scientists were still at work and that the result of their labors produced theories which, indeed, formed the nucleus of features which were incorporated in the electrical telegraph system perfected years later.

We read of but little progress in electrical telegraph until 1794, when Reusser proposed the employment of letters formed by spaces cut out of parallel strips of tin foil, pasted on sheets of glass. These spaces would then become luminous on the passage of the electrical current, and the message would be so read. Cavallo, in 1795, proposed to transmit letters and numbers by a combination of sparks and pauses, but there is reason to believe that this process was previously suggested by Don Silva in Spain. Your attention is invited particularly to these two inventions, for they are of special interest in telegraphic circles. The principles involved closely resemble those employed nearly forty years later in constructing the telegraph system that was eventually adopted throughout the world.

Following Reusser and Cavallo comes Betancourt. History tells us that Betancourt is entitled to the distinction of having constructed the first telegraph line of any magnitude. In 1796 he built this line, consisting of a single wire, from Madrid to Aranjuez, a distance of twenty-seven miles. The electricity was generated by Leyden jars and the reading was effected by the divergence of pith-balls. Here again we find the principle outlined by the unknown writer in 1753 being brought into actual operation. This time, however, the plan is modified by using only one wire. Though it would be interesting to know more regarding the success of this venture, the information does not seem to exist.

The thirty years following the construction of Betancourt's telegraph line is rich with experiment and invention in telegraph apparatus. Numerous methods were employed with varying success. While valuable for the truths established and the impetus derived, these inventions were useless from a practical standpoint. Indeed, in this period, the inventors at work upon the problems of the telegraph were as a rule receiving but little encouragement. Practically no interest was taken in their work except in idle curiosity, while their creations were considered in the light of scientific toys.

The semaphore was apparently rendering satisfactory service, but however that may be, Francis Ronald exemplifies the attitude of the general public toward electrical telegraphing. Appreciating the idea of the one-wire pith-ball system, he endeavored to bring it before the British Post Office, but was told in a tolerant manner that "telegraphs of any kind are now wholly unnecessary and no other than the one now in use will be adopted." It is curious for us in our time to conceive such an attitude toward a science that we are absolutely dependent upon. It would be impossible to estimate the conditions that would exist if the entire telegraph systems of the world were to be made null for a period of twenty-four hours, and yet in the beginning the telegraph was considered "unnecessary." But even with the discouraging indifference exhibited toward electric telegraph, progress was surely and certainly being made.

In the little town of Charlestown, Mass., there lived the Rev. Jedediah Morse, a Congregationalist minister. On April 27, 1791, a son was born to Dr. Morse. When the proper time arrived this youngster was christened Samuel Finley Breese Morse. Just why an innocent child should have been punished by being inflicted with so much name, I am unable to say. In 1810 this young man graduated from Yale University and chose the realm of art for his vocation. Studying abroad, he developed a splendid talent which brought to him remunerative employment and distinction.

In 1832, while returning from abroad, Mr. Morse met a fellow passenger by the name of Dr. Charles T. Jackson. Dr. Jackson described to Mr. Morse experiments in electricity he had seen while doing laboratory work in Paris. The subject proved intensely interesting to Morse, and so fired the creative instinct of his artist's mind that he set to work to invent a system. Before the ship had landed in America Morse had sketched a full set of instruments and was laboring to devise a code. It was not until 1835 that the first models were completed. The system was exhibited in New York. Mr. Alfred Vail was present at the first demonstration of the Morse system, and became so deeply interested that he invited Morse to visit him at his country home. Mr. Vail associated himself with Morse in his work and prevailed upon his father, Judge Vail, to assist with money the perfection of the invention, and in 1837 the patent papers were filed.

No interest was taken in the Morse system by the United States Government, so Morse went to Europe, hoping to interest European governments, but returned to the United States penniless and disheartened. On the last day of Congress, March 4, 1843, in the confusion of the parting, a hurried vote was taken on the question of whether or not money should be appropriated for building an experimental line of telegraph from Washington to Baltimore. To the surprise of everyone, $30,000 was appropriated.

Morse designed a system of eleven pipes to run underground through which he would draw his wires, but when near Relay, Md., Morse became convinced that the plan was not feasible. A year had been spent in fruitless endeavor, and all but $7,000 of the appropriation was exhausted. Morse then placed the construction in the hands of Ezra Cornell, who abandoned pipes and placed insulated wires on poles, and on May 24, 1844, the line was completed. With Morse on one end and Vail on the other, the famous message "What hath God Wrought?" was sent. This message is known to everyone, but the first message of actual news is far less known. During the period of the Morse test the Democratic national convention was being held in Baltimore. The new invention was brought prominently before the world by announcing the nomination of James K. Polk for president.

In his address before the New York Telephone Society, Mr. S. M. Williams cites the fact very interestingly and quoted the message transmitted. He says: "No wires were run into the convention hall, but a line of messengers was arranged, and as soon as it was announced that Polk had the necessary vote, the news was flashed to Washington, where the wires terminated at the Capitol, and the news was announced on the floor of Congress. Then there came back this message: 'The Democratic members of Congress to their Democratic brethren in convention assembled send greetings. Three cheers for James K. Polk.'" Thus the first commercial message transmitted over modern electrical telegraph was sent from Baltimore, a fact that adds somewhat to a city already rich in historical associations.

After this demonstration of practicability, telegraph companies sprang up all over the United States, and the value of the Morse system spread to Europe, where it was adopted. Morse came in for his share and was showered with honors. So great was the number of small telegraph companies operating telegraph lines and so complex was the system of operating becoming that in 1854 the two most prominent companies of the West and their controlling interests became affiliated with the most prominent Eastern companies and their controled interests, and this affiliation was granted a charter to operate telegraph lines, and the name selected by Ezra Cornell to designate the new company was The Western Union Telegraph Company.

When the Morse system was realized to be of value and was afterwards demonstrated, people began wondering what they would term a message received over the telegraph wire. The word telegram was manufactured, being formed from telegraph, the assumption being that it was permissible as an analogy to monogram, logogram, etc. But our English cousins in usual stolid manner could not accept this word without investigation. So a long and learned discussion took place in English newspapers before the adoption of the word by that country. So serious did the discussion become that it was advanced by several eminent philologists that the word "telegraphone" was exactly and strictly applicable to a message conveyed by telegraph. Civil war was averted, however, by the adoption of the word "telegram," and our English friends forgot their discussion and again pursued the even tenor of their way.

Since the day of Morse, science has advanced with marvelous rapidity the apparatus of the telegraph. If Mr. Morse should step into a telegraph office ot today he would be curious to know what sort of a system was being used. The telegraph company and its connections bind together by strands of copper not only the cities and towns of this continent, but brings the people of the four quarters of the globe into touch instantly, creating a means of communication which brings with it all of the attributes of civilization.

The Inventor of the Telegraph.

Editor, TELEGRAPH AND TELEPHONE AGE,

SIR: It seems a little odd, at this late day, to see Prof. Joseph Henry again proclaimed "The Inventor of the Telegraph," especially when Mr. J. C. Barclay, whose paper claiming this honor for Henry is quoted in part in TELEGRAPH AND TELEPHONE AGE, of July 16, makes this nullifying statement at the end: "Henry's claim is the claim of a discoverer and not of an inventor, and his principles in electro-magnetism were applied by Dr. Gale in 1836-37 to render Prof. Morse's apparatus effective at a distance."

This sentence sums up the whole matter and effectively disposes of the claim that Henry invented the telegraph. His discoveries entitle him to high rank in the annals of science; they were essential to the successful working of the telegraph and of other electrical inventions, but this being heartily and cheerfully granted, it still remains true that he was a discoverer and not an inventor; he helped to make the telegraph possible, but he did not invent the telegraph.

Henry's epoch-making discovery of the intensity magnet, which was, of course, an improvement on Sturgeon's, was made and published in 1831, but it required the genius of a Morse to link the power developed from a battery of many cups to Henry's intensity magnet, and to add the essentials, which were his own invention, thus making the telegraph a commercial possibility.

Henry's discoveries had been published to the world for five years before Morse's attention was called to them, and yet, until Morse appeared, no one had had the wit or genius to turn them to a practical use.

Henry himself never, as far as I can learn, made any attempt to elaborate his discoveries in a manner to make them useful to mankind in general. He saw the possibilities, but he left it to others to accomplish them. In a letter of May 6, 1839, written to Morse, he says:

"I am acquainted with no fact which would lead me to suppose that the project of the Electro-Magnetic Telegraph is impracticable; on the contrary, I believe that science is now ripe for the application, and that there are no difficulties in the way, but such as ingenuity and enterprise may obviate. But what form of the apparatus, or what application of the power will prove best, can, I believe, be only determined by careful experiment?"

That Morse supplied in good measure both the ingenuity and the enterprise is now a matter of history.

Again, as late as February 24, 1842, Henry wrote to Morse:

"About the same time with yourself Prof. Wheatstone, of London, and Dr. Steinheil, of Germany, proposed plans of the electro-magnetic telegraph; but these differ as much from yours as the nature of the common principle would well permit; and, unless some essential improvements have lately been made in these European plans, I should prefer the one invented by yourself.

With my best wishes for your success, I remain, with much esteem,

Yours truly,

JOSEPH HENRY."

By what right does Mr. Barclay claim for Henry that which Henry unquestioningly gives to Morse?

EDWARD L. MORSE.

Wood-boring Insects.—Mr. Thomas E. Snyder of the Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C., in a communication to the Entomological Society at Washington, states that while investigating damage by wood-boring insects to the bases of telegraph and telephone poles, he found a true fertilized queen of the species *Termes flavipes* kol. in the butt of a chestnut telegraph pole near Portsmouth, Va., on the Seaboard Air Line. The investigation is being carried on with a view to determining methods of preventing injury by termites to various classes of forest products:

Mr. Jesse Hargrave, superintendent Mackay Telegraph and Cable Company, Dallas, Tex., writes: "Herewith $2.00 for renewal of my subscription to TELEGRAPH AND TELEPHONE AGE. Never a bill more cheerfully paid. Long may the AGE live and prosper and continue to adorn the allied professions."


MAN at last has conquered the Elements.
KERITE
CONQUERED THEM
50 YEARS AGO
AERIAL - UNDERGROUND - SUBMARINE
KERITE INSULATED WIRE & CABLE COMPANY
General Offices, 30 Church Street, New York
Western Office, Peoples Gas Building, Chicago
Lillibridge

The Railroad.

Automatic Signals on Pennsylvania.—The Pennsylvania Railroad Company is installing auto-pneumatic electric signals on the main line in the vicinity of York, Pa., and the telegraph block towers will be abolished.

Railroad Telegraph and Telephone Construction.—Many of the railroad telegraph superintendents are busily engaged in new construction and reconstruction work. Additional telegraph and telephone facilities are being called for on many railroad systems to meet the demands of the increasing traffic. Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railroad system, St. Louis, Mo., is engaged in stringing two new copper wires along his line.

Mr. Worthington Before the Arbitration Commission.—Mr. B. A. Worthington, president of the Chicago & Alton Railroad, Chicago, and an old-time telegrapher, presented the side of the railroads in the arbitration proceedings recently held at New York over the demands of the engineers of fifty-two roads for increased wages and changes in working conditions. Mr. Worthington showed by exhibits of the present scales and working rules of the fifty-two roads the impossibility of standardizing either pay or rules owing to varying conditions. In the course of his argument he referred to the nine-hour law for telegraphers among other legal requirements which were constantly increasing the cost of operating the railroads. Mr. Worthington, in reply to a question, stated that he had never been opposed to labor unions.

The Railophone.

A demonstration of the Railophone was recently given in England in the presence of a distinguished gathering of electrical and railway engineers. This system permits of communication by telegraph or telephone with moving trains. In outline, the system comprises an insulated wire laid underground alongside the railway track and connected to the apparatus in the signal boxes and at stations, and a pair of coils wound on frames round a coach, one for sending and the other for receiving, connected with the apparatus mounted in the coach. No change-over switch is necessary when passing from sending to receiving, or vice versa. The apparatus carried on the train consists of a 24-volt storage battery (which may be that used for lighting the coach), the detector, an electric hooter, and a magnetic device for applying the ordinary automatic brakes, as well as telephonic and telegraphic instruments. At fixed stations or signal boxes electric gongs take the place of the hooter, and apparatus can be installed to operate signals, etc., with the aid of local batteries.

Communication with the train by telephone or telegraph was at all times possible, and audible signals were transmitted from the signal cabin to the train and from the train to the cabin at will. The underground wire is divided into sections of lengths corresponding to the signal sections comprised in three groups: The main section, of one to ten miles or more; the restoring section, and the clearing section, the last two being each about 100 yards long. The position of a train can, if desired, be indicated continuously by colored lamps in the signal box, and the danger signal behind a train is automatically locked, so that the signalman cannot give "line clear" while the train remains in the section.

Retirement of Mr. G. C. Cummings.

Mr. George C. Cummings, for several years general wire chief on the Chicago, Burlington and Quincy Railroad, has resigned to engage in poultry raising and farming at Vineland, N. J. Mr. Cummings is co-inventor of the Cummings-Wray selector used on the Burlington road, and, in addition to this, developed other ingenious devices which have proved to be of great value to the railroad, telegraph and telephone services. Mr. Cummings is also the inventor of the "booster telephone transmitter circuit," which has made possible the operation of long circuits equipped with a large number of stations, and which is widely employed on railway dispatching and message circuits throughout the United States and Canada.

Mr. Cummings possesses extraordinary skill as a telegrapher and was formerly in the service of the Western Union Telegraph Company and the American Telephone and Telegraph Company, and rose to positions of trust and responsibility with both companies. In one sense he has not yet retired, for he has a complete wireless station at Vineland, by means of which he keeps in practice and in close touch with the world.

Railway Telephone Dispatching.

Development of the railway telephone for dispatching purposes, as shown by the report of the Interstate Commerce Commission for January 1, 1912, recently issued, was not so great in 1911 as in the previous year. During 1910 there was a net gain on steam railroads of 11,768 miles, as against a gain for 1911 of 6,867 miles. Analysis of this discrepancy, however, shows that the remarkable increase of 1910 was due to the fact that many of the large roads then installed their initial equipment, and their later installations, in the nature of increases, have not been so conspicuous. In other words, the growth of railway telephony in 1910 was abnormal; that of 1911 was normal and healthy.

Where the telephone mileage of a railroad has increased, its telegraph mileage has not necessarily decreased in like proportion. As the figures indicate, there are sections of line on which both the telegraph and the telephone are used and there are other sections of line on which neither the telegraph nor the telephone is used for transmission of train orders. The total decrease of telegraph mileage from the report of 1911 is 5,811.

Telephones for Train Dispatching on Wabash.

The Wabash Railroad has recently ordered apparatus and supplies from the Western Electric Company to equip two of its divisions with telephones for train dispatching. One division to be equipped extends over a distance of approximately 115 miles from Decatur, Ill., to St. Louis, Mo., the dispatcher being located at Decatur. On this line there will be thirty way stations equipped with selector sets. Three other sets will be held in reserve. The other division will cover a distance of about 75 miles, from Decatur to Danville, Ill., with the dispatcher also at Decatur. Seventeen way stations will have selector sets, with three others held as spares. Mr. Joseph P. Church is superintendent of telegraph.

The management of the Wabash Railroad some time ago placed an order with the General Railway Equipment Company for the equipment of five selective telephone train dispatching circuits aggregating over 600 miles, and the installation of the apparatus is now in progress. The circuits are from Peru to Tildon, 101 miles; from Peru to Montpelier, 105 miles; from Montpelier to Detroit, 97 miles; from Decatur to Chicago, 173 miles and from Moberly to St. Louis, 148 miles. The equipment is the standard United States Electric Company design of Gill apparatus, or the local battery bell type, and the way station equipment includes 146 Gill selector outfits. At the five dispatcher stations there are installed the standard United States Electric dispatcher's signaling set and Gill individual automatic calling key cabinets with spare spaces in each for the addition of stations hereafter. There are three Gill wire chief's sets, and fifty siding telephones will be installed. Each circuit also has a portable telephone set in an iron case, and each of the way stations is equipped with the General Railway Equipment Company's new transmitter arm and head.

Obituary.

J. T. Green, telegrapher at Johnsonville, Tenn., for over thirty years, died at that place July 4. He was a writer of note, his pen name being "Ike Snort."

Robert A. Smith of Toronto, Ont., a trustee of the Mackay Company, was killed in an automobile accident on July 17. Mr. Smith was a prominent banker in Toronto.

L. T. Parry, aged 52 years, a well-known New York telegrapher, died suddenly, July 24, at his home in Elmhurst, L. I. Deceased was manager of the telegraph bureau of the *New York World*.

Mrs. Esther Ormerod, a telegraph operator for the Western Union Telegraph Company, at Asbury Park, N. J., died at that place July 22. She was recently married to Captain G. C. Ormerod, her former name being Sweet.

Ransom Phelps, an old-time telegrapher and a member of the United States Military Telegraph Corps, died at Crooked Lake, Minn., July 20, and his body was cremated at St. Paul, July 22.

Municipal Electricians.

Mr. George V. Tudhope, assistant engineer of the fire alarm bureau, Los Angeles, Cal., is a candidate for the newly created position of chief of police and fire alarm telegraph in that city.

Fire Alarm System in Manchester.—The city of Manchester, N. H., is investigating the fire alarm telegraph systems with a view to installation.

New Fire Alarm System in Passaic.—The city of Passaic, N. J., has completed the installation of the Gamewell fire and police telegraph system.

Toronto's New Fire Alarm System.—The Gamewell fire alarm telegraph system has been installed in Toronto, Ont. Over 25,000 feet of wire have been used in its installation and on one board there are 1,400 switches. Everything is in duplicate, even to the storage batteries, whose recharging is done on the premises, the motor that drives the generator being operated by hydro-electric power. Mr. J. S. Craig is superintendent of fire telegraph.

Convention of Municipal Electricians.

In a circular letter to the members of the International Association of Municipal Electricians, regarding the convention of that association at Peoria, Ill., August 26-30, secretary Clarence R. George says:

"We expect this to be a very interesting convention to the municipal electrician and those interested in municipal electrical affairs, also to the manufacturer and salesman of electrical apparatus and supplies.

"Some of the most prominent members of the association have been selected to prepare papers of interest for this meeting. There will be papers for the electrical inspector, city electrician, superintendents of municipal lighting, superintendent of fire alarm telegraph and police patrol signal.

"We have assurance from one of the highest authorities on the subject of electrical inspection to deliver a paper on municipal electrical inspection from the underwriters' standpoint.

"We expect to have a very interesting exhibit for the municipal electrician, who should not overlook this opportunity of keeping in touch with modern apparatus.

"The Jefferson Hotel has been selected as official headquarters, where the convention will be held. Ample space will be provided free of charge to those wishing to place exhibits on the same floor with the convention hall.

"Those desiring exhibit space will communicate with Mr. W. E. Walgamott, city electrician, Peoria, Ill., who will make all necessary arrangements. Mr. Walgamott will also make hotel reservations.

"The secretary will be pleased to furnish any information on matters pertaining to the convention on application."

Bound Volumes of Telegraph and Telephone Age.

TELEGRAPH AND TELEPHONE AGE for 1911 covers a period of great activity in telegraph and telephone development and contains a complete record of all important events in these lines, besides much other interesting and valuable matter of general and technical interest. The volume is well worth preserving by students and subscribers, as its contents will be frequently referred to on account of their important character.

Bound volumes are now for sale at the publication office of this journal, 253 Broadway, New York, at $3.50 per volume, express charges collect. These volumes are neatly bound in cloth and will be found very handy for the library.

Cable Changes at New York.

All submarine cables entering New York cross the inlet to Jamaica Bay and land at Coney Island, but the United States Government having decided on extensive dredging operations to make the bay navigable makes it necessary to remove the cables.

In order to meet the new situation the Postal Telegraph-Cable Company is constructing an extensive cable plant at Far Rockaway, 22 miles from New York, where the Commercial and German cables will be landed. This change necessitates considerable new underground work, and the Okonite Company, New York, is now engaged in manufacturing and laying the various cables to be used in connecting the main office at 20 Broad Street, New York, with the Far Rockaway station. Three seven-pair cables are now being laid from 20 Broad Street to Far Rockaway. All of the cables will be lead covered.

It is expected the entire work will be finished by November 1.

Talks With Telegraph and Telephone People.

We met Mr. J. F. Skirrow, associate electrical engineer of the Postal Telegraph-Cable Company, New York. He had just returned from St. Louis, whither he had gone on a trip of inspection of his company's plant at that point. We naturally asked him how he found conditions in that city and he replied that so far as his company's interests were concerned he never saw a better managed office. Intelligent-looking people were at every counter and desk and politeness was apparent everywhere. "When I entered the office," he said, "I was a total stranger to the clerks I approached, yet I was received with extreme politeness. It made a great impression on me. Superintendent J. F. Looney and manager W. S. Daniels are to be congratulated, while chief operator C. F. Bartlett has an operating staff that is not surpassed in efficiency by any in the country. His department is also a model of neatness, and all identified with the department from Mr. Bartlett down to the check boys, are striving to make themselves even more efficient."

A manager of a large office writes to us: "If we are to have greater economy in the telegraph, we must have greater efficiency. The best way to attain greater efficiency is through education and knowledge and with these come enthusiasm and ambition. These words are no doubt true. Economy is closely linked to efficiency. A man who is efficient in the transaction of his business cuts the corners sharply to save time. He does not walk around the block to get across the street. He transacts his business with the least trouble and the greatest facility. The man who takes the opposite view labors at every point and makes his work drudgery."

The London newspapers inform us of a very much confused and in fact demoralized telephone condition in the metropolis of the world. It is no wonder, therefore, that when Mr. W. T. Gentry, of Atlanta, Ga., president of the Southern Bell Telephone Company, happened to register in one of the London hotels, he was seized upon to appear before a committee to tell what he knew about organizing a telephone plant. We hope the recital of Mr. Gentry's experience and knowledge may prove of value to our London friends.

School of Wireless Instruction.

Every day we are in receipt of letters from operators who wish to engage in the wireless branch of telegraphy. We respectfully refer those desiring to make a change to consult the advertisement of the Marconi Wireless Telegraph Company, which appears on another page of this issue. The announcement is made there of the opening of a school of instruction and that technical classes will be formed at regular intervals. Applicants may enter the code class at any time, however.

The Marconi Company has established a well-equipped school at 29 Cliff Street, New York, where complete and thorough instruction will be given by a competent teacher.

The equipment at the school consists of a standard 2-kw. 240-cycle disc discharger transmitting set, including switchboards and controlling appliances for same, likewise a complete 2-kw. quenched-spark set with all necessary appliances for adjustment and obtaining resonance.

A standard auxiliary set with storage cells is in use for daily instruction. In addition to this there is a large amount of experimental apparatus to illustrate the applications of electricity and magnetism as applied to wireless telegraphy. This latter equipment contains wave meters for measuring wave-length and obtaining resonance in transmitting circuits, a decremeter, an instrument to measure the logarithmic decrement of damping, etc.

An interesting feature of the classroom for continental code practice is the use of a Wheatstone transmitter by which messages are automatically sent to the class at any speed desired. Operators are required to send and receive at a rate of thirty words per minute before being admitted to a ship's position, etc.

Those desiring to take up the work should communicate with the Instructing Engineer of the company at the address given.

T. M. B. A. Assessment.—Assessment No. 540 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the death of William E. Athearn at Brooklyn, N. Y., George A. Lyon at Live Oak, Fla., Chester H. Pond at Moorehead, Miss., John F. Guthridge at Washington, D. C., and John F. Kane at Buffalo, N. Y.

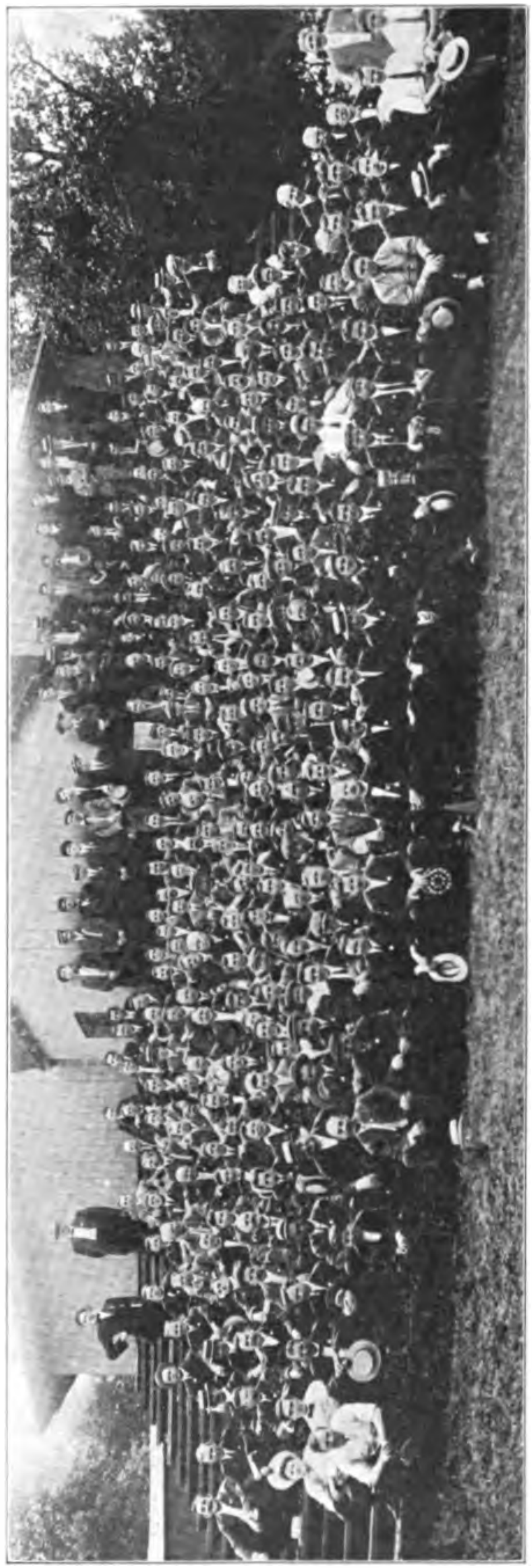
The Postal Outing.

The outing of the branch office managers of the Postal Telegraph-Cable Company, New York, which was held at College Point, Long Island, N. Y., June 29, as briefly announced in our issue for July 16, was a highly successful affair. There were 307 persons present, Mr. C. F. Leonard, district superintendent, being the guest of honor. Remarks were made by Mr. Leonard, chairman T. E. Heffren and managers J. J. Cochrane, J. Costelloe, J. J. Alcock and J. F. McNaill.

A game of baseball between the up-town managers and the down-town managers was won by the latter, the umpires being Messrs. John Costelloe and Jos. Tynan. Each member of the winning team received a pocket knife.

Six other athletic events were held, first and second prizes being awarded in each.

The accompanying photograph of the party was taken on the ground.



OUTING OF POSTAL BRANCH OFFICE MANAGERS, COLLEGE POINT, N. Y., JUNE 29.

Annual Outing of the French Cable Staff.

The New York staff of the French Telegraph Cable Company held their sixth annual outing on Sunday, July 14, at Witzel's Grove, Point-View Island, L. I.

The steamer "Fulton Market," chartered for the day, took over one hundred enthusiastic members of the staff, accompanied by several friends from the Commercial Cable Company and the Western Union Company offices, from the New York dock a little before 10 a. m. for a trip through Long Island Sound as far as Stepping Stones Lighthouse, and turning there, brought them to Witzel's Grove, where they disembarked and sat down to a most enjoyable breakfast.

The short sea voyage had whetted their appetites and full justice was done to the breakfast, which was very satisfactorily served.

Baseball, field and track games were the order of the day, and many strenuous members distinguished themselves in these events, winning prizes of money and useful articles.

Dinner was served about 6 p. m., and was thoroughly enjoyed by everyboly. Toasts were given to the headquarters and officers of the company, also to the manager, whose unavoidable absence was much regretted, and a pleasant evening trip through Long Island Sound to New York ended a good day's sport.

Among those present at the outing were: E. C. Sweeney, traffic manager, G. Godfroy, J. G. Sherry, Geo. Bain and Messrs. Shafer and Giles. The committee of arrangements consisted of J. Standinger, chairman; Charles Limbrick, treasurer; A. Harrigan, secretary; L. Desnouee, George Bain and Mr. Martin.

Mr. J. B. Coggins, manager of the Postal Telegraph-Cable Company at San Francisco, Cal., in renewing his subscription for another year writes: "I thank you for continuing my subscription as I do not wish to miss a copy."

The Real Vibroplex.—It is important to remember, when buying a transmitting machine, that if a Martin Vibroplex is desired the words "Horace G. Martin, manufacturer, New York City," should appear on the name plate. This is an evidence of the genuineness of the instrument. There are several inferior machines marketed under the general name "Vibroplex," but the real "Vibroplex" is that of the Martin make. The fact that it has imitations is evidence of its worth, because no one will imitate a poor model. Mr. Horace G. Martin is the pioneer in the manufacture of this type of instrument. He started with a first-class machine and has been producing them ever since. Purchasers should beware of the imitations if they want a reliable instrument. Mr. J. E. Albright, 253 Broadway, New York, is the sole agent for this instrument.

Telephone Specialties.

Mr. Frank B. Hall, Newton Falls, Ohio, dealer in telephone specialties, has just issued a new catalogue of the various specialties handled by him. The pamphlet covers cable cars, cable hangers, cable rollers, cable terminals, electric booth-fans, electric desk-fans, mica fuses, pole houses, steel "T" brackets, troubleman's cable cars, and weatherproof protectors. There are many excellent half-tone illustrations of representative articles of each line, together with a general description. Mr. Hall also carries a line of high grade standard porcelain insulators and porcelain house knobs. Copies of this catalogue can be had for the asking.

LETTERS FROM OUR AGENTS.

NEW YORK WESTERN UNION.

Mr. R. H. Tucker, who for the past five years has filled the position of southwestern wire chief in this office, has been appointed plant chief at New Haven, Conn. His territory covers the State of Connecticut. Mr. Tucker hails from Petersburg, Va., having learned the business there seventeen years ago. He has held positions with the company in St. Louis and Chicago as traffic, quadruplex and repeater chief. Mr. Tucker was married July 12 to Miss Roberta Martin, of Richmond, Va., at Washington, D. C.

PHILADELPHIA POSTAL.

Among the recent visitors at this office were J. F. Skirrow, associate electrical engineer, and F. Zeiss, New York, and A. H. Mitchell, Washington.

Chief operator E. W. Miller and cashier J. H. Wilson are absent on their vacations.

Manager C. W. Harkins, of Lebanon, is handling, in an excellent manner, the extra business caused by the encampment at Mt. Gretna.

BOSTON WESTERN UNION.

The Boston plant chapter of the Telephone and Telegraph Society of New England held its fifth annual outing in Auburndale, Mass., on Saturday, July 27. There was a variety of field sports, and valuable prizes were awarded.

ST. LOUIS AMERICAN TELEPHONE AND TELEGRAPH.

Mr. Sandy McDougall, late chief test board man at Kansas City, Mo., has been promoted to the position of district plant chief at Kansas City, vice Mr. J. S. Cole.

Mr. Fred C. Nitsche, for seven years past a test board man at St. Louis, has been promoted to the position of chief test board man at Kansas City.

On the eve of his departure, Mr. Nitsche was presented with a handsome meerschaum pipe by his associates of the St. Louis test room.

Messrs. F. N. Overlin, W. J. Powers, W. J. Carey and C. A. Marsh are recent additions to the test room force at St. Louis.

A certificate of membership in the Telegrapher's Mutual Benefit Association, 195 Broadway, New York, affording protection for the family and dependents in the amounts 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.

Telegraph and Telephone Age

No. 16. NEW YORK, AUGUST 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Electrical Requirements.

In every profession or line of business-calling there are certain laws or lines beyond which one may not trespass, and others which must be reached before they can be put into practical operation, and in no industry are these lines more strictly drawn than those in the electrical field.

Too many consider their electrical education finished when they have acquired a sufficient knowledge to handle the apparatus under their immediate care in an expert manner, and believe they can correctly explain the principles involved in the operation of the instruments. But there is a great deal more to be learned about such equipment than is generally believed, and of such a character and importance that unless one delves deeper he misses the first step in the ladder that leads to practical electrical engineering.

To those who are ambitious and desire to push forward, but do not know just how to proceed, we suggest that they obtain a copy of the "National Electrical Code," which is a compilation of construction rules published by the National Board of Fire Underwriters, and study it carefully. While, of course, this book offers no technical explanations, it points out the danger mark in the use of apparatus or undertaking, and states the remedies to be applied. In this way the student readily recognizes the fact that each piece of apparatus, wire, or other part of the equipment he supervises was not constructed or selected by any haphazard method, but that its selection was determined by a sharply defined set of rules, the reading of which will give him a better understanding of "How," and "Why."

For example, take Rule 50, in Class D, of the Code referred to; relating to the general construction of rubber covered wires and what is required to make them acceptable. It will give the reader a fair idea of what a cord or wire really is aside from its resistance and general appearance. In like manner fuller information concerning any other part of the equipment one handles may be ascertained by referring to the rule or rules governing its construction.

Rule 50 referred to is as follows:

RUBBER-COVERED WIRES.

(a) Copper for conductors must be thoroughly tinned.

Insulation for voltages 0 to 600, inclusive.

(b) Must be of rubber or other approved substances, homogeneous in character, adhering to the conductor, and of a thickness not less than that given in the following table:

B. & S. Gauge.	Thickness.
No. 18 to 16	1-32 inch
" 15 " 8	3-64 "
" 7 " 2	1-16 "
" 1 " 0000	5-64 "
Circular Mils.	
250,000 to 500,000	3-32 "
500,000 " 1,000,000	7-64 "
Over 1,000,000	1-8 "

Measurements of insulating wall are to be made at the thinnest portion of the dielectric.

(c) The completed covering must show an insulation resistance of at least 100 megohms per mile during thirty days immersion in water.

(d) Each foot of the completed covering must show a dielectric strength sufficient to resist throughout five minutes the application of an alternating E. M. F. proportionate to the thickness of the insulation in accordance with the following table:

Thickness in 64th inches.	Breakdown test of 1 ft.
1	3,000 volts
2	6,000 "
3	9,000 "
4	11,000 "
5	13,000 "
6	15,000 "
7	16,500 "
8	18,000 "
10	21,000 "
12	23,500 "

14	26,000 volts
16	28,000 "

The above is only part of Rule 50; the rest of it giving requirements for braided wires, flexible cords, etc., all of which is exceedingly interesting.

Of course the specifications do not mean that all apparatus must be constructed exactly as specified, but that they must at least withstand the tests required under the conditions stated. In other words there will be no objection to the construction and use of better apparatus, but inferior articles or methods will not be approved by the Board of Fire Underwriters.

When, however, it comes to the question of ascertaining the actual construction and electrical properties of any particular class of wires, cords, or apparatus used in the telegraph service, the facts in detail can only be learned from the company's own specifications, which, while complying strictly with the general requirements of the code, sometimes specify a form or method that is the equivalent of the approved form, and is therefore acceptable.

The object of this article is to direct the student towards a channel containing much useful and interesting information not usually contained in text books, at least not in a condensed form.

Recent Telegraph and Telephone Patents.

ISSUED JULY 16.

1,032,596. Antiseptic Telephone Mouthpiece. To C. V. Fuller, New York.

1,032,638. Telephone Attachment. To M. M. Wentworth, East Denmark, Me.

1,032,688. Hand Generator for Harmonic Signalling Systems. To R. H. Manson, Elyria, Ohio.

1,032,968. Wireless Means for Controlling Aeroplanes. To C. L. Vanderberg, Hutchinson, Kan.

1,033,065. Cable Terminal Box for Telephone Systems. To T. B. Farmer, Baltimore, Md.

ISSUED JULY 23.

1,033,085, 1,033,086 and 1,033,087. Differential Microphone Transmitter. To J. J. Comer, Chicago, Ill.

1,033,098. Telephone Receiver. To J. Halldow, Elyria, Ohio.

1,033,114. Telephone Relay or Repeater. To C. D. Morris, Washington, D. C.

1,033,135. Telephone System. To A. H. Weiss, Chicago, Ill.

1,033,619. Telephone Attachment. To J. E. Ross, Springfield, Mo.

1,033,725. Automatic Telephone Exchange. To E. Neuhold, Friednau, Berlin, Germany.

ISSUED JULY 30.

1,033,817. Telephone Wall Set. To R. H. Manson, Elyria, Ohio.

1,033,877. Telephone Exchange System. To E. R. Corwin, Chicago, Ill.

1,033,938. Telephone-Receiver Shell. To F. C. Richey, Elyria, Ohio.

1,034,148. Attachment for Telephones. To W. A. Schmelz, Pittsburgh, Pa.

1,034,200. Telephone Receiver. To L. W. Carroll, Riverside, Ill.

Telegraph and Telephone Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange August 12:

American Telephone and Telegraph Co. ..	146
Mackay Companies	87
Mackay Companies, preferred	69¼
Western Union Telegraph Co.	81¾

Personal.

Mr. D. S. Robeson, of Philadelphia, Pa., prominent in telegraph line construction work twenty-five years ago, was a recent New York visitor, and called on many of his old friends.

Mr. R. J. Young, a former telegrapher in the United States and Canada, and now representing Mr. F. G. Creed, of London, England, inventor of the Creed printing telegraph system, is in New York in the interest of that system.

Mr. Leon W. Quick, treasurer of the city of St. Louis, Mo., and a former telegrapher, is a candidate for governor of Missouri on the Republican ticket. Mr. Quick also fills the position of grand secretary and treasurer of the Order of Railroad Telegraphers.

Hon. John K. Royal, mayor of Harrisburg, Pa., a former telegrapher, is the subject of an interesting biographical sketch in the *Patriot* of that city. Mr. Royal worked for several years as an operator on the Northern Central Railroad. Since 1890 he has occupied various positions in the city government and was for nine years a member of the common council.

Canadian Notes.

Mrs. W. J. Camp with her son Mr. Eric Camp have been visiting friends in New York and New Jersey for the past month. Mrs. Camp is the wife of Mr. William J. Camp, assistant manager, Canadian Pacific Railway Company's Telegraphs, Montreal, Que.

Night Letters in Canada.—The Grand Trunk Pacific Telegraph Company has adopted the night lettergram service.

Platinum in British Columbia.—Platinum has been discovered in the vicinity of Nelson, B. C., and the ground for miles around has been staked. It is reported that arrangements are being made to carry on the treating of the platinum ores on an extensive scale.

Mr. H. K. Armstrong, manager Western Union Telegraph Company, Anderson, Ind., writes: "It is a pleasure to receive TELEGRAPH AND TELEPHONE AGE."

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager of the company, leaves August 19 on his vacation.

Mr. C. C. Adams, second vice-president, New York, is absent from his office on a vacation and will return on August 22.

Mr. E. B. Pillsbury, general superintendent, New York, will entertain the superintendents and managers of his division some time in October. This will be a business and social gathering similar to the one held in Chicago recently. They will be the guests of Mr. Clarence H. Mackay, president of the company.

Mr. L. Lemon who has been with the Postal Telegraph-Cable Company for a number of years as district and division superintendent at New York, has resigned to become managing director of the Metropolitan Telephone and Telegraph Company, recently chartered for the purpose of building lines and leasing them. Mr. Lemon's headquarters will be in New York.

Mr. H. D. Reynolds, superintendent, Buffalo, N. Y., was in New York August 3 on company business.

Mr. F. F. Norton, superintendent of traffic of this company has returned from a business trip to Chicago and other cities in the middle west.

Mr. Isaac Smith, superintendent of tariffs, has returned from a vacation spent in the Adirondacks.

Mr. Charles Shirley, assistant superintendent of traffic, New York, was married to Mrs. Margaret Flood, August 1. Mrs. Shirley was formerly an operator and is well-known to many New York telegraphers by whom she is highly esteemed. Mr. and Mrs. Shirley spent their honeymoon in the Adirondacks.

Mr. Wm. B. Dunn, assistant secretary of the company is in the Catskill Mountains, where he is spending his vacation.

Mr. W. C. Daviet, superintendent, Atlanta, Ga., announces the following appointments in his district: B. E. Sullivan, manager of the recently-opened office at Maysville, Ky., and L. W. McCuan, manager at Bowling Green, Ky.

Mr. M. J. Carey has been appointed manager of the Schenectady, N. Y., office of this company, vice C. F. Hortsman, resigned.

Mr. R. P. Wines, of the Battle Creek, Mich., office has been promoted to the managership of the Toledo, Ohio, office, vice Mr. J. R. Gilroy, transferred.

Mr. C. S. Woodin, manager of the Postal Telegraph-Cable Company at Auburn, N. Y., has been transferred to Jamestown, N. Y., to succeed Mr. W. A. Sterner, resigned. Mr. C. P. Smith, of Syracuse, N. Y., succeeds Mr. Woodin at Auburn.

A new line carrying seven copper wires is being built from Memphis, Tenn., to Dallas, Tex., by way of Little Rock and Texarkana, and will soon be placed in service. It includes a twenty-wire cable laid across the Mississippi River at Memphis. Mr. W. I. Capen, vice-president, New York, has returned from an inspection of this line.

This company announces in its tariff circular of August 1 that wireless messages may now be accepted for transmission via Cape Race, N. F., the year round, but delivery to outbound steamers is not guaranteed between January 20 and August 20.

This company has opened an office at Washington, Pa. This is the first competing office at this point since Mutual Union days.

The Cable.

Japanese Telephone Cable.—The Department of Communications of Japan has decided to lay a submarine telephone cable between Aomori and Hakodate.

Reimbursement for Cable Damage.—The Japanese government has paid the Commercial Pacific Cable Company $13,500 on account of the expense in curred by that company in repairing its cable across the Pacific Ocean, which was accidentally disrupted by a Japanese government vessel on November 30, 1910. The International Convention for the protection of submarine cables provides for the reimbursement by the parties doing the damage of the expenses necessary to effect the repair.

The Press Service.

Mr. Frederick Roy Martin, editor of the Providence, R. I. Journal and Providence Bulletin has been appointed assistant general manager of The Associated Press, New York, Mr. Kent Cooper has been appointed chief of the traffic department and Mr. Charles E. Klober, chief of the news department, both, with jurisdiction throughout the service.

Mr. C. A. Irons, chief operator of the Western Division of the United Press, Chicago, has relieved Mr. J. J. Rafter, superintendent of telegraph at New York, owing to Mr. Rafter's continued illness. Mr. Rafter has been given an indefinite leave of absence. Mr. Roscoe Johnson of the New York office succeeds Mr. Irons at Chicago.

Telegraphic Addresses in London.—Owing to the large number of telegraphic addresses in use in London, delay is incurred in consulting the records. On August 1 a new system was introduced, according to which an "indicator" word will be included (free) in the telegraphic address, enabling the staff to dispatch a telegram to the appropriate office of delivery without reference to a directory.

The Shreveport, La., office of the Postal Telegraph-Cable Company of Texas is stated to be one of the most completely equipped offices the company has. When it was opened for business fifteen years ago it had only two wires; now it has twelve.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Newcomb Carlton, vice-president, New York, is spending his vacation cruising around eastern waters on his yacht. He will be absent during August.

Mr. Wm. H. Baker, secretary of the company is spending the month of August in the Adirondacks.

Mr. C. H. Murphy, general superintendent of time service of this company, made a business trip through the New England States recently.

Mr. W. J. Lloyd, division traffic superintendent, Chicago, was a recent New York executive office visitor on company business.

Mrs. Ashton G. Saylor, wife of Mr. A. G. Saylor, general superintendent of this company, New York, accompanied by Mrs. S. A. Dunn, sailed for Europe from Boston on August 3 to be absent several weeks.

Mr. H. C. Worthen, general superintendent of the Western Union Telegraph Company, Atlanta, Ga., was a New York business visitor this week.

Mr. Frank Kitton of the engineer's office, New York, has returned from a vacation in the Adirondacks. Mr. C. R. Tilghman looked after his duties during his absence.

Mr. A. C. Terry, district commercial superintendent, Western Union Telegraph Company, Pittsburgh, Pa., is a member of the Trade Extension Committee of the Pittsburgh Chamber of Commerce. A handsome and artistic pamphlet recently issued gives an account of the annual trade extension tour conducted by the Chamber of Commerce, and contains many illustrations of individual members of the committee of "trade getters," including that of Mr. Terry. They are called Pittsburgh's "live wires." Mr. Terry has been appointed chairman of the publicity committee which has charge of the "Made in Pittsburgh" Manufacturer's Special Train, to be sent out September 10 on a 5,000-mile tour throughout the Middle West and South. The Western Union Company will have a completely equipped telegraph office on the train and every car will be connected by telephone with a private branch exchange, for local, long-distance and inter-communicating telephone service. The Pittsburgh newspapers will send representatives who will forward their press matter to Pittsburgh direct from the train.

Mr. T. P. Cummings, district superintendent, New Orleans, La., announces the following appointments in his district: C. A. Posey, chief clerk to the superintendent, to be district manager, second district, Gulf Division, and S. S. Gallagher, assistant chief operator in New Orleans to be night chief operator, vice T. H. Kelly, transferred to other duties. Charles Fish, claim clerk at New Orleans, has succeeded Mr. Posey as chief clerk to the superintendent.

Mr. W. H. Spain, manager of the Cleveland, Ohio, office, has been appointed manager of the St. Louis, Mo., office, vice R. H. Bohle, who has been made a special agent. Mr. C. W. Mitchell, manager of the Mansfield, Ohio, office, has been appointed manager at Cleveland to succeed Mr. Spain.

Mr. W. A. Sterner, former manager of the Postal Telegraph-Cable Company, at Jamestown, N. Y., has accepted the managership of this company's office at Sharon, Pa.

A conference of district commercial managers was held July 25 in the office of Mr. A. C. Terry, district commercial superintendent, at Pittsburgh, Among those present were Preston D. Callum, commercial agent, New York; and the following district commercial managers: E. R. Collins, Huntington, W. Va.; George S. Walters, Parkersburg, W. Va.; George F. Stadtmiller, Erie, Pa.; and T. J. Jones, district cable manager, Pittsburgh, Pa. The day was taken up in discussion of matters of interest to the service. In the evening a dinner was given at the Fort Pitt Hotel .

Mr. J. W. Atkins, manager at Key West, Fla., spent some time recently at Miami, Fla., in superintending the work of repairing the cable between Miami and Key West.

Mr. H. D. Jones, special agent of this company at San Francisco, accompanied by his wife, was a recent New York visitor and made it the occasion to call on many of his New York friends. Mr. Jones was for about twenty-five years chief clerk in the office of the district superintendent at Cleveland, Ohio. He has been located at San Francisco for the past five years. Mr. R. C. Allen, identified with the Cedar Rapids, Ia., office, was also a recent New York visitor.

Work has been started on the foundation for the new twenty-six story building of this company at 14 and 18 Dey Street, at the rear of the present building at 195 Broadway. When this new building is completed, the annex at 10 and 12 Dey Street will be torn down and rebuilt to correspond and when this portion is finished the present headquarters at 195 Broadway will be taken down and rebuilt to conform with the other sections, thus making one building of uniform design, with a frontage of seventy-five feet on Broadway and 250 feet on Dey Street. An extension will run through the block to Fulton Street, where it will have a frontage of seventy-five feet.

The pedestals and steps projecting from the face of the building at the main entrance at 195 Broadway, are being removed in order to comply with the recent ordinance requiring the removal of all structures projecting beyond the building line.

The company's cable steamer "Robert C. Clowry" has returned from repair work on the Prince Edward Island cable.

This company will erect a new cable station at Sydney, C. B.

Mr. W. H. Spain, manager of the Western Union Telegraph office, St. Louis, Mo., was born near Kenton, Ohio, February 17, 1871, and has been in the telegraph service since 1886. After working in various places throughout the middle West he became manager of the Akron, Ohio, office in April, 1904, and in August, 1910, was appointed manager at Cleveland. His present advancement to the larger office is a fitting recognition of his executive ability and worth.

How to Earn a Large Salary.—The New York "World" of Sunday, August 11, published an interesting interview with Mr. Theo. N. Vail, president of the Western Union Telegraph Company and the American Telephone and Telegraph Company, in which he tells how a man can qualify for a salary of $10,000 to $25,000 a year. Mr. Vail gives a good deal of practical advice, and sums it up in these words: "Of course a man has got to earn a big salary before we can pay it, but we are only too anxious to pay it to men who can earn it."

Educating the Public As to the Advantages of the Telegraph.—With a view to bringing the telegraph into closer touch with the New Orleans business interests a party of Western Union officials spent a few days in that city recently interviewing business men and acquainting them with the advantages of the various new services introduced by the company. It was pointed out that every office or residence with a telephone is practically a branch telegraph office and that much time is saved by telephoning telegrams to the telegraph office and delivering telegrams by telephone instead of by messenger. The party consisted of Messrs. J. C. Smith, division commercial and traffic superintendent; H. Van Devender, commercial superintendent, F. C. Cole, W. B. Kendall, W. E. Bellman, A. F. Felder, J. W. Brooks, R. P. Simmons, R. G. Williams, W. A. Logan, Jos. Holthaus, Val Thrain and Frank Leefe.

More Benefits for Western Union Employes.

Following is a copy of a circular letter sent out by president Theo. N. Vail, to the employes of the Western Union Telegraph Company on August 1.

"As stated in my letter accompanying the Provisional Pension we have under consideration a plan whereby those who have been in the service for short periods may receive some benefit in case of disability or death.

"Such benefit would naturally take the form of payments in case of temporary disability due to illness or accident, or of life insurance payable in case of death.

"Before determining upon one or the other of these benefits, I will be greatly obliged if you will indicate on the attached form whether your preference would be for relief in case of temporary disability of for life insurance.

"I take this opportunity to express my hearty thanks for the many letters and words of approval from employes expressing their appreciation of the Provisional Pension Plan and of our efforts to further improve the conditions of their employment. I believe that a continuance of your loyal support, together with the company's determination to improve conditions as rapidly as increased earnings permit, is the policy which will make for progress for the employes and for the company."

In an interview at his home in Lyndonville, Vt., Mr. Vail expressed himself in regard to the matter as follows:

"I believe that the young men should be encouraged to stay in our employ as well as the veterans. Old age pensions have always appeared to me to be something to talk about rather than an actually realized benefit to the working man. By the pension system just put into operation we have overcome the old difficulties. Employes of large corporations should not be compelled to work a lifetime before their employers show appreciation of their faithful service by the long delayed and often meagre pension which some companies offer.

"There are over 200,000 persons at work for the corporations of which I am the active head, and I purpose to aid the establishment this Fall of an insurance system that will make the prospect of want unknown among them.

"This can be done without loss to the employer, who gains infinitely in the improved quality and the greater quantity of service which the contented employe renders."

Night Lettergrams in Italy.—The Italian Parliament recently approved a law providing for a telegraph service of night letters similar to that in the United States and in Great Britain. The charge is to be 2 centesimi ($0.00386) per word, with a maximum number of words allowed of 250 and a minimum charge of 60 centesimi ($0.1158).

New Atlantic Wireless Plant.—The Atlantic Communication Company, with offices at 90 West Street, New York, is constructing a wireless tower and plant at Sayville, L. I. The Telefunken system will be used. It is stated that there is some German capital in the company, but that the German government has nothing to do with it, as has been reported recently.

Mr. M. T. Cook, division commercial superintendent of the Western Union Telegraph Company at Chicago, Ill., in renewing his subscription for another year, writes: "I shall take pleasure in recommending TELEGRAPH AND TELEPHONE AGE to anyone whom I can find interested and who is not now a subscriber, as from my own experience in reading its pages I know it will be of benefit to such."

The Telephone.

Mr. Henry W. Pope, secretary of the Telephone Pioneers of America, New York, is spending his vacation in the Catskills.

W. C. Fink, assistant secretary and treasurer of the Bell Telephone Company of Pennsylvania, Philadelphia, died in Atlantic City, N. J., August 4, of blood poisoning. He was found dead in bed.

Mr. A. W. Metzger of the Insular Telephone Company, San Juan, Porto Rico, has accepted a position in the plant department of the Bell Telephone Company of Missouri, with headquarters at St. Louis.

Mr. W. O. Nevill, special agent of the railway department of the Missouri and Kansas Telephone Company, with headquarters at Kansas City, Mo., has resigned to engage in other business.

Telephone Regulation in Memphis.—A telephone rate-regulation ordinance has passed the Memphis, Tenn., council. It is similar to that in operation in Louisville, Ky., and the maximum rate for a business telephone is $5.50 per month.

Telephony in Algeria.—A comprehensive system of telephones is to be established throughout Algeria, the Chambers of Commerce of the leading cities having been authorized to advance the necessary funds to the general Government.

Suit for Permission to Issue Bonds.—The Interstate Telephone & Telegraph Company has started a suit in the New Jersey Supreme Court against the Public Utilities Board to compel permission to issue $1,525,000 30-year first refunding mortgage 5 per cent gold bonds.

Consolidation of New York Telephone Companies Prohibited.—The Public Service Commission, Second District, New York, has denied the application to consolidate the independent and Bell companies in Northern New York. The resulting increase in rates is the reason for denying the application.

Merger in Michigan.—Negotiations have been concluded for the merging of the Home Telephone Company, of Detroit, Mich., and its subsidiaries, with the Michigan State Telephone Company, the consideration being between $3,500,000 and $4,000,000. The merger is subject to the approval of the Michigan State Railroad Commission.

Automatic Telephones in Berlin.—The German postal authorities have decided to install automatic telephones in some of the busiest and noisiest thoroughfares of Berlin, with a view to testing the innovation under the worst conditions. Should the results be satisfactory, automatic telephones will be installed throughout the city.

Telephone Communication Between England and Ireland.—In view of the inefficient working of the telephone communication between the south of England and Ireland, which has to go through the cable between Stranraer and Donaghadee, the British Post Office is taking steps to lay a telephone cable from North Wales to Dublin.

Microphone for Large Currents.—Messrs. G. Holmström and C. Egnér, Swedish electrical engineers, have invented a microphone for large currents, by the use of which it is stated that telephonic conversation can be carried on over twice the distance possible with present instruments. With a slight difference in design the instrument is suitable for wireless telephony.

Telephone Merger in Kentucky.—The Kentucky State Railroad Commission has approved the merger of the Cumberland Telephone and Telegraph Company, the Hopkinsville Home Telephone Company, the Pembroke Home Telephone Company and the Todd County Home Telephone Company. The new concern will be known as the Christian-Todd Telephone Company.

Convention of New England Telephone Managers.—A convention of district and exchange managers of the New England Telephone and Telegraph Company was held at the Hotel Somerset, Boston, Mass., August 8 and 9. There were 150 delegates present, and a banquet was given at the hotel. The reception committee consisted of E. W. Pierce, C. J. Abbott of Worcester, E. T. Emerson of Bangor, Me., George Knox of Brockton, R. Robins, Jr., of Salem and L. B. Stowe of Springfield.

London Telephone Service.—In reply to a question in the House of Commons recently, Postmaster-General Samuel stated that he did not regard the present situation as satisfactory; but the provision of extensions to existing exchanges and the construction of new exchanges to make good the deficiencies were being pushed on as quickly as possible. The staff available was not sufficient to cope with the demand for telephones, and the amount of work involved in the extension of exchanges and the transfer of overhead wires to underground lines was abnormal. Additional men had been employed, but the use of partially skilled assistance in the endeavor to meet the requirements had, to some extent, increased the difficulties.

Telephone Pioneers' Convention.—Now that the place and date for the next reunion of telephone pioneers has been fixed (New York, November 14 and 15) secretary Henry W. Pope is actively engaged in making arrangements for the event. An excellent and interesting programme is promised and addresses will be made by prominent pioneers. Mr. Thomas A. Watson, who was intimately associated with Prof. Alexander Graham Bell in the latter's pioneer work on the telephone will be one of the speakers, and Mr. Thomas D. Lockwood, of Boston, will also address the reunion. If secretary Pope is advised of any number of members from any one city or locality he will arrange for special railroad rates to New York.

Postal Outing and Conference in Chicago.

In our issue for August 1 brief reference was made to an outing and conference of Western Division superintendents and managers of the Postal-Telegraph-Cable Company at Chicago, July 24, 25 and 26. General superintendent E. W. Collins, Chicago, gave the following interesting account of the meeting to our agent, Mr. H. H. Dengler: "It was the desire of president Clarence H. Mackay as expressed by vice-president and general manager E. J. Nally, that as many managers as could be spared from each district in the Western Division be given a few days of rest and recreation at his expense, leaving the arrangements in the hands of the various superintendents. It was the consensus of opinion that it would be to the advantage of all to have one central meeting point to which all could come, get acquainted, have conferences and 'eat, drink and be merry.' The great city of Chicago was selected as the meeting place because it looked good, is good and will be good.

"The gathering consisted of the division superintendent, the district superintendents, the Chicago district managers, chief clerks, and fifty outside managers, and the conferences were presided over by the general superintendent.

"The exercises consisted of the reading of papers by managers Daniel of St. Louis, Sprong, of Cincinnati and McCormick of Detroit and a general discussion thereof. The vim and vigor with which the various subjects were handled is proof conclusive that the 'Postal Spirit' is very much in evidence all along the line.

"The following telegram was formulated by a committee of three composed of managers Holt, of Denver, Morlan, of Salt Lake and Gage, of Saginaw, and forwarded to vice-president and general manager E. J. Nally at New York who in turn cabled it to president Mackay, who is at present in Europe:

'The managers of the Western Division assembled respectfully request to express through you to their host, Mr. Clarence H. Mackay, who is also president of the company that we have the honor to represent, our sincere thanks and deep sense of appreciation of the event in which we are now participating, made possible through his generosity toward us, and we further wish to assure him that we are confident that the results derived therefrom will not only reflect credit to ourselves, but to the company we represent.'

"On Wednesday, July 24, a business conference was held between 10 a. m. and 1 p. m. at which an ably-prepared paper was read by manager W. S. Daniel, of St. Louis. At one o'clock the gathering adjourned for the day and all present witnessed a baseball game, attended theatres or were entertained at the 'White City.'

"On Thursday from 10 a. m. until 1 p. m., another business session was held at which manager F. W. Sprong, of Cincinnati, read a carefully prepared paper, and at 6 p. m. a banquet was given at the Sherman House. When all had feasted to his or her heart's content, the business programme was completed by the reading of a paper by manager McCormick of Detroit, which was an able effort by an able man.

"The readers of papers at the business sessions did not get off unchallenged. They were obliged to run the gauntlet of challenge and criticism, and while everything was done in the best of good nature no man got by without being able to defend his guns.

"On Friday all hands boarded the steamer 'City of South Haven,' and were transferred to that beautiful little lake city after which the boat was named. Three hours were spent in sight-seeing, eating ginger-bread and letting the crumbs remain on the floors of the touring cars so thoughtfully and magnanimously placed at the disposal of the guests by Mr. Monroe of South Haven, to whom a vote of thanks was tendered.

"On the return trip the story of the storm was told to the fishes by some of our very best story tellers whose names may be secured upon application to Mr. Collins who insists upon ten cents being enclosed with the application, the ten cents to pay cost of paper since the story is long and somewhat disconnected.

"There never was a more enthusiastic gathering—a gathering where the Postal spirit was so much in evidence, and when the party separated each heart was pulsating with Morse characters and the eager listener could plainly read

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Among those present were:

Mr. R. P. Wines, of the Battle Creek, Mich., office has been promoted to the managership of the Toledo, Ohio, office, vice, Mr. J. R. Gilroy, transferred.

E. W. Collins, general superintendent; S. H. Mudge, division superintendent, and superintendents E. S. Williams, H. G. McGill, J. F. Looney, A. L. Lafferty, A. B. Richards, F. W. Conger, W. C. Black, C. A. Comstock; T. N. Powers, chief operator. Chief clerks L. R. Thomas, to general superintendent E. W. Collins; A. J. Doyle, to superintendent J. F. Looney; E. F. Fahrendorf, to superintendent H. G. McGill; Frank Potts, to superintendent A. L. Lafferty; A. Buetler, to superintendent F. W. Conger; E. A. Newman, to superintendent C. A. Comstock; W. L. Simpson, electrician.

Chicago managers F. S. Kimball, E. A. Elliott, H. F. Dettman, J. D. Davis, J. W. Bolsby, C. W. Tagte, J. G. Force, T. R. Claffy, B. F. Ramsdell, H. S. Waters, and C. S. Haskell.

Visiting managers:—G. M. Purdy, Cleveland, Ohio; F. W. Sprong, Cincinnati, Ohio; G. E. Hawkins, Columbus, Ohio; F. T. Bott, Dayton, Ohio; C. H. Ferry, Akron, Ohio; C. A. Mathany, Youngstown, Ohio; J. F. Horn, Canton, Ohio; H. H. Mull, Charleston, Ohio; W. S. Daniel, St. Louis, Mo.; B. F. Rommell, Kansas City, Mo.; W. G. Brimson, St. Joseph, Mo.; F. H. Jacobs, Peoria, Ill.; H. J. O'Donnell, Springfield, Ill.; Miss S. M. Feutz, Cairo, Ill.; H. H. Clark, Decatur, Ill.; E. W. Schieberl, Molines, Ill.; H. E. Patton, Des Moines, Ia.; E. H. Wichelman, Davenport, Ia.; W. T. Busch, Sioux City, Ia.; L. C. McCormick, Detroit, Mich.; W. S. Sweet, Grand Rapids, Mich.; T. C. Hughes, Bay City, Mich.; R. P. Wines, Battle Creek, Mich.; G. E. Gage, Saginaw, Mich.; J. G. Wolf, Omaha, Neb.; W. J. Fowler, Lincoln, Neb.; W. W. Morrison, Oklahoma City, Okla.; G. F. Fuller, Indianapolis, Ind.; G. L. Pierce, Evansville, Ind.; Miss L. McNeff, South Bend, Ind.; C. F. Knight, Terre Haute Ind.; G. W. Holt, Denver, Col.; H. Morlan, Salt Lake City, Utah; C. D. Miller, El Paso, Tex.; P. L. Lee, Milwaukee, Wis.; C. P. O'Brien, Madison, Wis.; H. F. Wheeler, Racine, Wis.

Peter Cooper and the Early Telegraph.

The late Abram S. Hewitt, a former mayor of New York City, told an interesting story to Mr. E. J. Edwards, the well-known writer, of how Peter Cooper, the philanthropist—Mr. Hewitt's father-in-law—suggested to Professor Morse the use of telegraph insulators.

Peter Cooper was a personal friend of Professor Morse, who invented the electric telegraph, writes Mr. Edwards. Mr. Cooper used often to visit Professor Morse at his workshop, which was situated in the topmost story of a building that faced Washington Square, New York City. One day Mr. Cooper said to Professor Morse: "How far do you suppose you can carry your wire? For I should think that it will be very important for the business success of your telegraph that it be possible to extend it for a distance of one hundred miles or more."

"Yes, I understand that," replied Professor Morse, "I know, too, that it is perfectly practicable to send the electric current intelligibly through the wire for a distance of two hundred miles, perhaps more, without relaying. But it is necessary to protect the wire and to support it. I don't see how we can carry the wire in the open air, because first, it will be necessary to support it upon poles or posts, and in the next place it will be necessary, if we do support it in that way, to insulate the wire; otherwise the electric energy would be lost, or greatly impaired. So it seems to me that I shall have to run the wire in tubes underground. The expense of doing this would be large, and I am sometimes afraid that it will be so great as to be prohibitive."

"I will think about that," said Peter Cooper; and he went away, determined to find some method, if possible, which would eliminate the necessity of burying the telegraph wires under ground.

It must have been about this time that one of Professor Morse's assistants suggested to him that he string the wires upon posts or poles, showing that this would be a much cheaper method of carrying them, for Mr. Cooper called upon Professor Morse one day and said that he was sure he had thought of a little device, very inexpensive, which would make it possible for him to use the wire overhead, instead of underground. Thereupon Mr. Cooper asked Prof. Morse to let him have a telegraph wire. When that was done Mr. Cooper took his cane and attaching it to the neck of a glass bottle which had been broken from the bottle, ran the wire through this bottle neck, saying that all Professor Morse would have to do to insulate his wires would be to get bottle necks, attach them to poles, and run his wire through these necks, and in that way he could carry his wire to the uttermost limits of the battery's strength.

It was, in fact, the device accepted by Professor Morse, obviating the expensive method of burying the wires; although, instead of having actual bottle-necks, Professor Morse caused the familiar glass insulator to be made at the glass factory.

"In this way," said Mr. Hewitt, "Peter Cooper was associated with the perfecting of the Morse telegraph apparatus."

Municipal Electricians.

Mr. Clark E. Diehl, superintendent of fire and police alarm, Harrisburg, Pa., has been reappointed to that position by Mayor Royal. Mr. Diehl, who is also manager of the Postal Telegraph-Cable Company's office in Harrisburg, has held the position of city electrician through the administrations of five mayors. He is prominent in many of the civic activities of that city and was a member of the School Board for six years.

The Peoria Convention.—President J. W. Kelly, Jr., Camden, N. J., is sending a circular letter to the members of the International Association of Municipal Electricians regarding transportation arrangements in connection with the annual convention at Peoria, Ill., August 26-30.

It is proposed that the Eastern members take the Black Diamond express on the Lehigh Valley Railroad, leaving Philadelphia on Sunday, August 25, at 12.30 p. m.; New York (Cortlandt Street), at 12 noon; Newark, N. J., at 12.27 p. m.; Allentown, Pa., 2.20 p. m.; Wilkes-Barre, Pa., 4.30 p. m., arriving at Buffalo at 10.27 p. m., eastern time. The train will leave Buffalo at 10.35 p. m. central time on the Lake Shore road, arriving at Chicago at 12.50 p. m., and leaving Chicago on the Rock Island at 1 p. m., will arrive at Peoria at 6.25 p. m.

There will be a parlor car as far as Buffalo, a special sleeper to Chicago and a special parlor car to Peoria.

The rate of fare one way will be as follows: From Philadelphia, Trenton, New York, Jersey City, Newark, Harrisburg and Allentown, $19.75; Wilkes-Barre and Scranton, $17.75; Elmira $15.05; York, $19.93; Boston, $23.90; Wallingford, $22.80; New Haven, $21.25; Rochester, $14.63; Niagara Falls and Buffalo, $14.50; Watertown, $18.08. Pullman through rate Philadelphia and New York to Chicago, $4.50. It is proposed to make the trip out a part of the entertainment features of the Convention.

Telegraph and Telephone Facilities at the St. Louis Terminal.

The extent of the telegraph and telephone equipment at the St. Louis Terminal was described in a paper read before the convention of the Association of Railway Telegraph Superintendents in New York last June, by Mr. F. E. Bentley, superintendent of telegraph.

The main telegraph office on the fifth floor above basement or track level, is equipped with seventy-six telegraph wires, all but six being looped from the Western Union main office; also four telephone circuits. Twenty-three telegraph wires and three telephone circuits are exclusively dispatchers' lines; the remaining fifty-three telegraph wires and one telephone line used for message work, are cut onto eight sextette instrument tables.

All of the seventy-six telegraph wires are cut from the regular switchboard to another one improvised of Dean telephone jacks—eight strips of ten jacks each. A monitor operator at the jack-switchboard, using plug and cord on the telegraph instrument, plugs in on each telegraph wire at intervals of ten to twenty minutes, answers calls, has an operator in the room, gets the message if one is available, otherwise he takes it himself; gets off any miscellaneous rush messages, and helps out the chief operator, besides keeping a record of the condition in which he finds each wire—quiet, busy or open. If quiet, he announces his presence by saying "I" "I" UD, thus giving any office on that wire a chance to get him.

The chief operator and assistant chiefs distribute equipment orders and stock reports to the various departments and between the tenant railroads. When a line office has an equipment order to send, he says "coach" and our operator makes the required number of copies—eight or ten as the case may be—on typewriter at one writing and direct from the wire, thus saving delay and work. "Coach" manifolds of tissue blanks are kept set up and handy for operators' use. Stock and time freight reports are handled in a similar way.

This office is different from the ordinary railroad relay office in that a scattering few messages are handled on numerous wires, instead of a great number of messages on a few wires.

The telegraph arrangement has remained practically unchanged since first installed, when the Union Station was opened in 1894, excepting that train wires were taken off the table in 1904, operators devoting all their time to working and watching message wires. The telephone circuits were added during the past two years.

The twenty-three telegraph and three telephone dispatching circuits are looped to the train order office, which is located in the stationmaster's cabin on track level.

There also the telegraph wires are in an improvised Dean telephone jack switchboard and the telephone circuits terminate in a special jack box with one desk set instrument on cord and plug made to work in common on all lines. Separate telephones on an adjacent table are permanently connected for use by road officials without bothering the operator. None of the roads' dispatching wires is kept cut onto an instrument. Operators plug in when necessary to get orders or reports, or when told by main office to answer on any wire.

At that office passenger conductors of twenty-three roads register, call for mail, messages and orders, and leave reports which are usually sent to the main office through pneumatic tube for wire transmission. One operator handles train orders for those roads which use that office, and another operator gets hourly bulletins of incoming trains, making ten copies at one writing, distributes them to the various departments, and sees that the bulletin board is posted and changed.

An inbound train sheet record is made. so that any inaccurate figure given by a road dispatcher may be corrected after the train strikes terminal rails and before it reaches Union Station.

A daily average of about 2,500 messages, orders and reports are handled at these two offices, and nearly 400 telegrams between local offices which have no direct telegraph connection.

A question for discussion, and no doubt a timely one: Should not telegraph and telephone offices, both commercial and railroad, at large passenger terminals, be combined and centrally located on or near the track level, with the view of convenience for trainmen on the railroad side and patrons of the commercial companies on the other, thus economizing space and labor expense?

One private branch exchange is connected by junction circuits with eight of the other fifteen railroad private branch exchanges in St. Louis, as well as by trunk lines with the St. Louis main exchange.

Unlike the unchanging telegraph arrangement, telephone facilities not only at the Union Station, but over the entire Terminal property and in offices of the various railroads, have been a lively and growing proposition for the past fifteen years.

As the different departments feel the need of additional telephones, instruments are placed here and there, subject of course to the eagle eye of the management as to expense, but each addition is a gradual approach to the ideal situation of a telephone on the desk of every clerk and official needing one.

Naturally, the great bulk of communications between local offices should be and is handled by telephone, for speech has always been and forever will be the perfect means of transmitting human intelligence, and that medium is best which will convey it instantaneously with appropriate voice inflections from the person speaking, direct to the ear of the party for whom the information is intended.

Mr. J. M. Barnes, of the Canadian Pacific Railway Company's Telegraph, St. John, N. B., in renewing his subscription writes: "The Age is a welcome visitor and it contains much valuable reading and helpful hints that are an inspiration to one."

Joint Telegraph-Telephone Office in Newark, N. J.

Newark, N. J., has the distinction of being the first of the large cities of the country where the joint operation of telegraph and telephone has been attempted, says the *Telephone Review*.

The two accompanying illustrations show interior views of the joint telegraph-telephone office at 749 Broad street and the Western Union operating department at 281 Washington street, Newark, N. J. In addition, the Western Union Telegraph Company operates eleven branch offices in the city and handles 50,000 messages a month, with a force of over sixty employes, including thirty messengers.

FIG. 1—VIEW OF PUBLIC RECEIVING OFFICE, NEWARK, N. J.

The public office, although narrow, is nearly 100 feet deep, allowing ample space for a messenger room, and in the rear a room for the exclusive use of the press correspondents.

In the decoration of the walls a unique stencil was used, combining in a design the emblem of commerce with the Bell and Western Union seals joined by telegraph poles and looped wires. Between this office and the operating department in the telephone building, nearly one-quarter of a mile away, communication was planned by means of a double track pneumatic tube, allowing the distribution of messages for delivery from either point.

FIG. 2—VIEW OF TELEGRAPH OPERATING ROOM, NEWARK, N. J.

The room utilized for the operating department at the main building, 281 Washington street, is approximately 90x30 feet, and affords ample space for future growth. At one end of this room are the telegraph switchboard and cable terminals.

Then comes three standard sextette tables, equipped with eighteen Morse positions. Beyond these tables are the chief operator's and his assistant's desks, and then two more standard sextette tables, used for six telephone recorders' positions and a ten-line private branch exchange. These telephone positions are equipped with lamp monitor boards, wired in multiple so that an incoming call can be picked up by any one of the six recorders. Incoming calls for all other purposes are picked up by the private branch exchange operator and switched to any one of six extensions. Adjoining the telephone tables is the delivery department—a long counter for the delivery clerks, with windows opening into the messenger boys' waiting room. Here terminate the call box circuits, which are also multipled into the distant receiving office on Broad street.

There are also at both offices locker rooms for the boys, shower baths and every facility to maintain a high standard in the messenger force. The clerical and supervisory forces are accommodated in the commercial office, where also the telephone counter agents act as receiving clerks, handling the transient telegraph business and adjustment work along with their telephone duties. It was also necessary to house the Western Union linemen in quarters in the basement of the telephone building, as well as obtain suitable space for the power plant, consisting of storage batteries and machinery for the operation of the pneumatic tubes.

In preparation for the joint office work a daily school course was established for the telephone salesmen together with the supervisory force of the Newark office. The class undertook a thorough study of Western Union rates and regulations, and an effort was made to inculcate in the telephone men the true spirit of joint-office salesmanship, to the end that every telephone representative should feel the same enthusiasm and have the same interest in building up the telegraph business as in his telephone work.

Many opportunities are being found for utilizing the salesmen in telegraph work. Campaigns are being formulated to educate the habitual users of the call box system to use the telephone for filing telegraph messages, and private branch exchange subscribers are being canvassed for a larger portion of their telegraph business, while disputes, claims and complaints are being handled as case work along the same lines as has been the regular telephone practice where the personal call of an agent seems desirable. It is possible also for the receiving clerks at both main and branch receiving offices to suggest to the non-telephone subscriber who files a message personally the advantages of the telephone in the home or store for sending and receiving telegrams.

There is something of value to everyone in each issue of TELEGRAPH AND TELEPHONE AGE, and this value should not be measured by the cost of a subscription but by the influence the paper has on the individual.

The Telephone in the German Army.

While the telegraph was used extensively in warfare for many years, the telephone is of more recent use in that connection, and its great value in directing the movement of large bodies of men was first demonstrated in the Russo-Japanese war, says the *Telephone Engineer*. The German army has furnished all its troops with telephone equipment, enabling them to be in constant speaking communication even with the foremost outposts in the field. Every larger command or division has a special telephone corps attached, which consists of trained telephone men under the command of a sergeant, who is also a telephone man. All of the men are mounted, and the necessary equipment is taken along on trucks. Each division of this corps can lay four miles of telephone lines and equip four stations with the material on hand, taking about twenty minutes to lay 0.6 mile. These men are to establish communication between the troops in battle, the artillery and the staff commanders, as also between the staffs of the different army corps. The infantry is also provided with a special body of men, called the infantry telephone corps. This part of the service is a new department, and has not advanced very far as yet. But the idea is to equip each infantry company with such a small division and with a telephone outfit. The instruments are made in such a way that they can be carried by the men in the troop and that communication can be established in the least possible time between the outposts and the main body of troops.

The artillery carries this equipment on a special gun carriage, and the modern method of warfare in which artillery firing is done from protected positions and directed by the commanders at some distance back of the danger zone, makes the telephone one of the necessities for preserving life and obtaining an effective fire.

With the cavalry each regiment has a telephone patrol consisting of eight men and a sergeant with telephones and four miles of wire, and supplies of wire are carried along on a truck. In this way all of the troops are equipped with telephones, permitting rapid and efficient communication at all times.

The Law in Missouri.—It is a felony in Missouri to injure or destroy telegraph or telephone property. The statute provides that "Every person who shall wilfully and maliciously injure, molest or destroy any of the lines, insulators, wires, posts, piers, or abutments of any telegraph, telephone, electric light and power or electric railway company, or any materials or property used in or about the transmission of dispatches or other communications, etc., shall, upon conviction, be punished by imprisonment in the penitentiary for a term of two years or by fine not exceeding five hundred dollars."

A Peculiar Fracture in a Submarine Cable.

The London *Electrical Review* gives an account of a peculiar fracture in the submarine telegraph cable of the Great Northern Telegraph Company, between Gutzlaff and Amoy, China, which was partly removed from its old position to a new one nearer the coast in order to reduce its length. The new position, however, proved to be ill-chosen inasmuch as no fewer than ten fractures occurred in the course of about six months, all between forty-six and forty-nine miles from Gutzlaff, at a depth of about thirteen fathoms. The armoring of the cable consisted of ten No. 1 mild-steel wires with an outside serving of tarred jute. The cable, when picked up, was covered with a thick layer of mud and, while the serving was quite undamaged, the copper strand and more or less of the sheathing wires were broken without showing any notable elongation, the surfaces of the fractures being quite plane, exactly like those found in brittle substances.

During one of the repairs, a bend was found in the cable, and when the serving was removed, nine out of the ten sheathing wires were found broken. In another case a small piece of wire a few inches long dropped out from the sheathing when the serving was taken off.

A length of the cable near one of the fractures was cut out for test by the National Physical Laboratory at Teddington, England.

The different tests appear to indicate that the wires in the cable were of the usual quality, and that the defects observed are in all probability the result of some mechanical action to which the material was subjected after the cable was laid. The fracture appears to have been caused by the material having been fatigued by many thousand bends or twistings, and, as all the wires were broken close to the same point, and the copper strand showed no signs of stretching, these bends or twistings must have been of a local character.

The Great Northern Telegraph Company tested several of the wires from the cable. The breaking strain was between twenty-eight and thirty-two tons per square inch, with an elongation between fifteen and twenty per cent., and eleven to seventeen twists in six inches. Two of the wires broke like glass when hammered out with a wooden mallet on a wooden block, while the remaining pieces of the same wires were subjected to tensile tests without showing anything abnormal. On bending a piece of wire (one end of which was fastened in a vice), backwards and forwards at a very small angle, or, so to speak, shaking it for about twenty minutes, a fracture occurred with a plane surface quite similar to that in the cable.

All these tests, together with the fact that the cable has not been interrupted after being moved some few miles eastward, indicate that these curious fractures may have been caused by some outside circumstances.

Prof. E. Suenson of the Royal Polytechnic College, Copenhagen, Denmark, thinks that, as repeated twistings generally produce a fracture with a screw surface, and as the fracture in this case had a plane surface, the breaks must have been caused by either stress or bending tensions. Such tensions might be due to the flood carrying the cable toward the coast and the ebb drawing it out again, but the number of these movements would be far too few in the short time the cable has been lying in this track to be of any consequence. If, on the other hand, the cable had been suspended between two submarine rocks, it is just feasible that the out-flowing mud could have acted on the cable in the same way as the violin bow acts on the string, by carrying it along until the strain grows so heavy that the cable springs back, when it would again be seized by the out-flowing mud, and so on. In this way the number of repeated tensions would be considerable in the course of a short time; but Prof. Suenson thinks that even this would not account for the fractures in this instance.

Wireless Operator's Pocketbook of Information.

The Wireless Operator's Pocketbook of Information and Diagrams, is the title of a 174-page book recently published. The author is Leon W. Bishop, a well-known authority on wireless matters, and he has given to the student and general reader a book that is well worth careful reading and study. It is a practical pocketbook for the wireless operator, showing all up-to-date apparatus, in theory and practice. Its purpose is to satisfy the desires of the wireless operator and of those experimenters who have already some knowledge of wireless phenomena, for a practical book more suited to their needs than the many elementary ones which deal mostly with the construction of simple apparatus, or the elaborate technical and mathematical treatises which presuppose a technical education to understand them.

Briefly, it thoroughly describes all transmitting and receiving instruments; aerials, giving the types and relative sizes for the best work in transmitting and receiving; the latest methods of tuning both transmitting and receiving apparatus; and it has a full chapter of diagrams, showing the most improved circuits for all sizes and sets, both in transmitting and receiving.

Among other features it gives a table showing how to compute roughly the sending and receiving distances for all types of instruments with all types of aerials and ends with the latest Call-Book containing the calls of the principal land and water-stations in America both government and commercial. A prominent authority on wireless telegraphy states that this is the best book on the subject he has ever seen, and he has purchased them all. The book is very liberally illustrated and the price is $1.00. This and other books on electrical subjects can be supplied by J. B. Taltavall, Publisher, 253 Broadway, New York.

Wireless in the Tropics.

Mr. James A. Scrymser, president of the Central and South American Telegraph Company, New York, in an interview published in the *New York Herald*, made some interesting observations on wireless telegraphy.

"Atmospheric conditions make wireless communications unreliable and frequently interrupt them for days," said Mr. Scrymser. His opinion, the article states, is based not only on his own investigations, but on the official reports of the United States Weather Bureau, in which it is set forth that following stormy weather in the Gulf of Mexico recently no wireless reports whatever were received from that region.

"Along the Isthmus of Panama," said Mr. Scrymser, "it has been decided by the United States Government that there shall be no telegraph company, nor cable, nor wireless, as it is the intention of the government to control all communications. The authorities have refused to permit any company to establish wireless at that point. This country has, so far as I have been able to learn, spent about $500,000 for establishing at Guantanamo, Key West, Pensacola and Panama extensive stations, but I have yet to learn that these stations have ever been able to communicate with one another. This I gather from the operators of our company near those points. Unless ships at sea are within 500 miles of each other it is very difficult in southern waters for them to communicate, as there is always the risk of the telegraphing against thunderstorms in those regions."

Confirming the opinion of Mr. Scrymser is the report of James H. Scarr, district forecaster, who says in his "Bulletin" of weather conditions issued on June 6: "There are evidences of considerable disturbances in the Gulf of Mexico. No wireless reports have been received from the Gulf for several days, but shore winds and precipitation give evidence of a storm."

Mr. Scrymser declares that the electric disturbances which attend storms in the tropics, being much stronger in many cases than the wireless currents, tend to neutralize them. "For commercial purposes," he continued, "wireless is uncertain, especially where exact figures are required. It is quite easy by wireless to mistake one thousand pounds for one hundred pounds, so that where large sums of money are involved and exactness is required, the cable is far superior to the wireless. I quite agree with Mr. Charles Bright in his view that wireless will not supplant the submarine cable, although it may prove a useful adjunct. The cable companies continue to develop their submarine facilities since the advent of wireless. In the last fifteen years there have been laid 40,000 miles of cable. The Central and South American Telegraph Company has within the last three years laid a new cable to Colon. The Commercial Cable Company has put down a cable in the Pacific only in recent years. The Western Union has put down one of the costliest cables ever laid, that from Ireland to St. Johns, Newfoundland. They are continually extending their cable service.

"Mr. Scarr, the government forecaster, said that one of the indications of a storm at sea was the failure of wireless to operate. The Weather Bureau, said Mr. Scrysmer, "has equipped some fifty vessels, mostly those of the coastwise variety, with instruments for observing meteorological conditions. They transmit their observations to the land station by wireless. When there is too much lightning in the air there is a failure of aerograms. Of course, it may be that there are no vessels in the regions from which we have failed to hear, but the movements of steamships can be calculated with tolerable accuracy. The bureau is able to keep in touch with weather conditions by cable from Havana, Bermuda, Turks Island and such points. The wireless is useful to the Weather Bureau even when it refuses to work on account of electrical interference. I doubt very much if the wireless will ever supersede the cable. Rather, it will supplement the submarine service. At the present time, when accuracy and secrecy are necessary, the cable is of the highest value."

Wireless Interference on Telephone Lines.

In wireless stations where there is a telephone in the same room or even in the same building, it is often noticed that the signals being transmitted by wireless can be heard in the telephone receiver, says A. B. Cole in *Popular Electricity*. The question has been asked several times whether it would be possible to eliminate this condition by grounding the telephone and the wireless outfit on different pipes.

This would do little good because the gas, water and steam pipes are nearly always well connected electrically by the earth through which they pass, and because the action is not one of induction, but is due to the fact that the telephone acts as a wireless receiving outfit. The line wire acts as the aerial and the ground is common to it and the wireless set.

The telephone transmitter consists of a carbon cup containing carbon grains in a comparatively loose condition, and a carbon or metal diaphragm rests against the opposite side of the grains. The transmitter acts as one of the old style "autocoherers," and the receiver is in electrical connection with it.

The sound in the receiver is not generally sufficient to cause inconvenience to the person using the telephone. Sometimes, however, difficulty will be experienced in enabling the person at the other end of the line to hear distinctly, especially after the wireless apparatus has been in use for a considerable length of time. This is due to "packing" of the carbon grains and can be remedied by tapping the telephone transmitter with a pencil or some other light object, when the grains will return to their original condition.

Telephone Pioneers of America.

CASPER E. YOST.

Mr. Casper E. Yost, president of the Iowa Telephone Company, the Nebraska Telephone Company, the Northwestern Telephone Exchange Company, and the Western Electric Telephone System, with headquarters at Omaha, Neb., has been closely identified with telephone development in that section of the country since the early days. He entered the telephone service in Omaha in August, 1889. Prior to becoming president of the companies named he occupied the position of vice-president and general manager of the Nebraska Company.

CASPER E. YOST,
Omaha, Neb. (1889).

Mr. Yost is a man of wide experience in the telephone business and the success of the companies under his control has been due largely to his initiative and his executive ability. He is a native of New York State having been born at Waterloo, N. Y., October 9, 1841.

To Investigate the Patent Office.—A joint resolution has been introduced in the House of Representatives at Washington requesting the President to order an investigation of the patent office and make a report with recommendations to Congress. The inquiry is to determine whether or not the present methods, personnel, equipment and building of the patent office are adequate for the performance of its functions.

Col. George M. Dugan, formerly superintendent of telegraph of the Illinois Central Railroad Company, now living in retirement at Tip Top, Ky., writes: "Enclosed find $2.00 for a renewal of my subscription to your valued semi-monthly paper which continues to improve with age like many other things, (not noted in the scriptures, however) '73.' "

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

Is there any difference in the volume of current in different parts of a circuit?

Is the E. M. F. the same at all point of a circuit? Give explanations of the facts in each case.

In measuring E. M. F. with a voltmeter why does the E. M. F. rise when a greater current is permitted to flow by reducing the variable resistance shown in Fig. 71 on page 103 of Schneider's book?

In testing for resistance, using a galvanometer, how are the various parts of the testing system arranged with reference to one another?

A known resistance gives a certain deflection on the galvanometer; if we substitute an unknown resistance for it and a different deflection is given what must be done to make the deflections equal?

When the deflection of the unknown resistance is the same as that of the known resistance what does it indicate?

What is the direct deflection method of measuring resistances?

Upon what law is the direct deflection method based?

What is a galvanometer constant?

By what other names is a galvanometer constant called?

If a shunt is used in obtaining the constant what calculation is necessary?

In using a one-tenth shunt how much of the current is shunted around the galvanometer and how much passes through the galvanometer?

What is a deflection constant?

Point out the features of the Queen testing set.

Is there any essential difference between a voltmeter and a galvanometer?

How is the constant of a voltmeter obtained?

How is the resistance of a galvanometer ascertained?

What is the purpose of tests of battery cells?

How is the E. M. F. of a cell determined?

How is the internal resistance of a cell determined?

How is the current flow of a cell measured?

When a current produces a certain deflection on an ammeter needle, how may the volume be determined?

What is a potentiometer?

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New York, August 16, 1912.

Uplifting the Craft.

It has always been regarded as an obligation upon a successful business man that he owes something to his *alma mater* for his success, whether he be a banker, a lawyer, a railroad man or a telegrapher. His success is due to his special training along his particular line of work, and we all owe something for what we receive. We use the word success here in its broadest sense. The successful man is not necessarily the one who has accumulated riches. He must possess more than wealth—he must practice and preach those virtues that will tend to help his fellow men.

Wealth is unquestionably the most essential thing in the world's activities and the most beneficient if it is properly used and not abused. It is right and proper that when a man has accumulated a fortune, more than his reasonable needs will ever require, the surplus should be utilized for the general good. If all men were thrifty perhaps there would be no need of one portion of mankind helping another, but unfortunately we have always with us the poor in pocket and in spirit.

The telegraph school has produced many successful graduates, who, by reason of their training, have become wealthy, and as a rule they are liberal-minded and kindly disposed toward those of their former but less fortunate fellow workers.

Mr. Carnegie, of course, is the most prominent example and that he has a kindly interest in the telegraphic fraternity is well-known. He, no doubt, would be willing to do for it much more than he has done if a practical, common sense way could be devised. He does not believe in promiscuous charity. If a man is able to work, Mr. Carnegie believes in aiding him to earn his living rather than give him alms. As a rule giving money to an able-bodied man is to encourage laziness and dependence.

Besides Mr. Carnegie, there are other wealthy former telegraphers who are favorably disposed toward the telegraph profession and would be willing to aid in a practical plan looking to the welfare of the craft. At first glance it would not seem a very difficult matter to develop such a scheme, but when a practical working plan is essayed many difficult problems arise. Some years ago this matter received extensive consideration but nothing of a definite character was evolved. During the intervening years many bright young minds have come to the front and perhaps some of them can devise some sort of a practical plan to carry out the idea.

Let any one who thinks he can advise on this subject approach the matter along reasonable lines. He should mentally place himself in the position of the benefactor and ask himself "How can I do good to the greatest number without tending to pauperize anyone?" and let him act as though the money involved were actually his own. It makes a great difference usually whether one is disposing of his own property or another's; he is likely to be more careful of his own, but in using another's he should, in justice, apply the same rule. In view of all the circumstances, therefore, we say, a reasonable proposition will likely be listened to.

Popularizing the Telegraph.

Telegraph service is as much a commodity as is any other public utility, such as gas, the telephone or the railroad. The only difference between it and the others is that the public is not so familiar with it, simply because it has not been brought to their attention as the others have. It is as saleable as any other public service, however, and it is interesting to note that it is falling into line with modern business methods. The salesmanship of telegraph service is now assuming an important place in business science. The people are being taught what the telegraph is, what it is good for and how it ought to be used, of all of which facts they have hitherto been, to a large extent, ignorant.

An interesting development in the telegraph educational campaign is the visit of a party of expert telegraph "salesmen" to industrial communities where they meet the business men and explain to them the advantages of more liberal use of the telegraph. This was done recently in New Orleans, as noted in another column in this issue, and it is likely that the business men of that city now know much more about the advantages of telegraph service than they did before, or would ever know if left alone to use the telegraph as formerly.

The telephone of course plays a very important part in the work of popularizing the telegraph and the fact that every telephone subscriber virtually has a telegraph office in his home or place of business is a powerful argument in the campaign for business.

Annual Report of the Commissioner of Patents.

The annual report of the Commissioner of Patents, covering the year ended December 31, 1911, shows that during the year 33,927 patents were issued, including designs, and 157 patents were reissued. The total receipts were $2,019,388 and expenditures $1,953,690, leaving a surplus of $65,698. The last amount, added to the previous surplus, leaves a total on December 31, 1911, of $7,063,926.

The commissioner called attention to pending legislation relating to patents, and referred to bill H. R. 7609, which provides for the elimination of one of the appeals within the office. It is intended to accomplish this by forming a single appellate tribunal composed of the commissioner, first assistant commissioner, assistant commissioner and examiners-in-chief, any three of whom shall constitute a quorum. All appeals will go directly to this body; the final appeal would lie to the Court of Appeals of the District of Columbia. Bill H. R. 7711 provides safeguards against possible mutilation or fraudulent amendment of patent applications during the pendency in the office. This would be accomplished by requiring each applicant to file two photographic copies of each drawing embraced in a patent specification. The commissioner also recommended the passage of bill H. R. 8388, reducing from one year to six months the period within which an applicant is allowed to amend rejected claims.

The report concludes with a reference to the need of reorganizing the scientific library of the bureau and preparing a digest of the subject matter therein, and also draws attention to the urgent need of relieving the extremely overcrowded and hazardous condition of the Patent office. The present accommodations are obsolete and inadquate both as to space and equipment, and the extremely valuable contents are likely to be destroyed by fire at almost any time. It seems imperative that some action on this situation should be taken at an early date.

How Time Signals Are Transmitted by Wireless from Eiffel Tower, Paris.

Commandant Ferrié of the French military wireless telegraph service, is the author of an article in the *Postoffice Electrical Engineer's Journal*, of London, in which he tells how time signals are sent by wireless from the Eiffel tower at Paris.

Twice every day, in the morning and the evening, the following series of signals is sent out by the Observatory of Paris, actuating, through relays, the large wireless station at the Eiffel Tower.

As regards the morning signals, at 10.40 a. m. the words "Observatoire de Paris" are transmitted.

At 10.44 a. m. a series of slow dashes is commenced, and continued till five seconds before 10.45 a. m.

Exactly at 10.45 a. m., Greenwich time, the standard clock of the Observatory closes the transmitting circuit at the Eiffel Tower for about a quarter of a second, and a rather long dot is sent.

At 10.46 a. m. a series of dashes separated from one another by two dots is commenceed, and continued till five seconds before 10.47 a. m.

Exactly at 10.47 a. m. a dot is sent.

At 10.48 a. m. a series of dashes separated from one another by four dots is commenced, and continued till five seconds before 10.49 a. m.

Exactly at 10.49 a. m. a dot is sent.

Thus three time signals are sent—at 10.45 a. m., 10.47 a. m., and 10.49 a. m.

A similar series is sent in the evening, commencing at 11.40 p. m.

By noting the time indicated by a chronometer at the instant when the time dot is heard, it is easy, even for an inexperienced observer, to check the chronometer reading to within half a second. A practised observer can even check the reading to one-tenth of a second.

Thus, for observers situated within the range of the Eiffel Tower, it is easy to obtain Greenwich time accurate to within half a second.

In the case of an observer situated at a place outside the range of the Eiffel Tower, or of some other observatory from which accurate time signals can be sent, the problem is more difficult. If, however, the place in question be within the range of a wireless telegraph station, and if, also within the range of this station, there be a place the longitude of which is accurately known, the longitude of the first place can be found. It is not necessary for the wireless telegraph station to be equipped with any apparatus beyond that used for signalling.

Receiving stations are installed, both at the place the longitude of which is required, and at that of which the longitude is known. The chronometers at these stations are set to local time, which is known accurately by astronomical observations.

When a set of longitude observations is to be made, the operator at the transmitting station sends out some agreed preliminary signals as a warning, and then, after a pause of a few seconds, sends a single dot. The receiving operators note the time indicated by their chronometers when this dot is received.

By a repetition of this process, using different preliminary signals to prevent confusion, as is done in the case of the Eiffel Tower time signals, several such pairs of chronometer readings for the same instant of time can be taken at the two stations.

In this manner the difference between the local times at the two stations is obtained. The difference between the local times gives at once the difference in longitude, and since the longitude of one of the stations is known, that of the other can be obtained.

Course of Instruction in the Elements of Technical Telegraphy—XXI.

(Copyrighted.)

(Continued from page 498, August 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraph. The course, which was originally prepared by Mr. J. H. Penman an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application at 10 cents per copy.]

The Relay.

Wind a wire several times round one end of a soft iron bar, and then carry the wire along the bar to the other end, and wind a similar coil there. Connect the two ends of the wire to a battery, and the iron bar, since it now forms the core of two solenoids, becomes a magnet with a north pole at one end, and a south pole at the other end, and a neutral line at the centre of the exposed part between the coils.

Bring the two ends of the core close together by bending the bar to the shape of a horseshoe, and the strength of the magnetic field about the poles will be increased, for by bringing the poles closer, the external circuit of the lines of force—the paths taken by the magnetic lines of force from one pole to the other through the surrounding medium—is shortened, and the resistance consequently diminished; since any decrease in the resistance of the magnetic circuit increases the magnetism, or the strength of the magnetic field. A soft iron armature, if supported in a position facing the cores and held at a short distance from them by the tension of a retractile spring, will now be attracted towards the poles and held there as long as the circuit remains closed. On the circuit being opened, the cores lose their magnetism and release the armature, which in obedience to the pull of its retractile spring moves back to its original position.

The magnetic field of the cores must be sufficiently strong to insure the prompt response of the armature to the closing of the circuit; or, since the magnetic field is governed by the magnetizing force of the solenoid, there must be, to work the relay properly, a large number of ampere-turns.

Ampere-turns = current $\times$ turns, therefore if the relay be designed to work on a circuit in which the current is small, the coils must have a large number of convolutions in order to acquire the necessary number of ampere turns. A smaller number of convolutions in the coils would, however, give the same magnetizing power provided the current were increased. For example it has been found by experience that for telegraph circuits, where the currents are small, the line relays require about 8640 turns of wire.

Assuming an average current strength of .025 ampere, this is equivalent to $8640 \times .025 = 216$ ampere-turns. But by doubling the current strength half the number of turns would give the same magnetizing force, for $.05 \times 4320 = 216$ as before.

It should also be noted that each additional turn of wire in the relay coils adds its resistance to the resistance of the circuit, and decreases the current; but that up to a certain point at which the cores become "saturated," the magnetizing force gains more by each additional turn than it loses by the corresponding reduction in curent strength. Also, that when the point of saturation is reached, adding turns does more harm than good, for the cores, being already "soaked" with magnetism, do not benefit by added convolutions, whereas the current strength is decreased by the resistance of each additional turn as before.

Manufacturers obtain the horseshoe form of magnet in relays by placing the coils side by side, and connecting the core of each coil at one end by an iron cross bar, which becomes the neutral line of the magnet when the circuit is completed. A light lever, working between a front and back limiting stop, supports the soft iron armature, which is held against the back stop by the tension of a retractile spring when the cores are in a non-magnetic state.

The relay is provided with two adjusting screws, one of which controls the distance between the cores and the armature, and the other controls the tension of the retractile spring. Care should be taken not to confound these adjustments. The cores in close proximity to the armature, and the retractile spring twisted round and round the cross bar of the adjusting screw, is not the outward and visible sign of an intelligent operator.

In wet weather when, as will be explained later, such high adjustments are necessary, the relay magnets should be withdrawn from the armature by means of the adjusting screw in connection with the cross-bar across the core ends, thereby decreasing the number of lines of force passing through the armature, and lessening the attractive power.

The armature spring should be used only to give the armature prompt action, and should never be unduly extended.

When you see that a high adjustment is necessary, let the spring back to its normal stretch and withdraw the magnets until a rough adjustment is obtained, when a very slight movement of the spring adjusting screw will give the necessary prompt action.

Line relays are wound with 30 layers of silk-covered wire, 144 turns to a layer, making a total of 8,640 turns.

This winding gives a resistance of 150 ohms to each relay.

The relay armature should not move through a space of more than one thirty-second of an inch.

(*To be continued.*)

Telegraphy and Telephony.*

BY MAJOR W. A. J. O'MEARA.

The problem of successful telegraphy for any country is a very great one, and cannot be solved in days, months or even years. It is now more than half a century since the electric telegraph was put on a fairly sound footing for commercial purposes in this country, and although very great progress has been made in the interval, the complete solution of the problem still seems somewhat remote. The ideal is the ability of any telegraph office to transmit a telegram at once direct to the office of destination. Such a highly desirable facility would, in the nature of things, be very expensive as regards both plant and personnel. Unfortunately, it is extremely difficult under existing circumstances to avoid a certain amount of delay in the transmission of telegrams. This delay is due not only to the absence, as in many cases, of direct means of communication by telegraph, but also to the handling of the telegrams at the terminal stations and at the intermediate stations—where the latter are concerned. Retransmission of telegrams may occur a number of times, perhaps as many as six, according to the number of intermediate stations concerned; and at each of those stations two operations—i. e., receiving the message on one circuit and retransmitting it on another circuit—are necessarily involved, in addition to the transfer of the written message from one set of apparatus to the other set in each office. Delay may be caused, further, owing to pressure of telegraphic work, and the consequent necessity for arranging for each telegram to take its proper turn for transmission at the office of origin and re-transmission at each intermediate office. For these reasons it is manifestly desirable to reduce the number of re-transmissions to a minimum, consistent of course with economy in line wires. With the ever-changing conditions as regards the cost of labor and materials, the increase in operators' wages and improvements in apparatus, there is no exact dividing line as to how far one shall go in providing apparatus of greater carrying capacity or in building additional lines, fitted with less complex apparatus. This is, however, a phase in the problem that requires constant watching and intelligent anticipation of future developments and requirements.

The problem is not so easy as the telephone problem, because in the case of telephony there is only one method of transmission to deal with, whereas in telegraphy there are several methods, due to the fact that the apparatus that is necessary for busy lines is not suitable for minor lines, and vice versa. The severe competition of the telephone in respect of short-distance communication has reduced very considerably the number of short-distance telegraphs, from which, of course, the greater profit is derived.

The lecturer then described at some length the well-known types of apparatus used in the British telegraph service. These range from the simple A B C, or single needle instrument, suitable for use at places where highly skilled operators are not available, to the complicated quadruplex equipment and automatic apparatus.

As regards the design of lines which carry the signalling currents from one station to another, the current values generally in use vary from 10 to 45 milliamperes, so that the thickness of the wires is not determined by the current. In the case of aerial lines the gauge of wire is almost always determined by the mechanical strength necessary to hold the wire up, except of course on very long lines, where it then becomes a question of the rate at which currents can be reversed. This depends on the resistance and capacity of the line. It is not possible to reduce the capacity of an aerial line to any extent, but the resistance can be considerably reduced by using copper instead of iron, and by using thick copper wires instead of thin ones. This reduction in resistance allows the line to be charged and discharged much more rapidly, resulting in an increased speed of signalling over the line.

Owing to disturbances from storms, wilful and accidental damage, wires on poles often become interrupted or unsuitable for working with complex apparatus. On this account, and the need for space on the poles for telephone circuits, the Post Office is now putting as many as possible of the main telegraph lines into underground cables of the usual paper-insulated lead-covered type. Although this prevents the frequent interruption that occur to aerial lines, there is a great disadvantage, due to the reduced rate of working on an underground wire, as compared with an aerial wire. Owing to the greater reliability of these lines the slower rate of working is not such a serious objection as it might otherwise be, and can be to a great extent counterbalanced by the use of the faster Baudot code.

Submarine telegraph cables also come under the category of telegraph lines. On short cables the Post Office uses the Morse sounder, or the Wheatstone system, according to the amount of traffic to be dealt with. The Hughes and Baudot printing telegraph systems are used on Anglo-Continental cables. Where the length of these cables is fairly great, such as between England and Germany, the first cost is considerable, and it is essential to obtain the greatest possible output from the best available rate of signalling. So far the Baudot system has given the best results, and its use is likely to be considerably extended in consequence. The total mileage of wire used by the Post Office is approximately 1,030,000 miles.

* Abstract of lecture before the Yorkshire (Eng.) section of the Institution of Electrical Engineers.

To carry on successfully the business of a large telegraph system, such as that of the British Post Office, it is essential that the engineering and operating staffs should be highly efficient and thoroughly organized. Obviously, the engineering arrangements are based on the traffic requirements, and it is the engineers alone who can properly gauge and successfully meet these requirements, either by improved apparatus or additional or improved line plant. Also obviously, it is only the engineer who can properly gauge and form a sound comparison of the different methods by which he can meet these requirements. The traffic consideration is, therefore, one that is proper to the engineer. He has to consider the relative speed of different systems, the output in messages, the reliability, and the costs due to maintenance and depreciation of the plant he has at his disposal to instal. Line costs are a very important factor, because of the heavily loaded pole lines and the need for constant supervision.

Generally speaking, the line of development is in the direction of selecting a number of centres connected to each other by machine telegraphs of large output and great reliability in working with feeder circuits covering each district served by such centre. This would result in considerably lessening the number of transmissions, and at the same time it would considerably reduce the time occupied in transmission. The cost of operating would be lessened and a much more uniform service would be the result.

Turning to the question of telephones, though there were many local services, there was no long-distance service as we now know it until the Post Office commenced the construction of the backbone trunk lines in 1894. Most of these lines were completed and working in 1895. In 1896 the Post Office acquired by purchase the trunk lines owned by the National Telephone Company, and the nucleus of a comprehensive long-distance service covering the whole country was thus formed. The efficiency of the backbone lines was of the highest grade. Copper conductors weighing 1,600 lb. per loop mile were used for the longest and most important circuits; conductors weighing 1,200 lb. per loop mile were used for circuits of second importance, while for the shorter lines, conductors of 800 lb. per loop mile were erected. These backbone trunks were erected as aerial lines throughout. Mention should perhaps be made in this connection of the London-Paris telephone service which had been inaugurated in 1891. There were two circuits, consisting of aerial lines of 1,600 lb. per loop mile, on the English side, and 1,200 lb. per mile on the French side. The submarine section was a four-core cable, each core consisting of 300 pounds gutta-percha and 160 pounds copper per nautical mile.

Viewed in the light of our present-day knowledge and experience, the trunk system formed in 1896 was, unfortunately, defective in one important aspect from the engineering standpoint. It was a framework or structure in which many of the members were disproportioned, and were not disposed in such a manner that each should meet its duty in accordance with sound engineering design. This failing was due partly to (a) the fact that the system was an amalgamation of several smaller ones, each of which had been constructed without regard to the part it would play in a national network; (b) the absence of that most important factor—scientifically arranged traffic data; and (c) operating methods which were not altogether scientific.

One of the most important steps towards the co-ordination of the telephone system in the kingdom was the determination by the engineers of the Post Office, in co-operation with the engineers of the National Telephone Company, of the limiting distance of telephonic speech on various types of commercial telephone circuits. The first stage in the co-operative investigation referred to was to agree upon a standard unit of measurement, and, following upon approved American practice, a lead-covered paper-insulated cable of the ordinary type, and having the following constants was selected: Gauge, No. 20 S.W.G.; weight per mile of conductor, 20 pounds; diameter, 26 mils; resistance of conductor per mile loop, 88 ohms; capacity wire to wire, 0.054 mf.; inductance, 0.001 henry; insulation, 200 megohms.

The unit is commonly known as the mile of standard cable. The foregoing factors may be determined for any telephone circuit by calculation or by observation; consequently any circuit may be equated to its value in standard units. A standard type of subscriber's telephone station having also been agreed upon, a number of experiments under all possible practical conditions was carried out, and it was concluded that the effective limit of commercial speech was equal to that obtained through forty-six miles of standard cable. This limit has been confirmed by the results obtained by many other telephone administrations. It is quite possible for experts to carry on a conversation through a circuit having an equated length of sixty miles of standard cable; but the commercial limit of forty-six miles provides that factor of safety which is common to all engineering design. It must, however, be understood that, in order to speak successfully through a circuit which approaches the commercial limit, it is essential that the apparatus shall be in good order, that each correspondent shall speak distinctly and close to the mouthpiece of his transmitter, and that both telephones shall be in apartments or sound-proof cabinets into which extraneous noises do not penetrate.

It was recognized during the joint investigation referred to that for conversation with correspondents in the same town or district, subscribers would expect to be able to use their telephones with ease in ordinary rooms or offices into which street noises penetrated, and it was therefore agreed that the standard of transmission for local service should give this facility. This standard, which is attained when the total circuit has an equated length of from twenty to twenty-five miles of standard cable, was adopted as the basis for provision of local exchange plant, and was embodied in an agreement between the Post Office and the National Telephone Company. Another provision of that agreement which is of great importance in connection with the larger question of national and internationl service, requires that the standard of transmission between a subscriber's station and his nearest trunk exchange shall be that obtained through five miles of standard cable when the radial distance between them does not exceed nine miles; and when the radial distance is greater than nine miles the standard of transmission shall be equal to that obtained through eight miles of standard cable. This clause, therefore, taken into consideration with the limit of forty-six miles previously mentioned, has been the basis in the design of long-distance trunk circuits.

The developments in telephone science since the date of this agreement, added to the fact that the whole telephone system is now under one administration, have indicated the advisability of reconsidering the question of the allocation of efficiency as between subscribers' circuits, junction lines and the trunk lines respectively, and special studies which have been undertaken by officers of the Post Office engineering department have shown the necessity for the introduction of a measure of reform in this connection.

The quality of a telephone service depends mainly upon two important factors which demand a high grade of engineering design, namely: (1) efficiency of operating methods; (2) production efficiency of plant; and in this connection it is interesting to review the great improvements effected in recent years in the internal plant of telephone exchanges. So far as the exchange itself is concerned, these improvements, which have resulted from the scientific study of traffic and the labors of inventors, have been in the direction of reducing the amount of manual work and talk on the part of the operator, thus tending to a speeding up of the service, increasing the carrying capacity of the lines, and the permissible load upon the operators. The levelling up of operating loads is a phase of the service which has received great attention, and many ingenious devices have been introduced with this object in view. The earliest of these was an apparatus known as the intermediate frame. This apparatus is still employed for this purpose in most of the largest exchanges. By its means subscribers' circuits are "cross-connected" from the outside cable terminals to any desired position on the switchboard, quite independent of the multiple connections which must necessarily retain strict numerical sequence. A further arrangement with a similar object is known as the ancillary system. The feature of this system is the multiplying of the answering jacks and signal lamps of each subscriber's circuit at two or three points in the exchange. As each signal will be within the range of vision of three operators, it follows that any call may be attended to by any one of nine operators who happens to be disengaged at the moment.

The trunk lines of the kingdom are worked at the present day on the "zone centre system." At the time of the transfer of the National Telephone Company's trunk lines in 1896 only the most important commercial centres of the country were connected by telephone. Towns of second importance were generally served by a connection with only one large centre. As a consequence, the large centres soon became congested, and much unnecessary transmission work was involved. A more serious result was the large waste of time incurred in obtaining the simultaneous use of two lines at a transmitting centre, a fact which was greatly aggravated when more than one transmitting centre was concerned in establishing communication between two stations widely separated. As a first attempt to remedy this state of affairs, studies were made of the transmitter traffic at these large centres with the object of providing direct lines where there was sufficient volume of work to fill them. The immediate effect of this policy was a quickening of the service generally and the reduction of the holding time per call, but owing to the great increase in the total trunk traffic of the kingdom the tendency of the new policy in a few years was to multiply the number of trunk wire routes, many of which carried only two or three circuits.

With regard to fundamental studies in connection with telephone development, the object of such study is to establish first principles of design. Among the important principles of design to be so decided are (a) the laws governing the limits of telephonic speech; (b) the allocation of capital expenditure between (1) subscribers' plant, (2) junctions plant, (3) long-distance plant: (c) arising out of (b), the best distribution of copper between the respective sections; (d) the location of primary centres (corresponding to the piers of a bridge) on which the whole structure is supported, and the direction and disposition of the main channels or arteries radiating from the primary centres.

In connection with (a) I may refer to loading, whose advantages may be briefly stated thus: It is possible to increase the range of speech over a given type of cable (within certain limits) by about three times; or, in other words, the amount of copper required for a given efficiency may be reduced to one-third.

Primarily, the allocation of capital between subscribers' circuits, junctions and trunks, must rest upon the electrical characteristics of the line; but to a very great extent it must depend upon a study of the best theoretical distribution of copper, and fundamental equations can be stated which will comprise all the variable elements, and thus lead to a scientific solution of a difficult problem.

History of the Association of Municipal Electricians.

The history of the International Association of Municipal Electricians dates back to 1894, in which year Mr. John M. Gamewell, head of the Gamewell Fire Alarm Telegraph Company of New York, suggested to Frank C. Mason, who at that time was superintendent of police telegraphs in Brooklyn, the idea of forming an association composed of fire and police telegraph superintendents of the United States and Canada. The proposition meeting with his hearty approval, Mr. Mason began the preliminary steps necessary for forming such an organization and two years later, called a meeting for the purpose. As a result of his appeal a meeting was held at the Clarendon Hotel, Brooklyn, September 15, 1896, and an organization was effected, constitution and by-laws adopted and officers elected. This gathering was attended by the following twelve delegates:

L. Lemon, Baltimore, Md.; William A. Barnes,

J. W. KELLY, JR.,
Camden, N. J., President.

Bridgeport, Conn.; James T. Wafer and Frank C. Mason, Brooklyn; C. T. Hopewell, Cambridge, Mass; F. P. Foster, Corning, N. Y.; W. Y. Ellett, Elmira, N. Y.; Adam Bosch, Newark, N. J.; W. C. Smith, New Haven, Conn.; J. F. Zuluff, Paterson, N. J.; S. L. Wheeler, Springfield, Mass., and J. W. Aydon, Wilmington, Del.

The organization was first called the International Association of Fire and Police Telegraph Superintendents. The object of the association as set forth in the constitution is "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 to improving the service and reducing its cost; and the establishment of a spirit of fraternity among the members of the association."

Since its birth the association has steadily grown in size and influence, until now it embraces a membership of nearly 150, representing the principal cities of the country. Its affairs have been guided by progressive and experienced men, and its influence in municipal fire telegraph and police circles is very widely felt. It has

W. Y. ELLETT,
Elmira, N. Y., Past-President.

been the means of bringing these services up to a high state of efficiency and the protection thus afforded is incalcuable.

This year's convention at Peoria, Ill., is the seventeenth held by the association, and naturally promises to be the most successful of all. Many new developments have been made in municipal electrical work during the past year, and the accounts of these will be of special interest to the delegates.

In this connection a list of the places of meet-

J. B. YEAKLE,
Baltimore, Md., Past-President.

ing and of the officers of the association, since its organization, will be of interest:

1896—Brooklyn, N Y., September 15; Frank C. Mason, president; Morris W. Mead, vice-president; L. Lemon, secretary; Adam Bosch, treasurer.

1897—Nashville, Tenn., September 14 and 15; W. Y. Ellett, president; William Brophy, vice-president; H. F. Blackwell, Jr., secretary; Adam Bosch, treasurer.

1898—Elmira, N. Y., August 9 and 10; John W. Aydon, president; G. F. Macdonald, vice-president; H. F. Blackwell, Jr., secretary; Adam Bosch, treasurer.

1899—Wilmington, Del., September 5, 6 and 7; William Brophy, president; G. F. Macdonald, vice-president; H. F. Cottrell, secretary; Adam Bosch, treasurer.

1900—Pittsburgh, Pa., September 25, 26 and 27; Morris W. Mead, president; J. F. Zuluff, Burt McAllister and R. E. Moran, vice-presidents; Frank P. Foster, secretary; Adam Bosch, treasurer.

ADAM BOSCH,
Newark, N. J., First Treasurer.

1901—Niagara Falls, N. Y., September 2, 3 and 4; A. S. Hatch, president; W. M. Petty, A. C. Farrand, Wm. Crane and Wm. A. Barnes, vice-presidents; F. P. Foster, secretary; Adam Bosch, treasurer.

1902—Richmond, Va., October 7, 8 and 9; W. H. Thompson, president; Jerry Murphy, A. C. Farrand, W. A. Barnes and C. L. Williams, vice-presidents; F. P. Foster, secretary; Adam Bosch, treasurer.

1903—Atlantic City, N. J., September 2, 3 and 4; A. C. Farrand, president; W. M. Petty, G. F. Macdonald, F. F. Pierson and F. A. Cambridge, vice-presidents; F. P. Foster, secretary; Adam Bosch, treasurer.

1904—St. Louis, Mo., September 13 and 14; Walter M. Petty, president; J. B. Yeakle, G H. Holderman, C. E. Diehl and Charles Greenwald, vice-presidents; Frank P. Foster, secretary, Adam Bosch, treasurer.

1905—Erie, Pa., August 23, 24 and 25; Jerry Murphy, president; Wm. Crane, H. R. Allensworth, R. Blakey and F. A. Cambridge, vice-presidents; Frank P. Foster, secretary; C. E. Diehl, treasurer.

1906—New Haven, Conn., August 15, 16 and 17; T. C. O'Hearn, president; James Grant, Clarence R. George, John Berry and Wm. H. Bradt, vice-presidents; Frank P. Foster, secretary; C. E. Diehl, treasurer.

1907—Norfolk, Va., August 7, 8 and 9; R. A. Smith, president; J. B. Yeakle, R. Blakey, C. F. Gall and Charles S. Downs, vice-presidents; Frank P. Foster, secretary; C. E. Diehl, treasurer.

1908—Detroit, Mich., August 19, 20 and 21; J. B. Yeakle, president; W. S. Devlin, H. C. Bundy, M. C. Cambridge and Clarence R. George, vice-presidents; F. P. Foster, secretary; C. E. Diehl, treasurer.

1909—Atlantic City, N. J., September 14, 15 and 16; J. B. Yeakle, president (re-elected); J. S. Craig, A. L. W. Kittridge, A. J. Bell and C. S. McCosker, vice-presidents; Frank P. Foster, secretary; C. E. Diehl, treasurer.

1910—Rochester, N. Y., September 6, 7, 8 and 9; H. C. Bundy, president; J. S. Craig, John W. Kelly, Jr., J. G. Kraetz and John Berry, vice-presidents; Clarence R. George, secretary, C. E. Diehl, treasurer.

1911—Atlantic City, N. J., September 12, 13 and 14; J. W. Kelly, jr., president; John S. Craig, W. L. Riehl, W. A. White and John W. Bleidt, vice-presidents; Clarence R. George, secretary; C. E. Diehl, treasurer.

Transmitting Pictures by Telegraph.

It is stated that Paris newspapers are now making practical use of a process for telegraphing photographs. The apparatus is a modification of the photograph-transmitting system which was invented by Doctor Korn, of Munich, some years ago, and which depended upon the use of selenium and the fact that the amount of electrical current which passes through it varies according to the intensity of the light falling upon it. The new method does away with selenium and allows for a larger electrical current so as to counteract disturbances upon the line. Photographs are being reproduced in Paris by means of transmission over the telephone wires from Monte Carlo, 550 miles away, and the reproductions, while not as perfect as they would be if the line were free from disturbances, are nevertheless remarkably good.

Mr. W. O. Nevill, special agent railway department, The Missouri and Kansas Telephone Company, Kansas City, Mo., writes: "During the time that I have had the pleasure of reading your paper I have greatly enjoyed the information it contained, and I certainly congratulate you on the wide field that it covers and the diversity of subjects. I wish you continued success."

The Parts of a Telephone Instrument.*

The telephone instruments used by subscribers are of two general kinds—the magneto type, used in villages and in the country, and the common battery type, generally used in cities and large towns. Both types are made in various forms for convenience, such as wall sets and desk sets, but these forms differ only in mechanical details.

Fig. 1 shows a magneto wall set, both with the door closed and opened. Besides the transmitter and receiver, it contains a switchhook, three dry batteries, an induction coil, a hand generator and

FIG. 1—MAGNETO WALL SET—CLOSED.

a bell or ringer. These are all shown in Fig. 2, with their electrical connections.

The switchhook is what the receiver is hung upon when not in use. The weight of the receiver pulls it down, as shown in Fig. 2, and in this position the connections are such that a signal can

FIG. 1A—MAGNETO WALL SET—OPEN.

be sent by the hand generator or received by the ringer while the battery circuit is open to prevent waste of current. When the receiver is lifted the hook moves upward and makes the connections suitable for talking.

The dry batteries furnish the current to the transmitter for talking. The induction coil, which may also be termed a transformer, is used to permit of conversations being held over long lines. It consists of a bundle of small soft iron wires, around which are placed a few turns of comparatively large wire called the primary winding, and many turns of small wire termed the secondary winding. The current obtained from the three batteries is of large volume and small intensity, and would not flow over a long telephone line with satisfactory results, but when used in conjunction with the induction coil this current is

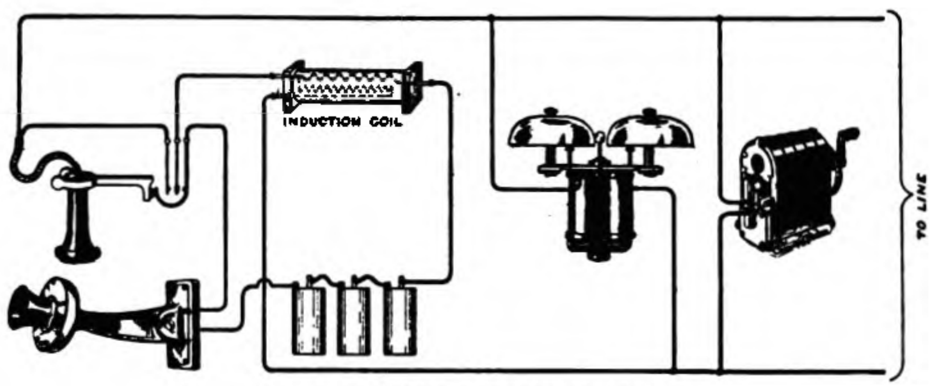

FIG. 2—DIAGRAM OF CONNECTIONS.

changed in character so that it is of small volume and large intensity. When so changed, it is suitable for use on long telephone lines.

The hand generator is a small dynamo which creates a strong current when the crank is turned. This current goes out over the line to ring the

FIGS. 3 AND 3A—COMMON BATTERY WALL SET—OPEN AND CLOSED.

bell at another telephone, or to operate a drop signal at the central office. The current generated is termed an alternating current, that is, its direction is continually being reversed, in this case about thirty-two times a second.

* Western Electric News.

The ringer is a device placed in a telephone to receive and make audible, signals coming into that telephone. The ringer is operated by a current similar in character to that generated by the hand generator, and consists of an electro-magnet, a permanent magnet and a soft iron armature or movable section to which is attached the clapper that strikes the bells. The electro-magnet is a "U" shaped piece of iron, around which are wound a large number of turns of small wire. The permanent magnet, working in conjunction with the electro-magnet when the latter is energized by the incoming alternating current, causes the movable soft iron armature to assume one position and then another. This movement is in step with the alternating current and causes the clapper to strike the bells. This action continues as long as the ringer is receiving alternating current.

Figs. 3 and 4 show the common battery wall set and its separate parts. It contains a transmitter, receiver, switchhook, induction coil and ringer like the magneto set, but the dry batteries and the hand generator are omitted, all power for both talking and signalling the central office being obtained from one large storage battery located at the exchange. With a common battery set a subscriber cannot directly signal another one on the same line as he can with a magneto set. Therefore all calls must be handled by the central office operator when this system is used.

When the receiver is on the switchhook the battery current cannot flow in the line to that instrument, but when the switchhook is allowed to rise, direct current flows, energizing both the subscriber's transmitters so he can talk and operating a relay at the central office to light a signal lamp. The subscriber's ringer is operated by an alternating current from a large generator at the central office. The current used to operate the ringer and the action of the ringer is the same as that previously described.

The common battery set has one other piece of apparatus, namely, a condenser, the action of which is somewhat unique in that it will allow the passage of alternating current and will not allow the passage of direct current. A condenser is composed of two long sheets of tinfoil, separated from each other by paper. The two sheets of foil and the paper are wound together, then pressed to assume the shape shown in Fig. 4 The function of a condenser in a common battery telephone set is to keep the battery current out of the receiver when the set is in use, as such current is detrimental to the proper action of that instrument. It also opens the line to direct current when the set is not in use, and at the same time allows the alternating current to enter the ringer for signalling purposes. If a condenser was not used in the common battery set, the direct current from the central office battery would flow all the time and consequently would be wasted; signalling would be impossible.

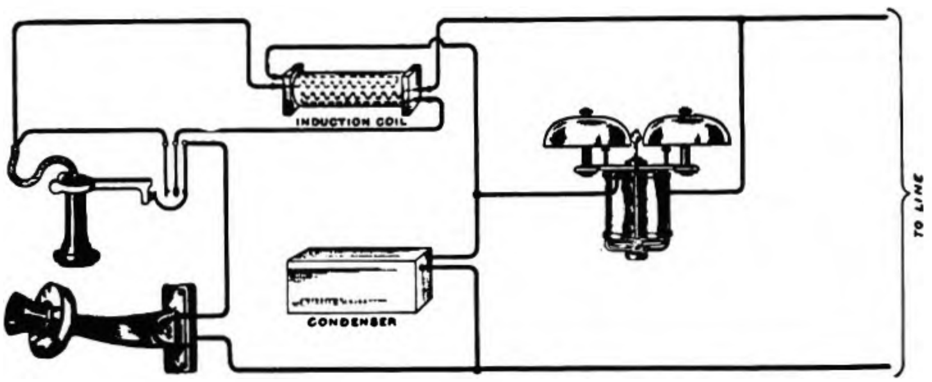

FIG. 4—DIAGRAM OF CONNECTIONS.

The Telegraph in Spain.—The latest statistics of the telegraph service in Spain are for 1909, in which year there were in operation 19,270 miles of state lines, 1,274 miles of municipal lines, 3,132 miles of submarine cables operated by the Spanish telegraph administration, and fifteen miles of subterranean cables. The total number of telegrams sent was 6,316,935, of which 1,697,215 were international.

Memorial to Lord Kelvin.—It is proposed by the engineering societies of the British Empire and the United States to erect in Westminster Abbey, London, a memorial window to the late Lord Kelvin. Lord Kelvin, formerly known as Sir William Thomson, did much for the advancement of cable telegraphy. He was one of the leading scientists of his time.

Mr. H. A. Potter, wire chief of the Chicago, Milwaukee and Puget Sound Railroad Company, Butte, Mont., writes: "Herewith check for $2.00 for renewal of my subscription to TELEGRAPH AND TELEPHONE AGE. This is one of several publications which I never fail to renew and depend upon it to keep me posted in all the new conditions which are constantly arising in our field. You certainly know the right subjects to handle."

Reid Memorial Fund.

Although the pamphlets containing request for subscriptions to the Reid Memorial Fund have not yet been distributed to all of the members of the societies that appointed representatives to act as a Board of Trustees, many responses to the request have already been received and are coming in daily.

The following are extracts from a very interesting personal letter written to Col. A. B. Chandler, treasurer of the fund, by Mr. Francis W. Jones, regarding his acquaintance with Mr. Reid:

"It is a great privilege to have the opportunity "of contributing to the fund being raised for "erecting a suitable memorial to the late J. D. "Reid. I formed an acquaintance with Mr. Reid "in 1874. In the summer of 1880 I was given the "position of general circuit manager of the West-"ern Union Telegraph Company, with a desk at "195 Broadway, New York, in the same room "with Mr. Reid, who was then in charge of the "Western Union Telegraph Company's bureau "of statistics, and this situation continued for "two years and afforded us almost daily compan-"ionship. During this time Mr. Reid passed "under the rod of both domestic and financial "trouble, which caused him much depression, but "the troubles were borne with the most exemp-"lary fortitude and meekness. * * *

"During Mr. Reid's illness at the Navarre "apartments, corner of Broadway and 99th Street, "New York, in the spring of 1901, I resided di-"rectly opposite and frequently visited Mr. Reid, "taking to him some strictly fresh eggs which his "physician had prescribed, and which I had to "scour Washington Heights to secure from the "squatter sovereigns. * * *

"Very shortly before Mr. Reid's death, I think "it was one or two days previously, I went over "to see him, and, after a brief visit, I took his "hand to say *au revoir*, and he pulled me gently "towards him and gave me his benediction: 'God "bless you.' * * *

"Mr. Reid's integrity and unfailing gentle and "helpful disposition were not a veneer, merely "worn that thrift might follow; they were rooted "deep down in good soil, which had been early "subjected to sterling christian cultivation, and "so his 82 years shine resplendent in the eyes of "his numerous surviving associates and acquain-"tances, who entertain a higher regard for an ex-"alted loving character than they do for the mem-"ory of those whose life's harvest is merely dol-"lars. * * *

"It speaks well for the heads and hearts of all "the gentlemen of the telegraphic profession that "they have so spontaneously recognized the ap-"propriateness of a suitable memorial to Mr. "Reid, not alone on account of his early connec-"tion with the Morse telegraph and with his im-"portant contributions in its infancy to its de-"velopment, but as well as a token of their esteem "for the splendid character which he has left "behind. * * *

"If each one of his friends and admirers were "to lay but one rose upon Mr. Reid's grave, at a "given time, he would sleep beneath a mountain "of flowers. I feel sure the contemplated me-"morial will be very beautiful and infinitely more "lasting than flowers."

The Railroad.

H. G. Prescott, formerly general superintendent of the Panama Railroad, died at Panama recently. He entered the service of the railroad company as operator at Colon, Panama, in 1889.

Mr. Edgar Eugene Calvin, vice-president of the Southern Pacific Company in general charge of operation and construction, with headquarters at San Francisco, Cal., began his career as a telegraph operator, and has filled various positions in the railroad service, being at one time train dispatcher.

Telephones on the St. Louis Southwestern Railway.—One of the principal railroad systems of the Southwest—that part of the St. Louis Southwestern Railroad Company's lines, commonly known as the Cotton Belt Route—has placed an order with the Western Electric Company, for telephone train dispatching equipment. Twenty-four way stations along the line which extends from Jonesboro, Ark., to Illmo, Mo., a distance of nearly 140 miles, will be equipped with standard selector sets. The dispatcher is to be located at Illmo. Besides the telephone equipment, power equipment is to be furnished for generating the current to be used for signaling and talking. This consists of a single-phase motor direct-connected to a direct-current generator, a power switchboard with accessories and ninety chloride accumulators. A wire chief's testing panel will also form a part of the equipment.

More Telephones for the Pittsburgh and Lake Erie Railroad.—The Pittsburgh and Lake Erie Railroad some time ago installed a telephone train dispatching system on its lines, and is now preparing to supplement this in part with a selectively operated "message wire" to be used for transacting only commercial business. No train movement orders will be handled over this line. The Western Electric Company, which furnished the apparatus used on the train dispatching circuits will also supply that to be used on the message wire, which will extend from McKee's Rocks to Woodlawn, Pa., about seventeen miles. A full metallic line built of No. 12 B. & S. copper wire will be used, along which fifteen way stations will be equipped with selector sets. This telephone line will terminate in the road's private branch exchange and the calls will be handled just the same as on a party telephone line, the switchboard operator calling each station without signalling the others. Mr. L. A. Lee is superintendent of telegraph.

C. B. and Q. Extending its Telephone Lines.—The Chicago, Burlington and Quincy Railway Company recently placed an order with the Western Electric Company for apparatus to be used in extending its telephone train dispatching circuits. At present, there is a train wire from Kansas City, Mo., to Napier, Mo., operated by special selector sets with the train dispatcher at St. Joseph, thus working the circuit from St. Joseph to Kansas City on one end and from St. Joseph to Napier on the other. The extension will bring the train wire into Council Bluffs, Ia., from Napier. This branch is now operated by telegraph and it will be simpler to operate the entire line by telephone, than by using a combination. Fourteen special selector sets will be installed in way stations along the line to Council Bluffs. The dispatchers will be located at St. Joseph. The new line is approximately 95 miles long. Mr. V. T. Kissinger is superintendent of telegraph.

Railway Commercial Training School.—One of the most complete schools in the United States devoted exclusively to the training of students to fill positions as station agents and telegraph operators for the railway service is that conducted at Elmira, N. Y., under the supervision of the Erie Railroad. For the practical instruction of the students the school is connected with two main line railroad wires and one Western Union wire—one a train dispatcher's wire, one a railroad message wire and the third a commercial wire—and the instructors are practical railroad men. From time to time the students are favored with lectures by railroad officials on railroad subjects. The telegraph equipment of the school is extensive and modern and instruction in practical train operation is given by the aid of a model railroad, provided with switches, signals, switch towers, engines, etc. An interesting pamphlet has been recently issued by the school and it contains several illustrations which give one an excellent idea of what the institution's facilities are. Mr. C. P. Utley is manager, and Mr. L. J. Baird, chief instructor.

The Old-Timers' Reunion.

It is evident from the indications at hand that there will be an unusually large and enthusiastic attendance at the reunion of the Old-Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, at Jacksonville, Fla., October 22, 23 and 24. Many inquiries are being received by secretary F. J. Scherrer regarding transportation routes out of New York and a preference seems to be shown in favor of the ocean trip to Savannah, although many, of course, will go by rail. The occasion will furnish an extraordinary opportunity to enjoy a short sea voyage and arrangements are being made for a number of the members and their families to go by steamer from New York to Savannah, Ga., thence by rail to Jacksonville.

The party will receive a hearty reception in the southern city and the programme for their entertainment, as published in our issue for July 16, shows that they will have an enjoyable time.

Mr. G. D. Ackerly, Jacksonville, Fla., is chairman of the Hotel Committee, and members intending to attend the reunion should communicate with him as early as possible regarding hotel reservations, etc., in order that proper and satisfactory arrangements be made.

Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old Timers and he will be glad to give further information.

Obituary.

James C. Mayer, aged 27 years, a Western Union operator at Cleveland, Ohio, died in that city, August 2, of apoplexy. Mr. Mayer was highly esteemed by his associates and friends, and his sudden death was a shock to all who knew him.

Richard Terhune, aged 73 years, an operator in the Western Union service for forty-eight years, died at his home in Ossining, N. Y., July 27.

James P. Keene, aged 61 years, manager of the Western Union Telegraph office at Franklin, Pa., died in that place July 30.

Ziba Nickerson, aged 89 years, a former telegrapher, died at Chatham, Mass., August 1. Deceased was manager of the Western Union office at Chatham for fifty-five years and retired from active service last December.

A B C of the Telephone.

There are several excellent books on the telephone and its practice, but all men do not know the rudiments of the telephone. It is well, therefore, in order to gain an understanding of this instrument, as in everything else, to begin the study at the beginning. The telephone is no harder to know than any other electrical device and it becomes extremely fascinating on better acquaintance.

A B C of the Telephone is a good book for the student to start with. It explains the subject in non-technical language and the main facts connected with the telephone industry are stated in a clear and simple style. Although it is elementary in character it covers the whole subject of telephony so comprehensively and completely that after a careful study of the book the student will have a good working knowledge of the instrument and its many uses. The book is rendered particularly valuable by reason of the great many illustrations, each one of which tells a story. It has 350 pages and nearly 300 illustrations. The author of the work is Mr. James E. Homans and he is a master of the subject.

The price of this book is $1.00 per copy and copies can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Handy Electrical Dictionary.

This little book, of vest-pocket size, is a practical hand book of reference and contains definitions of electrical terms and phrases in use in every branch of electrical science. It is especially valuable for telegraphers and telephonists, and will be found a great aid in the understanding of electrical things and apparatus met with daily. It is thoroughly reliable, having been compiled by an engineer, and it will be found a very useful companion for students and others who wish to broaden their knowledge of electrical matters. It has a marginal index which is very helpful in rapidly finding the word or expression whose definition is desired.

The price of this book is 50 cents. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

New York Telegraphers' Aid Society.

The quarterly statement of the New York Telegraphers' Aid Society, for the quarter ended June 6, is as follows:

Balance on hand March 6		$25,660.12
Receipts		2,665.56
Total		$28,325.68
Disbursements: Death Benefits	$400.00	
Sick Benefits	1,101.16	
Expenses	208.40	1,709.56
Balance on hand June 6		26,616.12
Total		$28,325.68

Relief Fund

Balance on hand March 6	$5,928.43
Receipts	133.62
Total	$6,062.05
Disbursements	197.00
Balance on hand June 6	$5,865.05
Total	$6,062.05

Selective Telegraph Calling.

Mr. J. A. Hulit, Chicago, Ill., has developed a new system for control of selective calling on a telegraph line, one which will meet all the old objections to this class of service. In his system the selectors stand inoperative to the Morse impulses, and at the first impulse of the selector signal the line is locked against possible interruption at the station keys. He provides a very efficient "answer back" which will notify the dispatcher when the bell rings. The operation of the device requires no apparatus not obtainable at the present time in the open market. Mr. Hulit is of the opinion that with this system in use, coupled with some form of electrical sending device, the telegraph will take first rank, once more, for dispatching trains.

Mr. Hulit states that the operation of the device will require but little more local current at the stations. It is extremely simple, and any lineman can install the complete system without the services of special installers and the consequent following special maintainers. He has given the system a thorough test in his private laboratory and finds nothing against the plan working out in commercial practice to an entire success.

To Study the Cause of Rain.—Prof. Willis L. Moore, chief of the Weather Bureau, Washington, proposes to study the dust mote in its relation to the production of rain. He thinks that its electrical condition plays an important part in its activities.

Mr. T. A. Haston, superintendent of telegraph, Chicago and Alton Railroad Company, Bloomington, Ill., writes, in remitting to cover his subscription for another year, "Can't get along without Telegraph and Telephone Age."

Radio-Telegraphy.

The Marconi Wireless Telegraph Company is arranging to build a 45-kw station at New Orleans, La., and one at Swan Island, for the United Fruit Company. Swan Island is situated south of Cuba, between British Honduras and Jamaica.

Wireless at Cotton Carnival.—The Navy Department will have a complete wireless telegraph station in operation at this year's Cotton Carnival in Galveston, Tex.

Wireless to Honolulu.—The Federal Telegraph Company has opened regular wireless commercial service between San Franscico and Honolulu, Hawaii, a distance of 2,350 miles.

Wireless in Palace of the Montezumas.—The ancient palace of the Montezumas on the heights of Chapultepec, Mexico, now the home of the Mexican president and his family, is soon to be provided with wireless telegraph equipment. Another station is to be established in Torreon. Both stations will be equipped with high power appliances, and will be in charge of the Department of War.

Long Distance Wireless in South America.—A few weeks ago the Telefunken wireless system was established across South America between Lima, Peru, and Para, Brazil, a distance of 3,400 kilometers (2,100 miles). The two points are separated by the Andes Mountains, which are there about 6,000 meters (19,680 feet) high. This is stated to be a new record in wireless telegraphy.

Concert by Wireless.—A musical concert by means of wireless telephone was conducted in San José, Cal., recently, by Prof. Chas. D. Herrold, assisted by wireless operator E. A. Portal. The music which was supplied by a phonograph, was heard by a large number of amateur wireless operators within a radius of 100 miles of that city, who by telegraph, signified their choice of musical selections to be transmitted.

Wireless Communications from Aeroplanes.—Successful experiments with wireless telegraphy between a flying aeroplane and a number of fixed wireless stations were carried out at Saint Cyr, France, July 26, by Lieutenant Mauger-Devarennes, who, accompanied by a telegraph operator, made a number of flights over the military camp here. His aeroplane was furnished with a small wireless apparatus.

Wireless Telegraphy Without Masts.—As the result of the experiments conducted in Hobart, Tasmania, by the Commonwealth, by Mr. Balsillie, wireless expert, the wireless stations to be erected in Papua, Queensland, and South Australia, will be modified from the original design. The masts will be only 140 feet in height, and grounded wires will be used in addition to the aerial wires. Mr. Balsillie regards his experiments as successful, and for other stations it is probable that masts will not be used. He is confident that grounded wires will be used in future in long-distance communication.

Institute of Radio-Engineers.—At the next meeting of the Institute of Radio-Engineers, Monday evening, September 2, at Columbia University, New York, a paper by W. Torikata and E. Yolsoyama on "Utilization of Both Waves Emitted from Closely Coupled Transmitters in Radio-Telegraphy," will be read and discussed. This paper is the result of elaborate tests made between the laboratory of the Department of Communication in Tokio and three stations 54, 253 and 515 miles distant.

Effect of Sunlight Upon Wireless Signals.—Mr. Nikola Tesla denies that the adverse effect of sunlight upon wireless transmission is due to the ionization of the atmosphere by the sun's rays. He holds that the transmission takes place by conduction through the substance of the earth, and not by Hertzian radiation, and ascribes the weakening effect of sunshine upon the signals to the evaporation of water on that side of the earth which is turned towards the sun, the vapor carrying off more or less of the electrical charges imparted to the ground.

United Wireless Affairs.—The United Wireless Telegraph Company reorganization committee, of which Mr. Arthur P. West is chairman, announces that approximately 15,000 stockholders holding about 650,000 shares have paid the assessment of fifty cents a share. This is more than sufficient to secure the success of the plan by which the company's physical assets and patents were turned over to the reorganization committee by the trustees in bankruptcy. These assets have in turn been sold to the Marconi Wireless Telegraph Company of America.

Government Control of Wireless.

The bill for Federal control of radio-telegraph communication, placing all American wireless stations under government regulation, was passed by the House, August 9. It requires all persons operating commercial radio stations in interstate commerce, including the operators, to take out Federal licenses; also that no person engaged at any radio station shall divulge the contents of any message to any one not authorized.

English Wireless Telegraph School.

The British School of Telegraphy, Ltd., London, Eng., is stated to be the largest school of wireless telegraphy in the United Kingdom and probably in the world. It is under the management of Mr. Arthur W. Ward, who, previous to taking up his present position, was in the postal telegraph service for forty years, retiring on a pension some four years ago. The school has had a very successful career and for several years has qualified more than 100 students per annum for the various services. This year the school has placed no less than 120 students into positions within six months. Harold Bride, the surviving operator of the "Titanic" was trained at the school as was also Harold Cottam, the operator on the "Carpathia."

Winnipeg Police Alarm System.—The police signal service of Winnipeg, Man., is a very complete and extensive one and was installed by Siemens and Halske and Siemens—Schuckertwerke Berlin, Germany, which concerns are represented in New York by Dr. Karl G. Frank. The system is fully described in German and illustrated in a pamphlet recently issued by the company.

Western Electric's June Business.—Goods billed out by the Western Electric Company during June were ten per cent more than for that month a year ago, which makes this year's six months' aggregate of gross sales two per cent ahead of the corresponding six months in 1911. The ten per cent increase for June is like the abnormal increase of seventeen per cent shown in April, and is due to special circumstances. The gain in June came mostly from America, and was widely distributed.

LETTERS FROM OUR AGENTS.

NEW YORK WESTERN UNION.

Messrs. James Young, F. Ackerman, F. Breen and A. M. Lewis are away with their respective organizations attending the New England military manoeuvres.

Mr. W. M. Morrissey has been appointed division traffic chief, southern division, vice J. B. Hurd, retired.

Mr. M. W. Howe has been promoted to be assistant traffic chief.

George Van Buren Frost, for many years superintendent of the American District Telegraph Company, New York, died at his home in Peekskill, N. Y., August 2.

WASHINGTON, D. C., WESTERN UNION.

Amos Adams, James Hahn and James Saffell have been retired. Mr. Saffell was chief operator at the Baseball Park for thirty-five years.

FLORIDA WESTERN UNION.

Branch offices have been opened at the Windsor, Burbridge, Aragon and Seminole hotels at Jacksonville and at the New Hillsboro and DeSoto, Tampa, preparatory to handling a large tourist business during the fall and winter.

Mr. H. G. Clark has been appointed manager at Tarpon Springs.

Mr. D. B. Murray, formerly of the telegraph department, has been appointed cashier in the office of L. J. Maxwell, district superintendent at Jacksonville.

William G. Shearer is acting wire chief at Jacksonville, in place of Samuel W. Perkins. Mr. Perkins is on a leave of absence on account of his health.

SAN FRANCISCO, WESTERN UNION.

Among recent happenings in this vicinity was the departure of Mr. James H. Sharon, of Stockton, for an extended trip through Europe, his itinerary taking in England, Ireland, Scotland, France, Germany, Italy, Switzerland and Austria. Mr. Sharon has been manager at Stockton for twenty-four years, being assisted by his brother John and the good-will of the business men of the city. Their appreciation of his sterling qualities crystallized itself into a pair of binoculars presented him on his departure. His trip was afterward saddened by the sudden death of his brother Edward by heart disease in this city before the traveler had reached New York. Yielding to the insistency of his friends, however, Mr. Sharon continued his voyage.

Miss Nellie Keenan has returned to this, her home city and many friends, after some years spent in Nevada.

The fruit season and the healthy growth of business on account of the World's Exposition of 1915 are already taxing facilities to the utmost and making good times for the operating force.

Telegraph and Telephone Age

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Replies to Correspondents.

A correspondent writes: "I have often used the proportional test set type ES20 a and found results very satisfactory, but am puzzled when I try to figure out why each stud represents percentage. Will you kindly enlighten me?"

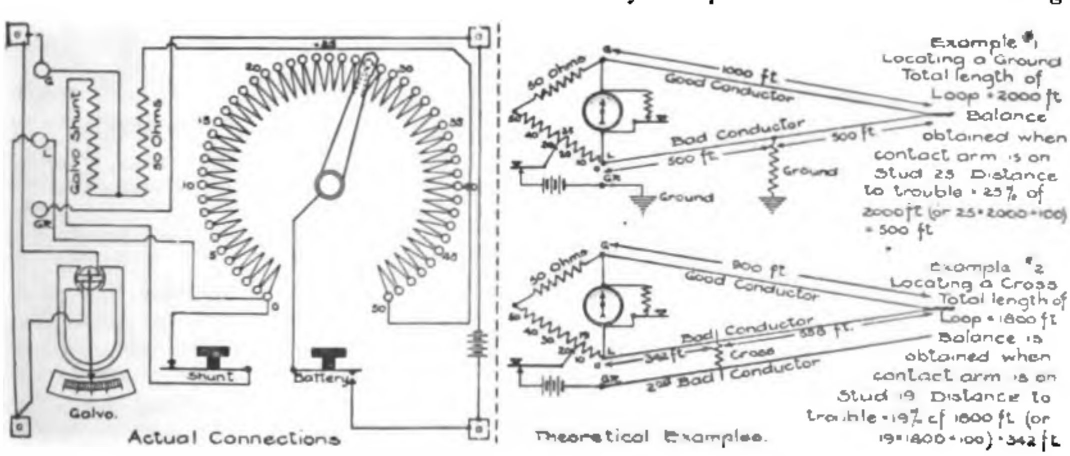
The set and arrangement referred to are herewith shown in diagram, together with examples for illustrating the operation.

The reason a marked stud represents the percentage of the total number of ohms or feet to the fault in a loop consisting of two conductors connected to the points G and GR, respectively, as shown in the upper right hand figure, may be explained in the following manner:

We know that when the needle of a galvanometer stands at zero, when a battery is connected to the junction of the two equal arms of a Wheatstone bridge, the resistance of the two external wires connected thereto must necessarily be equal; and also that when the arms have to be made unequal in order to obtain a balance, it indicates a corresponding and proportional inequality in the respective lengths or resistances of such wires. Hence the computations are made by reading the proportions in which the bridge resistance is divided. The amount of resistance or length of wire in each external conductor connected to the arms of the bridge will always be the same percentage of the entire external circuit (that of both conductors combined) as that of the percentage of bridge resistance required in each arm to effect such balance.

For example, let us take the problem worked out in the upper right hand figure in the diagram. It will be seen that the bridge consists of two arms containing fifty ohms each, joined together in series, or 100 ohms in all. If a battery is connected to the junction of the figure, the arms are equal (fifty ohms in each). But if we shift the battery connection from the junction to the point shown in the lower arm, we add twenty-five ohms to one arm and remove twenty-five ohms from the other; hence we have a bridge with unequal arms, seventy-five ohms in one and twenty-five in the other.

As the total amount of resistance in the two fifty-ohm arms is 100 ohms, it follows that if we divide this 100 ohms into two parts at the twenty-five-ohm stud, one arm will contain twenty-five per cent of the entire bridge resist-



DIAGRAMS OF PROPORTIONAL TEST SET AND EXAMPLES.

ance and the other seventy-five per cent, and, as the resistances in the external circuits, in this case, are in the same proportion, the percentage of resistance in each wire will correspond to the percentage of resistance in the arm of the bridge it is connected to.

In this example the entire external resistance is known to be 2,000 feet (that of the two 1,000-foot wires combined), but as yet, the length of each conductor is unknown because the ground or fault is not at the middle of the loop formed by the distant juncture of the two conductors.

The balance in this case was found with the radial battery arm resting on stud twenty-five, representing twenty-five per cent of the total bridge resistance; hence the distance in feet from the short arm of the bridge to the ground is 500 feet, because that is twenty-five per cent of the entire 2,000 feet in the loop. On the other hand, seventy-five per cent of the 2,000 feet (1,500 feet) represents the length of the return wire connected to the other arm of the bridge because that arm contains seventy-five per cent of the bridge resistance.

This rule holds good no matter what stud the dividing arm rests on, because the sum of the stud and remaining resistance in the bridge is always 100, or 100 per cent, the same percentage that the sum of the lengths or resistances of the two external wires represent, no matter how divided.

The left hand figure shows the arm resistances as arranged in the test set. The adjustable arm is circular in form and tapped by means of studs at regular intervals, the battery being connected to the movable lever. The other arm consists of an untapped coil of wire having fifty ohms resistance. The third coil shown is the galvanometer shunt.

In the same letter the writer asks how much current should be sent through the coils of a differentially-wound relay when testing for unevenness, and whether it is best to connect the coils in series or in multiple?

A good plan to follow in testing almost any electrical device is to provide the instrument with normal current at least. Sometimes it requires considerably more E. M. F. than a few cells of dry battery would furnish, to develop an incipient fault; this is particularly true where the insulation is just beginning to deteriorate.

There is little choice between the series and parallel coil methods of testing; some prefer the former and others the latter. Probably the series connection is most generally followed. For a close test, however, the contact points should not be very wide apart, and if it is a polarized relay that is to be tested, the armature should be accurately centered. For neutral relays the armature should be very close to the magnet and the tension of the retractile spring no greater than is necessary to pull the lever back. The degree of any magnetic unevenness disclosed is, of course, estimated by the magnetic strength with which the armature is attracted or repelled, and its interfering value may be further determined by widening the magnetic gap and contact points. It is possible for a really workable polarized relay to show a slight unevenness when closely adjusted because of its extreme sensitiveness to minute influences; hence it is better to determine the degree of interference before condemning an instrument that might and probably would give satisfactory service in a duplex circuit. An uneven neutral relay is more to be feared than an uneven polarized relay, because its smooth operation is of greater importance.

Among other questions that have been asked is: "What test can I apply to ascertain whether relay contact points consist of silver or platinum?"

This may be readily determined by placing a few drops of nitric acid on an oil stone and drawing the points through it. If the metal is silver it will leave a stain. Platinum will leave no mark.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange August 26:

American Telephone and Telegraph Co.	145
Mackay Companies	87
Mackay Companies, preferred	69⅛
Western Union Telegraph Co.	82

Recent Telegraph and Telephone Patents.

ISSUED AUGUST 6.

1,034,405. Printing Telegraph. To B. Soldatencow, Paris, France.

1,034,875. Telephone System. To H. P. Clausen, Chicago, Ill.

1,034,760. Mast for Radiotelegraphy. To F. G. F. Bräckerbohm, Wilhelmsruh, Germany.

1,034,964. Magneto Bell Ringer. To E. Bowman, Elmwood, Ontario, Canada.

1,035,009. System for Electrically Transmitting Signals. To E. Hermsdorf, Brunswick, Germany.

ISSUED AUGUST 13.

1,035,157. Telephone System. To H. P. Clausen, Chicago, Ill.

1,035,158. Telephone Apparatus. To H. P. Clausen, Chicago, Ill.

1,035,172. Telephone System. To A. H. Dyson, Chicago, Ill.

1,035,173. Telephone Apparatus. To A. H. Dyson, Chicago, Ill.

1,035,257. Instrument for Teaching Telegraphic Codes. To T. M. St. John, New York.

1,035,292. Sounder. To E. C. Wood, Somerville, Mass.

1,035,334. Wireless Telegraphy. To R. A. Fessenden, Brant Rock, Mass.

1,035,355. Telephone Support. To W. Kaisling, Chicago, Ill.

1,035,493. Telephone-Line Selective-Switch Device. To J. H. Swanson, Minneapolis, Minn.

1,035,568. Telautograph. To R. T. Frazier, Jr., Washington, D. C.

1,035,577. Telephone Receiver. To S. P. Grace, Pittsburgh, Pa.

Personal.

Messrs. Charles L. and Howard Krum, of the Morkrum Company, Chicago, were recent New York visitors.

Mr. J. E. Wright, formerly of New York, now of Swissvale, Pa., inventor of the Wright printing telegraph system, was a recent New York business visitor.

Mr. S. G. McMeen has been appointed chairman of the telegraphy and telephony committee of the American Institute of Electrical Engineers by president Ralph D. Mershon.

Mr. G. H. Groce, of Chicago, formerly superintendent of telegraph of the Illinois Central Railroad Company, sailed from New York for Europe on August 22. Mr. Groce will return the latter part of October.

Mr. John D. Hogshead, associate editor of the *Insurance Herald*, Atlanta, Ga., and a son of Mr. E. H. Hogshead, a well-known telegrapher of Meridian, Miss., was a recent New York visitor. Mr. Hogshead was accompanied by his wife.

Major George O. Squier, military attache of the American embassy at London, England, and well known as an inventor in wireless telegraphy, represented the United States at the funeral services in London, August 28, for General Booth, head of the Salvation Army.

Mr. Gerard Swope, general sales manager Western Electric Company, New York, has returned from Europe, where he spent three months. He reports the business situation in Europe in a very satisfactory condition. He visited England, France, Belgium, Germany, Austria-Hungary, etc.

Mr. John S. Ernest, formerly of the Western Union Telegraph Company at St. Louis, Mo., and an old-time telegrapher, well known in all sections of the South, has recently located at Jacksonville, Fla., where he has embarked in many business undertakings. Mr. Ernest is a man of integrity and enterprise, and success will no doubt crown all his efforts.

Mr. Henry G. Stott, superintendent of motive power, Interborough Rapid Transit Company, New York, whose stations have a combined output of 150,000 horse power, was for over four years assistant electrician for the Anglo-American Telegraph Company before coming to America. He left the telegraph service in 1889. Mr. Stott is a Scotchman by birth and came to America in 1891. He is one of the foremost electrical engineers in America and is a past-president of the American Institute of Electrical Engineers, his administration of that office being one of the most brilliant in the Institute's history.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. C. Platt, treasurer of the Mackay Companies, New York, is absent from his office on a vacation.

Mr. Minor M. Davis, electrical engineer of the company, spent his vacation at his old home at North Chatham, Mass., and Mr. John F. Skirrow, associate electrical engineer, toured through the New England States for two weeks.

Mr. Frank N. Roberts, traffic supervisor; Mr. J. D. Murphy, chief clerk of the service department, and Mr. A. E. Wilder, eastern traffic chief, all of Chicago, were recent New York business visitors.

The lines and offices in eastern New Jersey formerly in the seventh district have been annexed to the first district under superintendent C. F. Leonard, New York. Mount Vernon and Yonkers, N. Y., have also been annexed to Mr. Leonard's district. The lines and offices in the state of Connecticut have been annexed to the second district under superintendent E. Kimmey, New York.

Mr. Roy V. Harris, of Huntsville, Ala., has been appointed manager at Decatur, Ala., vice J. W. West, resigned.

Mr. C. Savage, manager Western Union Telegraph Company at Greenwood, Miss., has been appointed manager of this company's office at Greenville, Miss.

This company has established an exchange-money service with Holland. Money can now be transferred to Holland and from Holland to the United States.

The Postal Telegraph-Cable Company has amended its articles of incorporation at Louisville, Ky., to enable it to maintain telephone lines as well as telegraph lines.

Mr. Ralph P. Wines, whose appointment as manager at Toledo, Ohio, for the Postal Telegraph-Cable Company, was announced in our issue for August 16, was born at Conway, Mich., January 13, 1882, and began his business career as a messenger at Adrian, Mich., in March, 1889. Nine months later he became an operator at South Bend, Ind., and afterward worked in other Indiana cities. From October 1, 1901, until 1906 he was manager for the Postal Company at Mishawaka, Ind., and between October, 1906, and July last was manager for the same company at Battle Creek, Mich. On the retirement of the former manager at Toledo, Mr. Wines was appointed to fill the vacant position.

Live Saved by Overhead Wires.—Overhead wires are not such a menace and nuisance as they are generally supposed to be. A parachute man who cut loose from a balloon in Atlantic City, N. J., recently fell on a line of overhead wires and was thus saved from death.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager of the company, announces the following appointments: Mr. John C. Nelson, general superintendent of the Mountain Division, with headquarters at Denver, Col., has been transferred to New York as assistant to the general manager, vice Thomas W. Carroll, who goes to Chicago, as division traffic superintendent of the Western Division. Mr. Carroll succeeds William J. Lloyd, promoted to be general superintendent of the Mountain Division, with headquarters at Denver, Col.

Mr. E. Y. Gallaher, auditor of this company, New York, has gone to London, England, on company business, and will not return until the latter part of September.

Mr. W. N. Fashbaugh, traffic engineer, and H. A. Emmons of the traffic engineer's office, New York, are absent on vacations. Mr. Fashbaugh is spending his time in Denver and vicinity.

WILLIAM J. LLOYD,
General Superintendent, Denver, Col.

JOHN C. NELSON,
Assistant to the General Manager, New York.

THOMAS W. CARROLL,
Division Traffic Superintendent, Chicago, Ill.

Mr. R. E. Scorah, manager of the Terre Haute, Ind., office, has been appointed plant chief of the old sixth district, comprising parts of Ohio, Indiana and Illinois.

Senator W. L. Ives, dean of the operating department of the Western Union Telegraph Company, New York, has returned to his desk after a month's rest camping on Cayuga Lake, N. Y.

Mr. J. W. West has been appointed manager at Macon, Ga. Mr. West was formerly manager for the Postal Company at Decatur, Ala.

The "Flying Squadron" of the Western Union Telegraph Company, headed by Mr. J. C. Smith, division commercial superintendent, spent a few days in Fort Worth, Tex., the latter part of August. The party included, besides Mr. Smith, Messrs. J. W. Brooks, A. F. Felder, R. G. Williams, W. A. Williams, W. B. Kendall, W. A. Logan and F. C. Cole. Manager T. A. Darling of the Fort Worth office entertained the visitors at a "stag supper." The table was artistically decorated. In the center was a miniature lake dotted with swans, and at either end were two large telegraph poles with wires spanning the lake, while beside them were two smaller poles which carried the advertisement that appears on the back of all Western Union blanks. Each of the place-cards contained an appropriate and suggestive verse. The "Flying Squadron" is visiting all the principal cities from New Orleans to Oklahoma City for the purpose of ascertaining the kind of service being rendered by the company, each member of the party being assigned to interview the patrons in a certain district.

Mr. J. E. Cox, night chief operator of the Chattanooga, Tenn., office, was a recent New York visitor.

The general contract for the construction of the new Western Union building at the corner of Broadway and Dey street, New York, has been awarded to Marc Eidlitz & Son, New York, the cost of construction being estimated at $4,000,000. The structure, which will be thirty stories in height, was designed by William Welles Bosworth, architect, New York.

Mr. Ben C. Wilkins, manager of the Western Union office at Ashland, Wis., is a poet and an author of considerable reputation. On the arrival of a new baby at his home he composed a poem entitled "The New Little Baby Upstairs," which was sung by Anna Held, the actress, in Minneapolis, Minn., in compliment to Mr. Wilkins, on the occasion of a meeting of managers in that city. Mr. Wilkins has been in the telegraph service forty-three years.

The Cable.

The Commercial Cable Company announces that deferred plain language messages are now accepted at half the regular rate for northern Rhodesia, except Abercorn Fife, Rhodesia and Fort Jameson.

Cable Rates.—The Commercial Cable Company has issued a neat and substantially-bound booklet giving cable rates from New York to all parts of the world. It contains maps of the world's cable and land systems.

New Mediterranean Cable.—The Italian cable steamer "Citta Di Milano" finished laying a cable between Syracuse and Tripolion, July 13, when the first message was sent to Syracuse. This cable was manufactured in Milan by Pirelli & Co. Its length is about 280 nautical miles and its weight 499 tons.

Canadian Notes.

Mr. A. B. Smith, superintendent of telegraph, Grand Trunk Pacific Railway, was recently in Prince Rupert, B. C., in connection with the work of the extension of the company's telegraph lines east of that point.

Telephone Construction in Alberta.—Mr. W. H. Harmer, deputy minister of railways and telephones at Edmonton, for the province of Alberta, Canada, states that the stringing of more than 1,500 miles of telephone main lines and the installation of several thousand instruments, will be completed this year.

Increase of Salaries for Canadian Pacific Telegraphers.—The Canadian Pacific Railway Company's Telegraph has reached an agreement with its commercial operators. All operators will receive an increase of $5 per month, making the maximum at Vancouver, Calgary and Winnipeg $100 per month; Montreal and Toronto $90 per month. All operators who have been in the service four years will receive an annual vacation of two weeks with pay. There are some slight changes in the percentages in the larger offices, which will result in a few operators getting an increase of $10 per month. The increase affects 800 operators and is retroactive, going into effect as of July 1 last.

Examination for Government Operators.—The United States Civil Service Commission will hold an examination on September 24 at various places throughout the country to secure eligibles from which to make certification to fill vacancies as they may occur in different branches in the service in the position of telegraph operator, male or female. The salaries range from $900 to $1,000 per annum.

The only way to learn what is going on in the telegraph and telephone fields is to read Telegraph and Telephone Age regularly. Subscription Price, $2.00 per year.

London Telegraph Office Damaged by Fire.

At seven o'clock in the evening of August 24 a fire started in the operating room of the General Post Office, London, England, which caused considerable damage and completely cut off London from telegraphic communication for nearly three hours. Business for England, America and the Continent was sent to outlying telegraph offices by automobile and from these it was forwarded to destination.

By ten o'clock temporary repairs had been effected, and American cable business was resumed from the badly damaged office. Provincial telephone cables were also destroyed, and many wires were fused and extensive damage done to the instruments. Temporary offices were soon opened. Fortunately the fire occurred at a time when business was lightest.

The General Post Office is housed in a group of buildings situated in St. Martins le Grand, in the centre of old London. Here are concentrated the postal, telegraph and other activities under the direction of the postmaster general. The telegraph department was located in the West building, and the operating room, with a floor space 300 by 90 feet, contained 500 sets of instruments.

This fire recalls the disastrous fire at Western Union headquarters, at 195 Broadway, New York, in 1900, when the entire operating room was completely destroyed by the flames and the lower floors damaged by water. This fire started shortly before the day force was to have reported for duty.

The Old-Timers' Reunion.

The next annual reunion of the Old-Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, which will be held at Jacksonville, Fla., October 22, 23 and 24, promises to be the largest meeting in the history of the twin-associations. One of the attractions of this meeting is the sea voyage from New York to Savannah, which is proposed as one of the routes from New York to the convention city, and, although there are many land routes, the sea ride has a charm of its own and will be preferred by many of the delegates and their families. Once in Jacksonville, the members will find plenty of entertainment and good cheer. Mayor W. S. Jordan, president of the Old-Timers' Association, is taking an active interest in the plans, and Mr. G. D. Ackerly of Jacksonville has charge of the hotel arrangements. He will be glad to hear from the members who wish to make hotel reservations.

The complete programme of the convention was printed in our issue for July 16. Members desiring to go by steamer from New York to Savannah are requested to communicate with secretary F. J. Scherrer, 30 Church st., New York.

The Telephone.

Mr. Angus S. Hibbard, advisory relation executive department, American Telephone and Telegraph Company, New York, has been spending a vacation at Kineo, Me.

Mr. H. M. Fennemore has been appointed chief of the publicity department of the Mountain States Telephone and Telegraph Company, with headquarters at Denver, Col.

Messrs. John Balch and Charles A. Grant, respectively assistant treasurer and secretary of the Western Telephone and Telegraph Company, Boston, have been appointed assistant treasurer and assistant secretary, respectively, of the American Telephone and Telegraph Company.

Mr. D. H. Fitch, electrician of the Cazenovia Telephone Company, Cazenovia, N. Y., is the discoverer of a new method of treating tuberculosis. By mixing a powder with water a gas is generated which the patient inhales. Mr. Fitch states that it is a baccillicide, and is destructive to the tuberculosis bacilli.

New Telephone Company in Valparaiso.—The Empresa National de Telefonos has been organized in Valparaiso, Chile, with a capital stock of $168,000.

Consolidation of Nevada Independents.—The United Farmers' Telephone and Telegraph Company has obtained control of the Nevada Consolidated Telephone Company lines at Carson City, Nev.

Increase of Wages.—The Pacific Telephone and Telegraph Company has increased the wages of its operators in San Francisco, Oakland, Cal., and some other exchanges. The increases range from nine to twenty per cent.

Telephone Directory a News Channel.—A lady stopped subscribing for daily papers because she became a telephone subscriber and could read the directory which gave her the only news she wished to know—that is, if all her neighbors had telephones.

New York Telephone Companies Purchased.—The New York Telephone Company has purchased the property and business of the Inter-State Telephone Company, operating in Little Falls, St. Johnsville and Dolgeville, N. Y., for $147,600; also the Dutchess County Telephone Company, operating in Poughkeepsie, Wappinger's Falls and vicinity, for $33,050.

Wayside Telephones.—Patrol signal-boxes fitted with telephone apparatus, and communicating with the nearest exchanges, are being used on English roads, so that automobile travelers may, if they desire, order their rooms in hotels ahead, and business men may be able, while on journeys, to communicate with their offices or their homes. The use of these telephones will be free to members except for long-distance calls, for which, of course, the usual trunk charges will be made.

Dissolution of Western Telephone and Telegraph Company.—The stockholders of the Western Telephone and Telegraph Company have voted to dissolve the company. The directors will set a date for the sale of the company's assets, when they will be bid in by the American Telephone and Telegraph Company, which owns 99 per cent of the outstanding stocks. The practical dissolution of the company and the realignment of its various subsidiary companies into other operating units of the American Telephone and Telegraph Company were effected some time ago. The dissolution proceedings are necessary to comply with the law. The Western Telephone and Telegraph Company was composed of the Wisconsin Telephone Company, the Cleveland Telephone Company, the Southwestern Telephone Company and the Northwestern Telephone Company.

Telephone Equipment in New New York Hotel.—The New York Central and Hudson River Railroad Company will build a twenty-three-story hotel adjoining its new station in Forty-second street, New York. It will be named the Hotel Biltmore, and will have an extensive telephone plant. Each of the 1,000 guest rooms will be equipped with a telephone. The main switchboard will have twelve operating positions, each equipped with telautograph sections. In addition to the main switchboard, four subswitchboards will be installed. Thirty-eight telephone booths will be distributed at convenient locations on the main and mezzanine floors. There will be 100 trunk lines running into the main and subswitchboards, and a total of 1,200 telephone stations will be located on the premises. It is estimated that during the first year half a million local telephone messages will originate from the hotel.

Telephone Cables Out of New York.—The main borough of New York City—Manhattan—being situated on an island, telephone submarine cables must necessarily be used as a link in the means of communication with the rest of the country. There are now sixty-three armored submarine telephone cables leading from Manhattan Island in all directions, with a total number of pairs of conductors of 10,684. In addition, there are three cables laid in the subways of the Pennsylvania Railroad and five cables in a telephone subway across the Harlem River, which total 2,877 pairs. This makes seventy-one cables and 13,561 pairs of conductors (27,122 wires) passing under the North, East and Harlem Rivers. In laying these submarine cables the utmost care must be exercised not to have them cross each other. They must occupy the same relative positions in the cable houses on each side of the river. By being chained as low as possible there is little slack for an anchor to catch, and the cable is far enough from the surface to avoid being caught by a steamer or tug propeller.

Radio-Telegraphy.

Marconi Belmar Station.—The new station of the Marconi Wireless Telegraph Company soon to be erected at Belmar, N. J., will be surrounded by about twenty towers over 300 feet high.

Wireless in Austria.—The Government has established a department for wireless telegraphy, and intends itself to undertake the installation of wireless plants on board merchant ships. The system adopted is that of the German Telefunken Company.

Wireless in China.—It is proposed to establish wireless communication between Pekin, China, and Lhassa, the capital of Thibet, with two intermediate stations, one at Tachienlu and the other at Batang. The establishment of a chain of twelve wireless stations along the entire length of the Chinese coast, from the island of Hainan to the Gulf of Pechili, is also under consideration.

Pocket Wireless Receiver.—The French Under-Secretary of Posts in company with government directors of the telegraph service, recently learned of a pocket receiver for wireless telegraph and wireless telephones, which is said to be based on an entirely new principle. According to the dispatch no source of electricity is necessary for it. It is sensitive and light. The instrument is being investigated.

Marconi School of Instruction in London.—The Marconi Wireless Telegraph Company of England has arranged to establish a wireless station on the roof of Marconi House, on the Strand, in London, the headquarters of the company. This station will be an adjunct to the school of instruction in wireless telegraphy which the company has started there. The equipment will comprise three sets of apparatus, with ranges of 600, 250 and 100 miles.

Recommendations of London Wireless Conference.—Recommendations were adopted at the recent London International Conference on wireless telegraphy that the following problems be studied during the period before the next conference in Washington, D. C., in 1917: First, the development of a standard wave meter; second, the selection of a standard decrement; third, the development of a standard receiving apparatus for comparing the intensities of waves received from different sources.

New Wireless Detector.—A new wireless detector of the crystal type has recently been developed in England. It consists of a brass disk with a large hole in the center, carrying six crystal cups in which the crystals are fixed by means of a special fusible alloy. The disk is held up against a flanged nut on a spindle by springs and can be rotated sideways so as to bring any part of any crystal into contact with the point. The pressure of contact can be adjusted with the greatest precision by means of a screw and an arrangement of opposing springs. Crystals of galena of a particular formation are found to give the best results, provided the pressure of contact is extremely light.

Wireless in the East Indies.—Of the four wireless stations in Dutch India, whose erection was entrusted to the Telefunken Company, of Berlin, those of Sabang (Wé Island) and Sitoebondo (Java) are finished. The first named serves shipping alone, on which account it is favorably placed in the traffic-frequented Straits of Malacca. With plant of 2.5 kw, a range of 750 km. (465 miles) is attained by day and 3,600 km. (2,235 miles) at night. The station's operations have produced disturbances on the Lodge-Muirhead station at Victoria Point, Burmah, giving rise to protests, with the result that the Dutch Government has ordered that Sabang shall in future work only with 36 per cent of its power.

The San Francisco-Honolulu Wireless Service.—The San Francisco *Call* of July 29 prints an interesting account of the opening of wireless service on July 28 between San Francisco and Honolulu, Hawaii, by the Federal Telegraph Company. Eighteen hundred words of newspaper matter were transmitted to the Honolulu papers, the distance between the two stations being 2,350 miles. The American station is at San Bruno Point, South San Fraicisco, where there are two towers 440 feet high. The Federal Company uses the Poulsen system of wireless. Mr. James S. Hunt, a well-known old-time telegrapher, is the solicitor for the Federal Company in San Francisco and Mr. A. Y. Tuel is the chief operator.

High-Speed Wireless Across the Atlantic.

The High-Frequency Machine Company of Berlin, Germany (wireless telegraph system) is erecting a station at Tuckerton, N. J., on Hickory Island, in the marshes near the coast. It is to have a single steel tower 820 feet high, and the electric waves are to be produced by the Goldschmidt high-frequency alternator, of which Dr. R. Goldschmidt is the inventor. It will be driven by a Westinghouse engine of 420 E. H. P. The European station with which the Tuckerton station will communicate is identical with the latter and is situated at Eilvese, near Hannover. The company expects to attain a very high speed of transmission.

Express Telegrams in England.—The proposal that express telegrams should be accepted at a special tariff has evoked a protest in the English press on the score that all telegrams are urgent, and no priority should be recognized save that of receipt.

Mr. L. Lemon, Managing Director Metropolitan Telephone and Telegraph Company, New York.

In our issue for August 16, we announced the appointment of Mr. L. Lemon as managing director of the Metropolitan Telephone and Telegraph Company, with headquarters at New York, which company was recently chartered in Delaware for the purpose of building and leasing telegraph lines, and with a view of connecting some of the independent telephone companies in the territory through which the lines pass.

Mr. Lemon, though still a young man, has had a wide experience in the operating and managing branches of the telegraph service which will be valuable to the new interests. He was born near Mifflin, Pa., June 9, 1867. After receiving a common school education he was attracted by the possibilities of telegraphy for a young man just about to take up a business career. He learned telegraphy on the Middle Division of the Pennsylvania Railroad, and shortly afterward entered the service of the Western Union Telegraph Company as night operator at Trenton, N. J. He was afterward employed in a number of Pennsylvania towns, and in 1884 accepted a place with the Western Union at 195 Broadway, New York. He resigned there in the spring of 1885, and was appointed manager for the same company at Lancaster, Pa. He left there to enter the service of the Baltimore and Ohio Telegraph Company at Newark, Ohio, remaining with this company practically throughout its existence. He was transferred to Pine Bluff, Ark., as manager in 1886, and was again transferred to Indianapolis as chief operator, and was appointed manager shortly before the sale of that company to the Western Union. After a year's service as chief operator for the Postal Telegraph Company at Indianapolis, he established and took charge of the quadruplex repeating station on the Northern Pacific Railroad at Glendive, Mont.

MR. L. LEMON,
Managing Director Metropolitan Telephone and Telegraph Company, New York.

Returning from the West, he became manager for the Postal Telegraph-Cable Company at Altoona, Pa., from which he was advanced to the charge of the more important office at Baltimore, in which city he also served as superintendent of the Fire and Police Telegraph. His record at Baltimore so far determined the character of the man that his appointment as superintendent of the Postal company, with headquarters at Pittsburg, was a natural sequence. From the latter point to Philadelphia was a further move in the line of promotion, and on January 1, 1909, he was brought to headquarters at New York and advanced to the position of division superintendent of the Eastern Division, which office he filled with honor and credit to himself and to the company. As this district includes all the New England States and the Middle Atlantic States, this work has brought him in close touch with telegraph matters in all of the most important cities of the East.

Very few men have had an experience so varied and complete as Mr. Lemon in all that pertains to the work of a telegraph company. His intimate knowledge of so many different parts of the United States will make him especially valuable in the work of the Metropolitan Telephone and Telegraph Company. His career has been one of steady progress, year by year gaining in practical experience and rising in responsibility of position occupied. On August 15 of this year Mr. Lemon resigned his position with the Postal to become managing director of the Metropolitan Telephone and Telegraph Company.

Personally, Mr. Lemon is a man of high ideals and character, and he has a ready and wide grasp of all things telegraphic, which well fit him for the duties of his present position. His new work will be, of course, to a large extent, of a pioneer character and will offer a splendid opportunity for the exercise of the knowledge and experience he has been accumulating during the many years he has been in telegraph harness.

Mr. Lemon's standards were well reflected in an article written by him and published in "The Postal Telegraph" of December, 1909, under the caption, "It Pays to Do Your Level Best." This article attracted much attention, and it is safe to assume that the ideas presented therein have served as a stimulus and brought encouragement to many young men looking for direction and advice. In that article Mr. Lemon pointed out that the interests of the employe and the shareholder are so closely interwoven that whatever benefits one, is bound to benefit the other, and he urged greater activity on the part of every employe.

Mr. Lemon is a thirty-second degree Mason and a member of the Mystic Shrine, and has a host of friends who wish him success in his new line of work.

Understudies.*

BY R. B. FERGUSON, DISTRICT COMMERCIAL MANAGER, BUFFALO, N. Y.

In taking up the question of "Understudies, an Essential in Organization," it is almost necessary to revert to the recollection of our boyhood days, filled with its hopes, ambitions, and petty discouragements, in order properly to follow up our future calling in life, whether its commencement was accidental, a matter of choice, or due to conditions existing at that time over which we had but little control.

No doubt some of you will recall your early efforts to master the rudiments of the Morse alphabet and after many repeated but unsucessful attempts, you were almost discouraged with what seemed inevitable failure, until some other more experienced and obliging operator, recognizing your persistency, gave you a few moments of his time to extend the helping hand over what seemed to you insurmountable obstacles in the path of learning, little thinking that he was laying the foundation for your advancement. So it must necessarily follow to a greater or lesser degree, that as your own advancement in position and responsibility in the service of the company increases, the same helping hand extended to your subordinates, no matter what his or her duties may be, will materially lighten to a corresponding degree, your own future labors.

I believe the day has passed forever, in this age of systematic commercialism (if I may use the term), when any manager can alone successfully carry out the requirements demanded of his present day duties, unless he possesses the absolute confidence, co-operation and assistance of his entire force of subordinates, and must, in return, show his appreciation of their loyal efforts by entrusting to them the responsibilities of their respective positions, recognize their honest desires for further knowledge, beyond the routine of their daily labors, encourage them to assume the initiative, and to rely upon their own judgment.

Too often, managers are so absorbed in their own duties that they frequently fail to recognize or give due consideration to the hopes and aspirations of their youthful subordinates, so that in a short time, hidden talent that might otherwise have developed into the highest order of utility, has been often sacrificed to the monotonous daily grind of routine.

From the messenger to the manager, every office should be so conducted in all its departments, that should any vacancy occur, "the Understudy, an Essential in Organization" is immediately available. It will not then be necessary, as it has been in many instances, to suddenly shift the duties of various employes to a routine with which they are absolutely unfamiliar, for the purpose of tiding over an unprepared-for emergency, thereby invariably causing a general disorganization in the entire workings of the office, more or less confusion, unnecessarily long hours and dissatisfaction in general.

When you find an employe either so jealous of his own limited knowledge that he has neither the time nor patience to impart a small portion of it to an ambitious "understudy," make up your mind that that employe is afraid of his own position, and will always prove a detriment to any further advancement of those with whom he comes in contact.

In the present organization of the telegraph profession that has been so forcibly brought to us in the past few months, we managers must not lose sight of the fact that the plant departments are exerting themselves to the utmost in order to provide the facilities necessary for the proper handling of the rapidly increasing business, and that the traffic department is likewise bending every energy to care for it, so that it is now the duty of the managers, working in co-operation with the solicitors, to go out into the highways and by-ways of commercial industry, forage for, and supply the daily increasing demand for fuel made necessary to feed the facilities provided for us. Consequently, the "understudy" in all our various departments is an absolute essential, in order to enable us to spend a considerable portion of our time in the creation and solicitation of business, which must be obtained at any cost.

I will frankly confess, and I believe that in doing so I am only voicing the belief of others, that to the manager who has spent years in thoroughly equipping himself with all the knowledge of traffic and financial details of his own office, and who has not for years past been fortunate in the possession of a good understudy, will find it a hard problem to immediately turn over to his subordinates the handling of the details of his office, in order that he may spend more of his time in obtaining new business.

*Address before Western Union Commercial Managers' Association, New York.

Telegraph Company Charged with Alienating Feminine Affections.—A suit has been started in New York against one of the telegraph companies, charging it with alienating a young woman's affections. A young man wrote: "Good bye. I love you forever," in a message to his fiancé, but on its way to its destination the word of affection encountered a snag, and the young lady, soon to become a bride, read: "Good bye, I leave you forever." She returned the presents and accepted another offer of matrimony, hence the claim for damages.

International Electrical Congress of 1915.—The committee on organization of the International Electrical Congress, which will be held in San Francisco, Cal., during September, 1915, has arranged tentatively a list of sections. It includes sections on telegraphy and telephony, including all communication and signaling by wires, and wireless telegraphy and telephony, including all communication by electromagnetic waves without wires.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(100) Q. Will you please describe how submarine cables are laid across the ocean? I have been informed by some people who pretend to know that it sinks to the bottom and by others that it is attached to floaters sixty or seventy feet below the surface of the water, and what they call whistlers are attached every five miles in order to locate the cable for repairs. T. J. D.

A. Submarine cables are allowed to sink to the bottom, and when one is to be repaired, it is necessary to drag the bottom of the ocean with a grapnel until the cable is caught, and then it is hauled to the surface. In laying the shore ends of cables, barrels or kegs are generally used to support the cable until the work is finished; then the cable is cut loose from the kegs and allowed to sink to the bottom. The shore ends are handled in this way because they are large and heavy, and it would require a great power to drag the cable into position, but by the use of the kegs the work is made much easier. In deep-sea cable work, when a cable is hauled up to the surface and cut for repairs, the ends are attached to buoys in case it is necessary for the ship to leave the locality temporarily. The ends can then be readily recovered without having to drag the bottom again, and when the repairs are effected the cable is again dropped to the bottom and the buoys taken on board. There is no such thing as a cable floater.

(101) Q. I desire to know why it is that a five-ohm buzzer will not operate on a 110-volt, 60-cycle circuit by itself, but when a sixteen-candle power lamp is placed in series with it, it gives good results, and the larger the lamp is, the better the results. F. S.

A. A five-ohm buzzer placed across a 110-volt circuit does not offer enough resistance in itself to prevent short-circuiting. The insertion of a lamp reduces the current flow to that more nearly required for the normal operation of the buzzer. An ordinary buzzer constructed for operation with battery will not usually work satisfactorily on alternating current, as the normal mechanical pitch of its armature may not be in tune with the frequency of the alternating current, rendering a rather uneven buzzing effect.

(102) Q. Will you please state the resistance to ground from the point where the current enters the neutral relay of the bridge type of quadruplex, assuming that the polar relay coils are connected in series and that there are 2,000 ohms in the rheostat; also the formula for obtaining the result.—A. W. D.

A. The resistance is 1,146 ohms and the formula is $R = 895 + \frac{416S}{S + 1311}$

where R=Total resistance of set.
S=Resistance of artificial line.

(103) Q. What are the advantages of the Hughes polarized relay? T. G. S.

A. The chief advantages are sensitiveness to weak currents and quick action. At the recent convention in New York of the Association of Railway Telegraph Superintendents, Mr. William Maver, jr., head a paper on the polarized relay and sounder, which was printed in part on page 465 of our issue for July 16. In the same issue was also printed in abstract, a paper by Lieutenant George R. Guild, on the practical application of the Hughes relay in the signal corps of the United States Army. Our correspondent is referred to both of these articles for detailed information.

New Books.

Plans and Specifications for Wireless Telegraph Sets is the title of two paper-covered booklets issued by Spon and Chamberlain, New York, Mr. A. Frederick Collins being the author. Part I gives complete and detailed instructions for making an experimental set, also a one to five-mile set, and Part II covers five to ten-mile sets, also a ten to twenty-five-mile set.

Mr. Collins is a well-known writer on wireless telegraphy and telephony, and has done a great deal of practical work along both lines, and he is therefore qualified to write authoritatively on this subject. The booklets are very well and clearly illustrated and any one with a little mechanical ingenuity can make a practical operating wireless set by following Mr. Collin's specifications.

The price of each part is 25 cents and copies may be purchased of Telegraph and Telephone Age, 253 Broadway, New York.

Shanties on Poles.—A reporter of a Pennsylvania paper recently discovered that the telephone company was installing pole distribution-boxes and they appeared so strange to him that in order to convey his impressions of them to his readers he likened them to cranemen's shanties or fighting tops of vessels. He further volunteered the information that "the day will soon come when all such contraptions will be put underground. Poles are bad enough," he states, "but when they are used as sites for small buildings it begins to strain a bit." Perhaps the reporter took them for New York flats.

Mr. R. A. Barton, formerly manager of the Postal Telegraph-Cable Company, at Lancaster, Pa., writes, "Accept my thanks and appreciation for your courtesy in renewing my subscription to your interesting journal. After nineteen years in the service, I have chosen another vocation, but there still lingers an affection for the telegraph and those associated with it."

Telegraph and Telephone Age

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CHANGES OF ADDRESS.—In ordering a change of address the old as well as the new address must be given.

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New York, September 1, 1912.

The Art of Thinking.

In his excellent book on "The Art of Thinking," T. Sharper Knowlson relates a story of how Southey, the English poet, explained to a quakeress his method of utilizing his time. He studied Portuguese grammar while he was shaving; he read Spanish for an hour before breakfast; after breakfast, he wrote or studied till dinner time—in a word, his whole time was filled by writing, reading, eating, talking, taking exercise and sleeping. After his recital of the details, the quaker lady asked: "and friend, when dost thee think?"

It may appear surprising to those who have not given the subject any serious consideration that few people know how to think—that is, to think effectively. Our thinking faculties require proper training for their best development just as much as the muscles do.

Proper thinking is constructive, while improper thinking is destructive. Every enterprise of man is built up on an idea or a thought and if the thoughts are not correct the results of the work cannot be enduring.

The man who does not take time to think cannot develop the best that is in him. He works like a machine and soon gets into a rut, because his thinking faculties have not been exercised; he becomes a cog in the wheel instead of becoming the power that drives the wheel. Such men are willing to let others do the thinking for them, and they remain cogs.

It is a fact that telegraph employes are realizing more and more the importance and necessity of independent thinking in their line of work and the result is a wide-spread mental activity such as was never known before in the telegraph service. The starting point of this movement is correct thinking and investigation, and he who has not experienced the pleasures resulting from widening knowledge thus acquired should test the matter for himself.

In order to think logically and effectively the surroundings should be favorable—that is there should be no confusion to distract the attention. A good way is take a walk alone if one desires to think on any particular subject. We know of an instance where a very serviceable telegraph device was invented in such a manner. The inventor developed the thing in his mind during solitary walks in the park on Sunday mornings.

The man whose working hours are fully occupied by his work of course has little or no time to think continuously on any other subject, but out of hours he can get away by himself and reflect mentally. If he likes his business he can, under such circumstances, possibly devise ways and means to bring about improvements that will lighten his work and that of others, and thus bring him substantial benefits.

The telegraph and telephone companies are always looking for men who can think, besides work—men with ideas. Officials should encourage their employes to think more. By so doing the service is benefitted and the men themselves are lifted into a higher plane of life.

Volumes could be written on this subject but the ambitious man should study his own case, with what advice he can command, and devise the means best suited to attain the desired results.

The thinking faculties require exercise for their development and the only way to get exercise is to think. The essential thing always is willingness and desire.

Express Telegraph Service.

It is interesting to note that the development of the telegraph service shows a decided tendency to follow the lines along which railway service has been developed.

On railways there are fast trains, popularly known as "fliers;" express trains which run at standard speeds, and local trains which require a relatively long time to reach their destination. The tendency now is to classify telegraph service in a similar manner. Up to a year ago there were two classes of telegraph messages—the day message, which was supposed to be forwarded to its destination in the shortest time possible, and was comparable with the ordinary express train service; and the night message, which corresponded with the comparatively slow-going night or local trains. There has recently arisen the question of the expediency of introducing a guaranteed special fast telegraph service, for which an extra charge is to be made. This class of messages would correspond with the "flier" service of the railroads, for which an extra fare is charged.

It has been objected in the case of this proposed new telegraph service that it might have a retarding influence on the regular business, but it is not at all likely that it would be so voluminous as to have such an effect. It is also pointed out that in principle all telegraph business is rush business and that there should be no discrimination. The same argument might well be applied to the fast railway service. The real test, however, is the public's attitude toward such innovations; but anything in the line of improvement and progress is almost certain to be received with favor.

The business public is always ready to support any means that will tend to facilitate the more speedy transaction of business. To "get there" in the shortest time possible is the consideration of first and greatest importance to them; whether it be in railroad travel or sending telegrams.

The Wireless Situation Improving.

The wireless situation is being gradually cleared up and put on a more satisfactory basis, but there is yet more to be done to give the service the inviolability and reliability that it must possess in order to gain the entire confidence of the public.

The provisions of the wireless ship act as amended and approved by Congress make mandatory certain requirements that have for some time been the subjects of discussion, and it required such an event as the "Titanic" disaster to show the necessity for definite action on these matters. It is now made imperative that passenger ships shall have their wireless instruments manned all the time, and that the transmitting range of their apparatus shall be no less than one hundred miles, day or night. It has always seemed to us that the former requirement was perhaps the most important of all, because under the old methods there was always the possibility of distress calls being unheard on account of the instruments being unattended for one reason or another.

The bill does not provide for every situation, for that would be impossible in the present state of knowledge of wireless, but with the development of the art all the weak points will be revealed and means found to meet them. The most enthusiastic advocates of wireless do not claim that they have attained anywhere near perfection in their work, but they are sure that wireless will be developed to a higher degree of efficiency as time goes on, and every practical need will be met. We do not believe that any problem within the range of possibility is unsolvable; it is simply a question of knowing how.

Overhead Line Construction in California.—The California Public Utilities Commission proposes to adopt uniform specifications for overhead electric line construction. A hearing was given recently on the subject, at which the telegraph and telephone interests were represented besides power transmission and railroad companies.

At the Telephone.

The telephone is not merely a mode of communication, but a school of manners, says the *Philadelphia Public Ledger*. It is a school in which many of the pupils permit themselves lapses from the rules of good breeding and violation of the unwritten laws of etiquette. For instance, here is a person who is quite sure that his time is more valuable than that of one he desires to interrogate. The latter may be an elderly woman, but it makes no difference. He will say to a clerk or secretary, "Call up Mrs. Malaprop." When she comes he will keep her standing there until he gets ready to come—or perhaps until he is through using another telephone, or has dismissed a caller. And yet she is the one who is supposed to be conferring a favor by responding to the summons of the bell.

That is where the cunning device has the advantage over the personal interviewer. It takes precedence over letters, telegrams and living presences, for it might be "something important." Suppose you are asked to call up a number with which you are unfamiliar. It is easy enough to say you won't; the message has been received in your absence, and the "party" refused to give his name. If you refuse you may be missing some advantageous business or social appointment. It is all very well to denounce the telephone as a nuisance, but it has become an indispensable one, and the annoyance it causes is offset by the inestimable benefit it may be in times of domestic or industrial emergency. So it is for us to adapt ourselves to it and learn to use it as though it were an arm or a tongue—a part of ourselves.

Wireless Telegraphy Without Antennas.

Experiments in wireless transmission without antennas have recently been carried on in Berlin, employing a new arrangement devised by Prof. Zehnder. An ordinary insulated conductor, supported on telegraph poles, is connected at each end to the ground, with or without intermediate condensers, as substitute for the antenna. The total length of wire should not exceed one-half of the wave-length at the frequency employed. This conductor is excited in the usual manner near its center by a Braun vibratory circuit which is tuned to resonance. Telegrams were transmitted several hundred miles without the use of antennas and with small-sized sending apparatus. It has been discovered that this arrangement possesses a selective action in reference to the direction of transmission. The most favorable direction is that of the wire itself. According to the *Electrical World*, radiograms have been satisfactorily transmitted with this equipment from Berlin to Norddeich, and with the ordinary type of receiver messages have been received in Berlin from Glace Bay, Nova Scotia, across the Atlantic.

Successful business men choose men for what they are, not for what they claim to be.

Course of Instruction in the Elements of Technical Telegraphy—XXII.

(Copyrighted.)

(Continued from page 530, August 16.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order. The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

The Local Circuit.

We have already seen that a relay, placed in a circuit, responds by movements of its armature to the opening and closing of the circuit.

These movements are, however, inaudible at a short distance on account of the lightness of the lever, which is designed to respond easily to the weak currents flowing in the coils.

To obtain a clear, audible sound a much heavier lever is required, necessitating, since the moving parts must act quickly and promptly, a much stronger spring.

But if the weight of the lever and the tension of its antagonistic spring be increased, a greater magnetic influence must be brought to bear on the armature to overcome this increase, so that it becomes necessary to employ a local circuit in which the current strength is sufficient to supply the increase in magnetizing force required by an instrument of heavier moving parts.

In the main line the current is reduced by the length of line and the number of relays on it, but in the local circuit the only external resistance is the resistance of the sounder coils—neglecting the small amount added by the battery leads—and by constructing the sounder magnets with thicker wire and fewer turns and thus keeping the resistance down to a few ohms, a sufficiently strong current can be obtained from a very low E. M. F. to offset the deficiency in wire convolutions, and to produce a magnetizing force of the requisite ampere-turns.

To this end the sounder coils are wound with about 900 turns of No. 23 wire, which gives a resistance of about four ohms to the instrument.

To produce the loud "click" of the Morse sounder, a current strength of .25 ampere is required in the coils; but this comparatively large current can be obtained from two gravity cells, the circuit resistance being only eight ohms, ² = .25.

Fig. 13 shows the connections of a local circuit. R is the relay, S the sounder, B the local battery.

When the armature of R is attracted, the lever rests against the front stop, and the circuit of the local battery B is completed as shown.

When the main circuit is broken, R's lever moves over to the back stop, and the local circuit is broken. S responds to the opening and closing of the local circuit in the same way as R responds to the opening and closing of the main line.

In a case where the sounder does not act while the relay responds to a current in the line, there is some fault in the local circuit. The relay points should be closed with the fingers; if the sounder

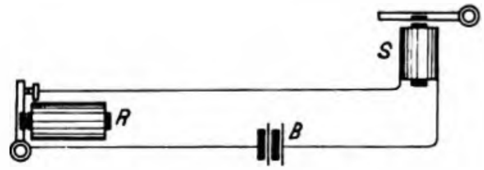


FIG. 13—CONNECTIONS OF A LOCAL CIRCUIT.

still does not respond, the condition of the relay points and the connections should be carefully looked after, and the local battery tested; if the sounder now cannot be made to respond by closing the relay points, the trouble may be in the magnets of the sounder.

Main line sounders are sometimes used on short lines in place of relays, but to obtain the necessary ampere-turns the coils require about 1,800 convolutions, by which their resistance is increased to about 20 ohms.

That a larger number of turns is required in the main line sounder is evident from a consideration of the ampere-turns required to work the instrument satisfactorily. For example, the current in a circuit which includes a four-ohm sounder is .15 ampere.

There are 900 turns in the sounder coils; the magnetizing force is consequently $900 \times .15 = 135$ ampere-turns.

The required magnetizing force is $900 \times .25 = 225$ ampere-turns; consequently the sounder does not respond to the opening and closing of the circuit.

Assume the circuit to have a total resistance of 200 ohms, and substitute a main line sounder for that of four ohms.

The E. M. F. of the circuit is $200 \times .15 = 30$ volts. The circuit resistance is 216 ohms, sixteen ohms having been added by the change of sounders; the current is therefore $= .14$ ampere nearly.

But the convolutions are now 1800, which with the current gives a magnetizing force of $1800 \times .14 = 252$ ampere-turns, and the main line sounder responds promptly to the closing of the circuit.

(To be continued.)

The Effect of Daylight upon Radiotelegraphic Waves.*

BY DR. J. A. FLEMING.

One of the unsolved problems on the theoretical side of radiotelegraphy is the full reason for the diminished range of it by day as compared with night. It is now well known, even to the general public, that a given transmitting and receiving apparatus has a considerably greater range of action during the dark hours of the night than during the full daylight. This phenomenon, discovered by Mr. Marconi in 1902, has been attributed both to an action of daylight on the sending antenna and also to a certain degree of absorption of the electric waves by the atmosphere when illuminated by sunshine. Neither of these explanations is entirely satisfactory. It was discovered by Hertz in 1887 that ultra-violet light which is present in the light from the electric spark or electric arc when falling on another spark gap facilitated the discharge so that the spark across that gap will take place at a slightly lower voltage. Subsequent investigations showed that ultra-violet light has a particularly strong discharging action when such light falls on a zinc surface negatively charged.

Certain other metals, such as potassium, sodium, and rubidium, also lose an electric charge under the influence of ordinary light. Hence it was at least a permissible hypothesis to assume that the antenna, when charged, would during daylight lose some of its charge, and hence be raised to a less voltage than during the night. Another supposition made was that the action of daylight is due to the ionizing effect of daylight on the atmosphere by which it becomes to a certain small extent conductive, and therefore absorbs some of the energy of the electric waves passing through it. The recent occurrence of a solar eclipse, which was total at or near Paris, seemed, therefore, to offer an interesting opportunity to gain some further knowledge on this subject.

Since the darkness of a solar eclipse is localized to a small area, which is the cross-section of the conical shadow of the moon at or near its apex, then if this shadow should sweep across a radiotelegraphic station it is evident it will for a few seconds put the antenna in darkness, whereas the rest of the large area over which signals can be received is in full daylight. During a recent visit to Paris I obtained from the French authorities permission to visit the Eiffel Tower radiotelegraphic station, and asked M. Ferrié, the eminent radiotelegraphist in charge of the station, what effect on the signals was produced by the eclipse. He told me that a slight increase in strength of the signals had been noted at the time of totality. This result agrees with certain observations of Dr. Eccles in England. One would need to be able to command the services of a good many prolonged total solar eclipses to make all the control experiments necessary to settle how far the effect is due to an action on the antenna itself and how far it is due to an action on the surrounding air.

We can, however, make measurements of the conductivity of the air near the earth's surface and at higher levels. Nevertheless, the results are not altogether such as enable us to definitely settle the question of the influence of ionic conductivity in the air.

It is well known that sounds are better heard when the wind blows with the direction of the sound than when against it. The true explanation of this was given many years ago by the late Sir George Stokes. When wind is blowing along the surface of the earth the wind velocity is generally less close to the earth than at higher levels. Hence, if a plane sound wave is travelling against the wind, the upper parts of the wave front travel more slowly than the lower. The wave front is therefore tilted backwards, and the direction in which the sound travels, being normal to the wave front, is tilted upwards. Hence the greater part of the sound wave passes right over the head of the observer, and he hears less sound. I have applied the same kind of reasoning to electro-magnetic waves. If we imagine a plane vertical wave advancing through the air, all parts would travel at the same speed, and the direction of the ray would be horizontal. If, however, any cause, such as ultra-violet light, ionizes the upper portion and condenses on the ions atmospheric moisture, then it is quite possible the dielectric constant of the upper region may be greater than that of the air near the surface. If this is the case, the upper part of the wave front will travel more slowly than the lower, and it will be tilted backward, and the direction of the ray or normal will be tilted upward. Hence at a distant receiving station the greater part of the wave may pass right above the receiving antenna and so weaken the signals.

Accordingly the loss of range in daylight may not be due to conductivity produced by ionization, but to increased dielectric constant in the upper atmosphere.

It has been pointed out by Sir J. J. Thomson that air exposed to ultra-violet light may be regarded as filled with minute water particles condensed on the ions. This suggests that perhaps even the blue of the sky, generally now attributed, on the authority of Tyndall and Lord Rayleigh, to dispersal from small particles, may not, at least, in part be due to such molecular groups.

Professor Zenneck states that he has not found that air filled with water cloud has a higher dielectric constant than pure air. I am at present engaged on experiments which have for their object to investigate this question more closely. If it should turn out that the action of ultra-violet light upon air containing moisture is to increase its dielectric constant by even one or two parts

* From "The Marconigraph."

in a thousand, it would provide a basis for the above hypothesis, which would enable us to explain the effect of daylight on long-distance radiotelegraphy without assuming any increase in conductivity. One of the notable peculiarities which call for explanation by any valid hypothesis is the well-known depression in the signaling-intensity curve at or about dawn. If a diagram is drawn, showing the disposition of the earth's shadow with regard to air antenna at the boundary, it will be seen that we have just the arrangement which is most favorable to such an uptilting of the transmitted waves, provided that the part of the wave front travelling in sunlit air moves more slowly than the part travelling in darkness. Before, however, we can safely theorize on this matter, we require far more extensive measurements than have yet been made of the atmospheric conductivity at various levels and times of the day, and also of the dielectric constant of air under the influence of ultra-violet light.

Some of these matters are at the present under investigation in the radiotelegraphic laboratory at University College, London.

Wireless Ship Act.

Following is the text of the act approved July 23 in reference to apparatus and operators for radio communication on steamers:

"Section 1. That from and after October 1, 1912, it shall be unlawful for any steamer of the United States or of any foreign country navigating the ocean or the Great Lakes, and licensed to carry, or carrying, fifty or more persons, including passengers or crew or both, to leave or attempt to leave any port of the United States unless such steamer shall be equipped with an efficient apparatus for radio communication, in good working order, capable of transmitting and receiving messages over a distance of at least 100 miles, day or night.

"An auxiliary power supply, independent of the vessel's main electric power plant, must be provided which will enable the sending set for at least four hours to send messages over a distance of at least 100 miles, day or night, and efficient communication between the operator in the radio room and the bridge shall be maintained at all times.

"The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators and watches shall subject him to a penalty of one hundred dollars.

"That provisions of this section shall not apply to steamers plying between ports or places less than two hundred miles apart.

"Section 2. That this act, so far as it relates to the Great Lakes, shall take effect on and after April 1, 1913, and, so far as it relates to ocean cargo steamers, shall take effect on and after July 1, 1913: Provided, That on cargo steamers, in lieu of the second operator provided for in this act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life."

Mr. Benj. S. Cable, acting secretary of the Department of Commerce and Labor, Washington, has approved the use of the Edison storage battery as a source of auxiliary power supply for radio communication on ships.

Mr. W. D. Terrell is the United States wireless ship inspector at New York.

New Edition of Jones' Diagrams.

Mr. Willis H. Jones is preparing a new edition of his book of diagrams and descriptions of telegraph apparatus and systems, and it will probably be ready in three months.

The former editions of his work were very popular and had a large sale, and the last edition has been entirely sold out. The new edition will be thoroughly up to date in all respects in its treatment, and all new apparatus, etc., adopted by the Postal Telegraph-Cable Company and the Western Union Telegraph Company will be fully covered. The new Athearn quadruplex will also be illustrated and described in Mr. Jones' inimitable way.

The new book will be of great value to telegraph engineers and students, because it will include the latest in everything telegraphic, and every progressive person in the service will, for this reason, find it necessary and indispensable.

Sending a Message by Telephone Illustrated.—An interesting illustration is published in the *Bell Telephone News*, of Philadelphia, showing the seven operations in sending telegrams by telephone. It is made up of seven separate views, showing successively (1) the sender in his office lifting the telephone from the hook and asking for the telegraph office; (2) the telephone operator connecting him with the telegraph office; (3) the telephone clerk in the telegraph office transcribing the message; (4) the Morse operator sending the message; (5) the Morse operator receiving the message on a typewriter; (6) the telegraph clerk telephoning the message to the addressee, and (7) the addressee receiving the message.

Transformers in Wireless Telegraphy.

Transformers used in wireless telegraphy may be divided into two general classes, the closed core and the open core. The names given these two classes are descriptive of the manner in which their magnetic circuits are completed.

Any transformer consists essentially of three things, first a core of iron, generally laminated, that is, built up of thin sheets of soft iron or in open core wireless transformers a core constructed of thin soft iron wire; second, a primary winding, and last, the secondary winding. The arrangement of the primary and secondary coils differs in many ways. The primary may be wound over the core, and the secondary over the primary, or the two windings may be wound upon entirely different legs of the core. When the iron core forms a complete path for the flux, the transformer is said to be a closed-core transformer, and when the iron core does not make a complete path for the flux, i.e., the lines of force are compelled to pass through the air or some other non-magnetic substance, the transformer is said to be of the open core type.

It is obvious that a transformer is a necessary part of the equipment of a wireless station as the oscillatory discharge of a condenser is occasioned by a quantity of electricity stored upon the plates of the condenser. To store up any charge of moment requires an E. M. F. which is great when compared with our ordinary 110 volt incandescent lamp circuit, as the quantity of electricity measured in coulombs is the product of the capacity of the condenser and the E. M. F. in volts applied to it. We might from the above statement conclude that a small voltage could be used with a large capacity and still accumulate a charge of sufficient moment to satisfy our demands.

Now, the current supplied by commercial light and power companies is usually 110 volts or thereabouts, and this voltage has been generally adopted as the voltage most conveniently handled. It sometimes reaches 120 volts. Also it may be either direct or alternating current. If alternating current is available, eliminating the necessity of a converter or motor-generator set, and it is at 110 volts, the sending key may be inserted in this circuit with no danger to the operator. Conductors carrying currents at this voltage do not demand as high insulation as would higher voltage currents.

To obtain alternating current of high potential is the purpose of the transformer and when used in this manner, it is called a step-up transformer. Conversely, were a low potential desired and a high potential available, the transformer could be used and for the purpose would be known as a step-down transformer. However, step-down transformers are not used in wireless transmitters.

The action of a transformer upon a wireless set may be briefly explained as follows The primary coil is connected to a source of alternating current, in the circuit of which is inserted a key and aerial switch and has impressed upon it an E. M. F. of say 110 volts. When the circuit is completed through the aerial switch and key, the alternator will supply current which sets up an alternating magnetic flux. This flux not only sets up a counter E. M. F. in the primary caused by self-induction, but on account of the expanding and contracting lines of force, sets up an E. M. F. in the secondary coil. In a well designed transformer, the counter E. M. F. set up in the primary coil is very nearly equal to the impressed E. M. F. so that with no current flowing on the secondary, very little current will flow upon the primary. As stated, one volt E. M. F. is produced when 100,000,000 lines of force are cut by a conductor in a second. If there be more than one conductor cut, naturally a higher voltage will be produced. In a step-up transformer this fact is made use of and so the secondary coil consists of a great number of turns, the E. M. F. set up on the secondary at no load being proportional to the number of turns in its coils and the primary E. M. F. That is, were 110 volts impressed upon the primary consisting of 300 turns of conductor, a secondary upon the same core as the primary but consisting of 30,000 turns of conductor would have set upon it an E. M. F. of 11,000 volts, assuming there be no magnetic leakage, the effect of the latter being to cause a decrease of secondary E. M. F. at full load. Transformers used for distributing electricity for power and lighting purposes have a small magnetic leakage, it being desired to maintain a constant E. M. F. on the secondary, whether the transformer is delivering full load or a fraction of full load.

However, a transformer for wireless purposes must be of an entirely different design than that of a commercial lighting transformer, the latter being designed to supply more and more power as the resistance of the secondary circuit decreases, that is, as the load increases. This action by a wireless transformer would result in a poor spark. The load of the wireless transformer is the condenser which charges by the secondary current and at a certain moment the high potential breaks down the resistance of the spark gap and a spark passes which lowers the resistance of the gap to a very few ohms, this resistance being practically a short circuit for the secondary. Under these conditions, an ordinary transformer would at once supply a maximum amount of current directly across the short circuited spark gap, the gap would sustain an arc similar to that of an arc lamp, and the condenser would receive a very small charge, too small in fact to produce any oscillatory discharge. In consequence, the transformer under these conditions would not be fulfilling the purpose for which we intend it. Were the transformer designed to draw a very small current when the oscillatory discharge of the condenser is beginning, no arc across the gap would take place after the oscillatory discharge has ceased, and upon the next period of charging the condenser would accumulate a quantity of electricity and thus be performing its duty in a manner as is desired and necessary for the production of oscillations. As was stated, magnetic leakage, which in reality is magnetic lines which do not cut any turns of a transformer, and so are not useful but rather a waste of energy, tends to lower the voltage of a transformer at full load. Were a transformer designed to give a higher voltage than necessary for a certain wireless transmitter and possess magnetic leakage in a high degree, when operated, this transformer's voltage at full load should fall, thus partially eliminating the probability of the transformer establishing an arc across the spark gap, which it would be very liable to do under other conditions. This would be a desired result, as the condenser would get its charge as is intended.—From "Wireless Telegraphy and Telephony," by Hoppough.

Wiring of Large Buildings for Telephone Service.

In a paper read by Mr. Frederick L. Rhodes at the recent annual convention of the American Institute of Electrical Engineers in Boston, the author described the general methods that have proved satisfactory for wiring buildings for telephone service.

In modern office buildings, hotels and apartment houses, large numbers of telephones are required, he said. It would be inconvenient and impracticable to run a pair of wires through one of these large buildings each time a telephone is installed, in order to establish connection with the outside wire plant of the telephone system. as is ordinarily done when telephones are installed in residences or small business buildings. To overcome this difficulty, when the plans are prepared for an office, hotel or apartment house, a forecast should be made of the probable future requirements of the building as a whole for telephone service, and facilities provided for a certain amount of cabling with the necessary terminals and subsidiary wiring. All large cities contain many buildings that are cabled and wired for telephone service according to a comprehensive plan. Of the smaller places, there are few that do not have some buildings of a character requiring more or less provision of this kind. The building plans should include provision for telephone wiring.

Owing to the type of building construction generally employed, and the large number of telephones to be served, unless suitable facilities are provided in advance for accommodating the cables and wires, and for running them through the walls and floors, the work will either be unsightly in spite of all precautions to the contrary, or expensive and costly alterations will be required after the completion of the building to enable the wires to be effectively concealed.

It is therefore of prime importance to owners and architects that, in preparing plans and specifications for office buildings, hotels or apartment houses, suitable arrangements should be made for such telephone wiring and terminal boxes as the character and use of the building will demand. As every large building to a certain extent presents problems of its own, advantageous and economical arrangements can frequently be suggested by those who are specially familiar with work of this kind. It is to the advantage of telephone companies as well as building owners, to have adequate facilities provided for the cables and wires. Telephone companies are glad to place their experience freely at the disposal of those who are planning the erection of buildings that require special provisions to be made. It is now the general custom for architects to send for the telephone company's experts in these matters to obtain such information as they need to plan this work in the best way.

Audible Wireless Signals.

In his testimony during the investigation into the "Titanic" disaster Signor Marconi intimated that a wireless alarm might be invented that would attract attention in case the operator were absent from his instrument.

Mr. Andrew Plecher, of Las Animas, Col., is the patentee of a wireless alarm system which he asserts is especially adapted to sea service. He states that had the "Titanic" been equipped with such a system the sleeping wireless operator on the steamer "Californian" might have been aroused and that steamer promptly dispatched to the rescue of the ill-fated vessel.

Mr. Plecher's invention calls for a column of mercury in a glass tube, with a very minute opening at the bottom immersed in a solution of potassium cyanide or other solution that may be used for the purpose. The Hertzian waves cause this column of mercury to rise and fall. Near the top of the column is a wire so adjusted that when the mercury rises it will touch the wire and complete the electrical circuit through a battery and bell back through another wire piercing the column of mercury lower down. It is the movement of this column of mercury that makes it possible to produce the connection which causes the alarm.

Mr. Plecher's patent is dated November 24, 1903.

Another Way to Mulct a Telegraph Company.—A novel suit has been brought against one of the telegraph companies. A man was arrested and lodged in jail. He then telegraphed to a relative for $36, that he might gain his freedom. The money did not reach him quick enough, so he is now suing the telegraph company for not being more expeditious. He wishes to collect $45 per minute for the time spent in jail.

Effect of the Day and Night Letter Services on the Traffic Load Line.

In his recent address before the New York Telephone Society, Mr. S. M. Williams, manager press service, Western Union Telegraph Company, New York, gave some interesting facts regarding the effect of the day and night letter business in raising the level of the traffic load line.

The newspaper and the telegraph company each has problems to meet in spreading the news of great events, he said. For the journalist it is the public's insistence for immediate information with all the details, no matter when or where news may occur. This necessitates a vast journalistic organization, always ready but often comparatively idle and unproductive.

For the telegraph company the problem now is one of traffic—a problem that has taken on new phases within the past two years. Before the advent of the night letter and the day letter, telegraph traffic load lines ran to a high peak between the hours of 10 a.m. and 3 p.m. Immediately after three o'clock there was a decided drop and during the night there was relatively little business aside from press messages passing over the wires. This condition enabled the telegraph company to handle press dispatches almost as a by-product. There were ample idle facilities; only the operating forces had to be considered.

Another phase is that up to a few years ago there was not much day press business. From three-fourths to four-fifths of all newspaper dispatches were transmitted at night for morning papers. But the afternoon paper has had a wonderful advance recently and its demands for telegraph news have greatly increased. Particularly is this the case in sporting news.

Baseball games and many other sporting events usually occur in the late afternnon. The sharp drop in commercial telegraph traffic immediately after three o'clock in former days left facilities available for long distance circuits between baseball grounds and newspaper offices throughout the country. Every sporting writer had his own direct wire which he used much or little as desired.. A practice arose of correspondents dictating their reports to the sending operator as plays occurred instead of writing them out afterwards. This necessitated circuits being held constantly in service waiting for plays to be made, with the result that for example a baseball circuit between New York and Chicago, set up for a period of three hours usually showed from 60 to 75 per cent of idle time.

Under the old methods when wires were plentiful, after three o'clock such conditions were not always burdensome. But the day letter changed the situation. The traffic load line does not drop sharply after three o'clock. Circuits cannot be held idly waiting for something to happen between 3 and 6 o'clock without causing serious delay to other business. This is one of our new traffic problems, for the telegraph company is desirous of rendering all special service possible to the press.

The night letter, too, has made a difference in traffic arrangements. It has raised to a much higher level the load line between 6 p.m. and midnight, which is the period also for most of the night press business. This has required traffic and plant chiefs to do some sharp manipulation of circuits as compared with former times when there were facilities available on every hand at night.

These conditions are really beneficial for they are tuning up the whole system to a degree of efficiency that must result in the best of service for public benefit and operating economy.

How Savages Telegraph.

The principle of telegraphy would appear to have been anticipated by the savage tribes of Africa. This barbaric system of communication, at once practical and effective, survives to this day, and its value has been tested many times.

French explorers seem to have been the first to bring this system to the knowledge of civilized people. By means of it news of important events in the interior of the Soudan reached all the trading ports on the coast in a very short time.

The communication is made by means of various instruments, the most common ones being horns, tomtoms and whistles. The horns are made of solid ivory, hollowed out of elephants' tusks. The mouthpiece is at the side. These trumpets are of various sizes, but the favorite ones are very long and give seven distinct notes produced by plugging the mouthpiece with corks of different sizes.

Among the Bengala tribe a sort of xylophone is used with four notes, by means of which the natives communicate over great distances in a kind of telegraphic language.

An American missionary working among the Basutos discovered that the villages had means of conveying messages from one chief to another or of transmitting the intelligence of defeat or victory.

The Basutos hollow out a large gourd and thoroughly dry it. Then kidskin, as hard and as thin as parchment, is stretched across the hollow of this gourd. When beaten with a padded drumstick it gives forth a sound that can be distinctly heard at a distance of from five to eight miles.

In every village there is a class of men who are utilized as scouts. Among these there are always some trained to the use of the gourd drum. The code is what might be called an African Morse alphabet and is beaten on the drum.

The sound is carried across the valleys and glens to the next village, where it is interpreted by another scout. If the message is for a distant village he reports from village to village, with very little loss of time until it reaches the person for whom it is intended.

The Development of Selective Systems.*

BY J. A. KICK.

The selective signal systems of today range from the four-party harmonic telephone subscriber's line in commercial service to the unlimited party line in railway dispatching and message service.

The limiting factor to development of a telephone system for the required mileage and number of stations has been the transmission losses due to the signaling equipment in the systems used, that is, the bells across the line which could not be made of sufficient impedance to effectually keep down the transmission losses without reducing the ringing efficiency.

On magneto lines of ten to fifteen stations there has always been more or less dissatisfaction owing to code rings, which are both confusing and annoying. Generally poor service has resulted, due to parties failing to distinguish a certain signal from the general clatter of a multiplicity of long and short rings. Commercial service made little demand for party lines of appreciable length or of a considerable number of stations, so that the problem was not until recently given the attention necessary to develop the present selective signaling systems used in train dispatching.

The circuit details and mechanical devices in connection therewith, are so very simple as to cause wonder at the tardiness of the arrival of such a clever method of direction of train movements.

Almost every old time telegrapher has invented a set of single line telegraph repeaters, and yet there are only two or three really successful mechanisms in service. So it will likely be with selective systems, a number of fairly good systems will be divised, of which two or three will lead, with perhaps one that has little more to be desired in speed and efficiency.

The first step appeared to be the securing of some means of signaling the operating mechanisms which could be so placed in the circuit as to minimize the transmission losses. This was found to be rather easy of solution by the application of a direct current for signaling impulses. A method by which the signal receiving-relay coils were in the two-line wires serially, was tried but was replaced by bridging the signal receiving relay across the line. In the series method, a low wound relay was used, while by the bridge method, a high wound relay was considered more desirable. This high wound relay proved advantageous in keeping down transmission losses by reason of offering considerable impedance to voice currents.

With the gradual increase of mileage on old and new circuits, it became apparent that the ordinary transmission circuit was not efficient enough to prevent troublesome interruptions to service, due to too many instruments across the line at one time, thereby seriously cutting down transmission and especially between the terminal stations. Two serious faults were found in the circuit, both of which contributed to the transmission losses. One was insufficient impedance in the direct-current signaling bridge. The other was a transmission circuit of too little volume outgoing and of not sufficient effective ohmic resistance to prevent several of these receiving circuits offering what was comparatively a low resistance short path across the line. These faults so reduced the transmission from terminal to terminal as to indicate that improvements were absolutely necessary to success.

Special impedance coils were designed for the service. When of sufficient value they were found to increase the transmission as well as to improve the generator ringing which was used to signal the master station. But the most serious trouble was not yet overcome and attention was then turned to the transmission system, with the result that several methods were devised, either of which was an improvement.

The result of the improvement to the transmission system is to provide such volume and quality of transmission as to entirely remove the wire mileage and limited station number factors, leaving only the factor of the capacity of the dispatcher and the message operator.

It has been said by a so-called authority on such systems, that the impedance coils in the selector bridge are unnecessary and while this is an opinion allowable to any one who chooses to express it, yet it does not quite agree with good practice, i. e., to prevent all losses and attempt to secure the best results obtainable. There is no denying that the presence of extra impedance coils in the selective bridges will somewhat reduce the speed of any of the present high speed systems of selective signaling, but the reduction in speed is scarcely appreciable, while the improvement in transmission is quite noticeable.

Of course it is known that some argue that this and that is good enough, at the same time admitting the possibility of improvement. This basis they apply to train dispatching circuits for transmission, while they do not allow a good healthy margin for unfavorable conditions under which a dispatcher must at times work or abandon the circuit. The circuit with the greatest operating margin, both from a transmission and signaling standpoint, is the best for train direction and to the end that it be made such, no avoidable losses should be allowed.

Every argument for and against methods of operation, classes of equipment and standards of efficiency, certainly had some reason for its presentment. One side may be taken by theory, the other by practice; still another may be one side operative and the other constructive. Then again there might be a commercial side of vital importance.

* From "Telephony."

The transmission on any given dispatcher's circuit can be first class or just passable; and so it can be with the selective system, all depending upon the equipment used. One railway line of forty-five miles is now and has been dispatched by telephone for twenty-five years. During all this time a grounded telephone circuit has been used and considered satisfactory, indicating that the quality of the circuit often depends upon the requirements of the user.

Our present day selective systems are the result of the indefatigable work of the inventive minds of a large number of theoretical and practical men. They turned a deaf ear to the chronic pessimist who can never see any good in anything new, especially when its adoption means a direct departure from the "old way." Some systems which theorized beautifully, proved miserable failures in practice. While in these particular cases, the desired ends were not secured, an entire loss was not experienced, as the failures proved what a successful system should not be, if nothing else. Some systems while proving failures as a whole, demonstrated the efficiency and general reliability of some one or more parts of the system and furnished the nucleus for assembling a second system along the line of advancement.

The inventive and construction work in connection with the selective system has not been nearly so trying as has been the discouraging necessity of convincing the user that a great advancement has been made in the methods of handling dispatching and message work. This too in view of the fact that a large number of practical demonstrations have been at hand.

There are several selectors now on the market using central energy current for operation and ringing. Two or three use local battery for stepping up the mechanisms and for ringing. The main battery of the latter system is only required to close a light armature relay in the local circuit and can therefore be very small in comparison with that of the central energy systems.

For proper operation of the central energy systems, at least, six milliamperes must be furnished per selector and effectively distributed, and the usual specifications call for ten milliamperes per selector to provide sufficient margin for battery deterioration and line losses.

As the main line relay is operable down to somewhat under one milliampere, it can be readily seen that the circuit with four mills normal operating current has a wider margin on the low side than the one with ten mills normal and six mills the lowest current allowable. In addition to this is the undeniable fact that the required current for forty stations at ten milliamperes per station, or four hundred mills at three hundred and eighty-five volts, would more readily break down insulation than forty by four or one hundred and sixty milliamperes at two hundred and twenty-five volts. With the selective bridge of the same retardation in both cases the reduction of current possible by using the relay selector would increase the speed of operation, unless it was preferred to add a retardation coil in the selector bridge to secure the maximum transmission and generator ringing efficiency.

While the retardation coil in the selector bridge effectually excludes all voice and generator currents and gives maximum efficiency in the talking circuit, there is present in the selective circuit, the coil discharge interval which causes the relay to slightly lag. The speed is therefore no greater, in fact it is slightly less than the central energy system without the coil and very appreciably lower than the relay type minus the coil. With such a material reduction of main battery, it is quite possible to reduce the number of coils and condensers formerly used at the dispatcher's station. This reduces the coil discharge impulses audible to the dispatcher, as it follows, that for a given capacity, the amount of damping equipment should decrease in some ratio as the decrease of the voltage.

There are a number of points on which authorities do not agree, both in regard to transmission and signaling, but there is little chance for an agreement, as the standards for both are set by the user. As there is a wide difference between the adopted standards, there is little common ground.

Dictating Letters by Telephone.—In a large New York dry goods house letters are dictated by telephone to the stenographers, who are located together in a room especially arranged for the service. The New York Telephone Company designed a special table provided with five typewriting positions on each side, and in the space extending down the center of the table and in front of each stenographer's position an annunciating drop and spring "jack" are installed. Each of the ten typewriting positions is equipped with a breast transmitter and a head receiver terminating in a "plug," the same as are used by telephone exchange operators. This leaves the hands of the stenographers free either to take notes or to write direct on the machines as though the persons dictating were sitting beside them. It is only necessary for any one wishing to dictate to lift his telephone receiver, say "Stenographer, please," and be connected with one of the ten stenographers who is least engaged. Often the work is completed in less time than it heretofore took the stenographer to reach the point where the dictation was to be given.

Mr. A. J. Coppin, of the Western Union Telegraph Company at St. John, N. B., Canada, well known in cable stations in Nova Scotia, writes: "I have to thank you for renewing for another year my subscription to TELEGRAPH AND TELEPHONE AGE, a journal that increases in interest and value as the years roll on."

Composite Systems.*

The telephone within recent years has become extremely useful and important in railway work, as an adjunct to the telegraph in relieving overloaded telegraph lines. The enforcement of more rapid and frequent train service has compelled many railway companies to provide more adequate means of communication between the old stations, and to bring in touch with these stations, new ones in which there are no attendants. To accomplish this, requires either an enlargement of the existing telegraph system, the installation of a separate telephone system, or the equipment of the existing telegraph lines with telephonic apparatus—in other words, installing a composite telephone and telegraph system.

Of these three methods for increasing the communicating facilities of a railway installation, the composite system possesses marked advantages in first cost, operating cost and maintenance. Its installation requires no additional line construction, its operation necessitates no increase in the operating staff, and the absence of outside construction simplifies the maintenance problem. Communication by telephone is, moreover, quicker than by telegraph, and the signaling of the distant party more effectual.

The railway composite telephone and telegraph system has been devised for the purpose of enabling telephone and telegraph messages to be transmitted simultaneously over grounded telegraph lines. It is adapted to simple Morse circuits where interruptions in the telegraphic current are of comparatively low frequency, and where the change in potential of the current due to the operation of the telegraphic apparatus is not excessive. Except under favorable conditions, it is not suitable for use on duplex or quadruplex lines, or where machine sending is employed.

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 telephonic apparatus between the line and ground. A condenser in each telephone set prevents the telegraphic current from passing through the apparatus to ground.

Telephone signaling is accomplished by pressing a button which places high frequency current on the line by means of an interrupter and induction coil. This current at the signaled station passes through a condenser and howler to ground, causing the howler to produce a sufficiently loud sound to be readily heard in the station. Regular local battery is used for the talking circuits and a condenser is joined in series with the receiver, which itself is shunted by a retardation coil.

Telegraph Stations.—Each telegraph station on the composited portion of the line is provided with a one-microfarad condenser and a coil having a non-inductive resistance of 1,200 ohms. The former is bridged across the telegraph station apparatus outside of the peg switch, thus providing a by-path for the telephonic talking and signaling currents, which otherwise would be seriously reduced by the impedance of the relays and interrupted by the operation of the keys. The latter, a coil of high non-inductive resistance, is bridged across the telegraph relay so that when telephonic signaling current is applied to the line, any of this current flowing around the condenser will pass through the resistance and so prevent a chattering of the relay.

Telephone Stations.—At each terminal telephone station is located a telephone set, a protector, a combined retardation coil of fifty ohms resistance, and a one-microfarad condenser designed to stand a potential of 1,000 volts. The retardation coil is joined in series with the line, and the condenser is bridged to ground from that portion of the telegraph line which is not composited. The retardation coil prevents the telephonic currents from passing to ground over the telegraph line beyond the telephone station, but does not impede the telegraphic currents, because these are of much lower frequency than those generated by the telephones. This coil and condenser combined prevent the impulses of the telegraphic current from producing annoying disturbances in the telephonic instruments. The condenser also aids in the dissipation of any disturbing currents that may reach the telegraph lines from inductive or other causes.

Each intermediate telephone station requires a telephone set, and a protector. Batteries are installed in all the telephone stations for providing signaling and talking current.

Protection of the Apparatus.—The protective devices installed at each telephone station, not only protect the telephonic apparatus from lightning and abnormal currents, but owing to the fuses, prevent a permanent ground at the cut-outs from interfering with the telegraph service. The protector should be connected in circuit with the fuses next to the line. At intermediate telephone stations, only one side of the protector is used, as there is only one wire connecting the telephone to the line. The protector has copper blocks instead of the carbon usually used.

Limitations of the Composite System.—The length of telegraph line and the number of stations with which this composite system can be

* From "Telephonology."

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.

In arranging a line for composite service, it must be remembered that iron wire is much inferior to copper wire of the same size when used for telephonic transmission, and also that conductors in cable are much less efficient than open wires. Furthermore, paper insulated wires in cables are much more efficient than wires of the same size in rubber insulated cables, on account of the high electrostatic capacity of the latter.

Owing to the many different conditions governing the use of railway composite apparatus, and the variation in these conditions for each particular line, it is impossible to give inflexible rules applicable to every case regarding the length of line over which service can be successfully obtained, or regarding the number of stations which can be successfully operated on a single line. Each particular telegraph line must be considered separately before a definite statement can be made regarding its adaptability for telephone service.

As a general indication of the possibilities of the system, however, it may be stated that successful operation should be practicable over ordinary telegraph lines up to 100 miles in length, and with as many as five intermediate telegraph stations.

The portable set is entirely self contained, the necessary dry cells being inside the case, together with all the talking and signaling apparatus. The box is of substantial hardwood construction, with metal corners, and is divided in two parts by a partition, the dry cells, retardation coil, induction coil, hand-switch springs, key springs and condensers being located in the rear, while the transmitter, receiver, howler, interrupter, hand switch lever, signaling key-button and rail clamp are in front. Access to the apparatus in the rear is obtained by taking out the screws in the back of the case, and removing the back board.

A line pole is also a part of this portable equipment. It consists of three six-foot sections, so arranged that either two or three sections may be used. A 104-foot insulated flexible wire cord is furnished with this pole, soldered to the metal joint on the butt section. The joints on the other two sections have permanent wire connections, from one end to the other, the wire on the end section connecting with a metal hook so that when the pole is jointed together and the hook hung on a bare telegraph wire, the circuit between the line and telephone set is completed. The connection between the set and ground is by means of a rail clamp, made adjustable so as to fit flanges of different sized rails, and connected to the set by a flexible wire cord.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

Is it possible to use modern testing sets as potentiometers? Explain how it can be done.

How may voltmeters be checked by the potentiometer?

In charging a condenser is the charge accumulated instantly?

What is the effect of increasing the battery in charging a condenser?

How is the capacity of a condenser measured?

Does a condenser store up electricity?

What is the character of a condenser discharge—is the charge dissipated at once?

Does a direct-current pass through a condenser?

Are the effects of an alternating-current arrested by a condenser?

Can a vibrating bell be rung by a direct current through a condenser?

If the current is alternating, what is the effect on the bell?

Does the alternating-current actually pass through the condenser?

Why does the effect of an alternating-current take place through a condenser?

Study the formula for measuring capacity.

How can a condenser be tested for insulation?

If a deflection is shown on the galvanometer after a condenser has been charged, what does it indicate?

Upon what does the length of time a condenser will retain its charge depend on?

What is the inductive capacity of air? of mica?

In cable testing what is the practical effect of shunting a resistance around the condenser?

What is the purpose of the three main tests of a cable?

Between what parts of the circuit are tests made for insulation?

What connections are made when a multiple-core cable is being tested for insulation?

When the insulation of a lead sheathed or armored cable is being tested what are the connections?

How should the ends of cable cores be prepared for attachment to the circuit?

Why is it important to exclude dampness on the insulating material?

(To be continued.)

Methods of Testing Dry Cells.*

The methods of testing in the first place must be of benefit to those interested in dry cells. The users may be divided into three classes: the average ultimate consumer, the large user, and the manufacturer.

No standard methods of testing can be devised, which will be suitable at once for all of these classes, and the most serious obstacles are encountered in formulating methods suitable to the first class.

The large users of dry cells, such as telephone exchanges, engine manufacturers, installers of alarm and signal devices, railroads, etc., who purchase cells in large quantities, are especially interested in testing methods. Various methods of testing have been evolved by these users as a basis for purchase specifications and as a means of judging the relative merits of the various makes of cells on the market.

Of even greater importance is the testing of dry cells by the manufacturer, who must necessarily adopt methods which will give him the necessary information concerning his product, no matter how elaborate.

The methods of testing which the committee is recommending are those that are particularly suited to the second class—the large users. These tests, if extensively adopted, will be of indirect benefit to the small consumer, and will be of mutual advantage to the large users and manufacturers.

It has been suggested to this committee that the methods for testing should include, aside from electrical measurement, methods of physical and chemical analysis, such that judgment may be made thereby of the merits of a cell, and that what constitutes a satisfactory product should be described in these terms so that they might form a basis of specification. There is a striking similarity between the various cells on the market as far as materials used and general structure are concerned. Exceedingly slight variations, however, which introduce large variations in the quality of the product, are not capable of detection by physical and chemical examination. What is of even greater importance in determining the quality are the methods of assembling, such as methods of mixing, grading as to size, of the particles which constitute the cell mixture, and methods of tamping, factors which cannot be easily determined by physical or chemical inspection of the resultant product.

The dry cell, in all of its multitudinous uses, is merely a source of electrical energy, and its ability to deliver this energy, in the quantity and at the times desired, constitutes the principal measure of value.

Dry cell tests may be conveniently divided into three main groups.

1. Tests to determine whether or not a cell is in good condition before being placed in service.
2. Tests to determine the actual or comparative service capacity of cells.
3. Tests to determine the rate of deterioration of cells on open circuit.

The electromotive force, short-circuit current and internal resistance tests are used, to determine the condition of a cell before use.

Electromotive Force.—The E. M. F. of a a cell may be read by connecting a voltmeter directly across the terminals. In new cells of various types the E. M. F. may vary from 1.5 to 1.6 volts. If a cell of the type now in general use gives an E. M. F. less than 1.45 volts, it is an almost certain indication either of serious deterioration due to age, or of the external short-circuiting of the cell, or of some defect such as an internal short-circuit, which will soon render the cell unfit for service.

It is seldom necessary to measure the open-circuit voltage of cells, since they are seldom deficient in this respect. It is a test which may be considered as secondary in nature, and should be applied when it is suspected that the cells are below standard; for example, when cells are received with wet packets, when the terminals are corroded, when the electrolyte leaks from under the seal, or when the cells are abnormally low in short-circuit current.

An accurate or carefully calibrated voltmeter should be used, the resistance of which is sufficiently high to render the current flow through it inappreciable. A two-scale Weston instrument of 300 ohms resistance with three-volt maximum deflection and 1,500 ohms with fifteen volts maximum deflection has been found very satisfactory for both cells and batteries. Cheap pocket instruments are often so inaccurate as to make their indications of open-circuit voltage worse than useless. The effect of temperature on electromotive force is very slight.

Short-Circuit Current.—The short-circuit current of a cell may be obtained by connecting an ammeter directly across the terminals of the cell. The short-circuit current of a cell is of value only when coupled with a familiarity with the brand of cell in question. If the reading is normal for that brand of cell, it is reasonably certain that the particular cell is in good condition, and that it will probably give as good service as others of the same make. This applies only to cells of the same brand and make. That the short-circuit current of a cell of a new and unfamiliar brand is as high as that of another brand is no indication whatever of the equality of the service capacities of the two cells.

The short-circuit current bears no relationship to service, and when measured without reference to temperature or other conditions may be entirely meaningless and misleading.

The ammeter for reading short-circuit current should be deadbeat, and with its leads should

* Abstract of a committee report to the American Electro-Chemical Society.

have a resistance of 0.01 ohm, to within 0.002 ohm. Two thirty-inch lengths of No. 12 lamp cord make very convenient leads. The maximum swing of the needle should be taken as the short-circuit current of the cell. The ammeter should be connected across the brass terminals of the electrodes. Low readings are likely to be obtained if the ammeter is applied to the carbon electrode directly. In order to avoid high contact resistance, the terminals of the cells and of the ammeter leads should be brightened.

It has been found very convenient to fit the ammeter leads with small terminals of lead. The contact on the cell terminals is greatly improved, and with such leads it is unnecessary to brighten the contacts. For accurate measurement of the short-circuit current of a new cell, instruments of the pocket type should be avoided.

The effect of temperature on the short-circuit current is quite pronounced. The amperage of cells is raised about one ampere for each ten degrees centigrade rise in temperature. This value varies considerably with different cells, and is somewhat greater at the lower temperature and less at the higher. At very low temperatures the effect is very pronounced, and it is often noted that cells received in extremely cold weather read but one or two amperes. On bringing them to room temperature, however, the short-circuit becomes normal and the cell is not impaired by the freezing.

Internal Resistance.—This value is usually determined by applying the formula

$$R = (V - V')/C$$

where V is the open-circuit voltage of the cell, V' the closed-circuit voltage, and C the current to which the cell is subjected in order to make the determination. The value obtained varies with the current flowing, the age of the cell, and the temperature.

For these reasons we advise against the use of this test. It indicates nothing in regard to the service capacity, nor does it give an exact value of the actual internal resistance of the cell.

Service Capacity Tests.

In general there are but two reasons for desiring a service test upon dry cells: First, to ascertain what life may be obtained from a brand of cells in a certain service; second, to ascertain which one of several brands will give the longest life in that particular service.

With the former object in view, the knowledge is best obtained by actual use of the cells in connection with the appliance. In some cases this is one only feasible way in which the definite information sought can be obtained. The great majority of tests are carried on, however, with the second object in view.

Where the amount of testing is large, it is impossible, even were it expedient, to use the actual appliances for testing cells, and it becomes necessary to devise special testing methods and apparatus such that results obtained therefrom shall be comparable to the results obtained from the cells when placed in actual service.

It has been suggested that cells of various makes be tested by connecting them in series and discharging them simultaneously through any suitable resistance, thereby assuring that the cells are discharged at the same rate and under identical conditions. There are several objections to this method and we therefore advise against the testing of cells in this manner.

In interpreting the results obtained from a test of various grades of cells, we wish to caution against drawing definite conclusions from the outcome of a single test or of a small number of tests. When the matter of choosing a brand is of much importance, it is necessary to run a series of tests over a period of six months or a year. In this way a very good idea may be obtained of the average service results which may be expected.

Telephone Service.—Discharge three cells, connected in series, through twenty ohms resistance for a period of two minutes, each hour, during twenty-four hours per day and seven days per week, until the closed-circuit voltage of the battery at the end of a period of contact falls to 2.8 volts.

The following readings are taken:

1. Initial open-circuit voltage of the battery.
2. Initial closed-circuit voltage of the battery.
3. Closed-circuit voltage at the end of the first discharge period.
4. Closed-circuit voltage at the end of a discharge period after three days, and weekly thereafter.

Report the results as the number of days during which the closed-circuit voltage remains above the limiting value of 2.8 volts.

Ignition Service.—Discharge six cells connected in series through sixteen ohms resistance for two periods of one hour each per day, seven days per week. The periods should be eleven hours apart, but in cases where the circuits are not automatically controlled, the first and the last hour in the working day may be chosen for the discharge periods and the discharge omitted on Sunday, without materially affecting the results.

The following readings are taken:

1. The initial open-circuit voltage and short-circuit current of the battery.
2. The initial closed-circuit or working voltage, and the initial impulse of current which the battery is capable of forcing through a 0.5-ohm coil connected in series with an ammeter, and in parallel with the 16-ohm coil.
3. Closed-circuit voltage and impulse current through the 0.5-ohm coil at the end of the first period of closure, at the end of the sixth period, at the end of the twelfth period and after every twelfth period thereafter.

(*To be continued.*)


MAN at last has conquered the Elements.
KERITE
CONQUERED THEM
50 YEARS AGO
AERIAL - UNDERGROUND - SUBMARINE
KERITE INSULATED WIRE & CABLE COMPANY
General Offices, 30 Church Street, New York
Western Office, Peoples Gas Building, Chicago
Lillibridge

The Railroad.

Mr. John M. Bell, formerly manager of the Postal Telegraph-Cable Company at Tacoma, Wash., has accepted the managership of the Continental Telegraph Company in the same city. The Continental Company is a commercial system owned and operated by the Chicago, Milwaukee and St. Paul Railroad Company and is being rapidly extended.

Eastern Railway Telegraph Superintendents.—The Eastern Division of the Association of Railway Telegraph Superintendents will probably hold its next meeting in November. The date and place of the meeting are to be selected later. Mr. Charles Selden, general inspector of transportation and superintendent of telegraph, Baltimore and Ohio Railroad, Baltimore, Md., is the chairman. Mr. E. A. Chenery, superintendent of telegraph, Missouri Pacific Railway, St. Louis, Mo., and chairman of the Western Division of the Association, states that no definite date has been set for the next meeting of that division.

Telephone Train Dispatching.—The *Daily City Item*, of Allentown, Pa., on July 27 printed an interesting article on the use of the telephone in train dispatching, and makes special reference to the service on the Lehigh Valley Railroad. The advantages of the use of portable telephones on trains are pointed out, and instances are cited where their use has effected the saving of much time. The article knits together all the facts which have appeared from time to time in these columns concerning this and other roads.

Industrial.

The Calculagraph Company, 9 Maiden Lane, New York, has just issued a pamphlet describing and illustrating the Calculagraph as used in cost-recording in manufacturing industries, and in telephone exchanges and other businesses where it is necessary to record elapsed time. The pamphlet is an interesting study in time calculation.

Advertising Efficiency.—Perhaps our readers can offer some practical suggestions as to how advertising in the columns of TELEGRAPH AND TELEPHONE AGE can be made more remunerative to the companies and individuals paying the bills. Our journal goes to the telegraph and telephone departments of all foreign governments, and practically all railroad and commercial telegraph and cable officials in the United States, Canada and Mexico. Goods advertised in our columns bring many orders from these interests, but, as the requisitions generally go through the supply departments of the companies concerned, our journal does not, because of this, get all the credit for efficiency as an advertising medium to which it is entitled. How best to meet the situation is a problem, and if any of our readers have any practical ideas on the subject we would like to hear from them.

Western Electric's July Business.—Business of the Western Electric Company for July was three per cent greater than for the corresponding month last year. For the seven months ended July 31, business was at the rate of over $67,000,000. In some portions of Western Electric's business, especially in lighting and general supply products, last month was the largest July in the history of the company. Not only was the volume of orders larger, but prices were better than a year ago, and this condition is expected to continue. Foreign business of the company is also good, and shows even a more satisfactory increase than that in the United States itself. The number of employes of the Western Electric Company at the end of July was about 27,000, or almost 4,000 more than at the beginning of the year.

Municipal Electricians.

Convention of Municipal Electricians.—The annual convention of the International Association of Municipal Electricians was held at Peoria, Ill., August 26-30, and a large attendance is reported. Several papers of special interest to the members were read and discussed, and the entertainment programme was an interesting one. The meeting was a highly successful one in every respect. We expect to have a full report of the proceedings in our issue for September 16.

Cross-checking Telegraph Messages. — The Public Service Commission, Second District, New York, has inaugurated a system of cross-checking telegraph messages with a view to ascertaining fair representation of the service rendered. An outline of the method used was sent to both the Postal Telegraph-Cable Company and the Western Union Telegraph Company for their comments on the same. Both companies replied that the method was excellent and that they would appreciate any records which the Commission makes in their cross-checking, and asks the cooperation of the inspectors in reporting any violation of rules which may come under their observation at any office.

Improving Italian Telegraph and Cable Service.—The bill for the improvement of the telegraph service in Italy contemplates the erection of seven new copper and five new iron inland lines and the laying of two submarine cables. A cable will be laid between Naples and Palermo, and another between Sicily and Calabria.

Mr. F. C. Hackett, formerly identified with the telegraphs as manager at Detroit, Mich., Toledo, Ohio, and Pittsburgh, Pa., now general manager of the Toledo Warehouse Company, Toledo, writes: "I am enclosing my check for another year's subscription to TELEGRAPH AND TELEPHONE AGE, to the coming of which I look forward twice a month. You certainly keep abreast of the times, and it gives me much pleasure to read your valuable paper."

The Reid Memorial.

The esteem and admiration in which the late James D. Reid was held by the telegraph fraternity is revealed in letters received commending the movement to establish a more suitable memorial in the Rochester, N. Y., cemetery in the place of the present plain stone over Mr. Reid's grave.

In a letter to Mr. David Homer Bates, Mr. Edward L. Morse, son of professor S. F. B. Morse, writes: "I have received one of the circulars of the James D. Reid Memorial Association, and I am, naturally, very much interested. Mr. Reid was not only a dear and loyal friend of my father's, but of all of us, and he often visited us at our old home in Poughkeepsie and in New York. Nothing would give me greater pleasure than to subscribe liberally to the fund. * * * I wish you and the others to know how heartily I approve of the movement to do fitting honor to the memory of James D. Reid."

Mr. J. F. Moore, of Fairbury, Neb., writes: "Every person connected with the telegraph should consider it an honor to contribute to this worthy object."

"Although out of the business for many years," writes Mr. B. F. Coan, of Cincinnati, Ohio, "I still hold among my most cherished memories my long years' service in the profession, and particularly my association with many of its most eminent members, among whom was Mr. Reid, whose personal acquaintance and friendship I enjoyed, and under whom I served as an operator on the New York, Albany and Buffalo telegraph line about the year 1856. The proposition to honor Mr. Reid's memory, and his services to the telegraph business and profession, is a most commendable one, and I heartily wish it the fullest success."

Evelyna Halsey of Brooklyn, N. Y., in a letter to Col. A. B. Chandler, treasurer of the fund, says: "It gives me great pleasure to know a memorial to James D. Reid has been proposed. I give it my hearty good wishes for great success. He was my best friend. After his day in the office, though greatly fatigued, he would always reply when I asked him if he was tired: 'Greatly fatigued, child! Nevertheless he came to my home, and taught me telegraphy. He was a grand, noble man."

Mr. Arthur K. Ingraham, of Boston, Mass., one of the charter members of the Telegraphers' Mutual Benefit Association, and the first receiver in the cable department at No. 145 Broadway, New York, writes: "Enclosed please find a small check to add to the fund for the Reid memorial. I remember Mr. Reid and his kindly way to all his associates. With love and respect to his memory, yours, etc."

Mr. C. W. Thayer, of Stockton, Cal., says: "It is my regret that I had not the pleasure of Mr. Reid's personal acquaintance, but I am sure the memory of his kind acts will live in the minds and hearts of the telegraph fraternity. His face certainly was an index to his character. 'The noblest contribution which any man can make for the benefit of posterity is that of a good character.'"

Telephone Pioneers of America.

EDWARD B. FIELD.

The subject of this sketch, Mr. Edward Bell Field, president of the Mountain States Telephone Company, with headquarters at Denver, Col., is one of the telephone pioneers of the West, and has grown up with the business, or rather, the business has grown up with him. He entered the service in January, 1880, when the telephone was still in its infancy, but, like a few other progressive spirits, he saw in the new invention large possibilities and took up the new business as his life's work. He began as an operator and rapidly advanced through the higher positions as his telephone knowledge and experience expanded. He occupied successively the positions of manager of operating departments, general superintendent, general manager, vice-president and general manager, finally reaching the highest post, that of president.

E. B. FIELD (1880),
President Mountain States Telephone Company, Denver, Col.

The success of the company under Mr. Field's management is the best evidence of his ability to conduct the affairs of so large and important a business interest as is the Mountain States Company.

Mr. Field is a native of Chelsea, Mass., where he was born in 1850.

It is just as easy to be careful as to be careless. Little extra attentions cost nothing and gain everything.

Obituary.

H. V. Johnson, aged 26 years, district contractor for the Pacific Telephone and Telegraph Company, San Francisco, Cal., was killed in an automobile accident at Vallejo, Cal., on July 31.

Frank D. Slaughter, aged 26, formerly manager of the West Nashville, Tenn., Western Union Telegraph office, died at Atlanta, Ga., July 17, from the effects of an operation.

C. F. Burlingame, an operator of the Western Union Telegraph Company, Washington, D. C., died in that city August 8. It is stated that he suffered a nervous collapse while on duty at Baltimore during the Democratic convention there.

C. C. Wilson, promoter and president of the defunct United Wireless Telegraph Company, died suddenly in the Federal penitentiary at Atlanta, Ga., August 25, where he was serving a term of three years for using the United States mails to defraud, in connection with the sale of stock of that company.

Frank J. Mulcahy, aged 53 years, vice-president and manager of the Crane Valve Company, Bridgeport, Conn., died in that city August 19, after an operation for appendicitis. Mr. Mulcahy, who was formerly a prominent telegrapher in the West, entered the service of the Crane Company, in Chicago, seventeen years ago, and took charge of the Bridgeport plant in 1905. He was born in Ohio.

A New System of Telegraph.

A local telegraph and signaling system has recently been developed which will double the efficiency of the telegraph for train dispatching, or for commercial purposes, where time is lost in calling offices.

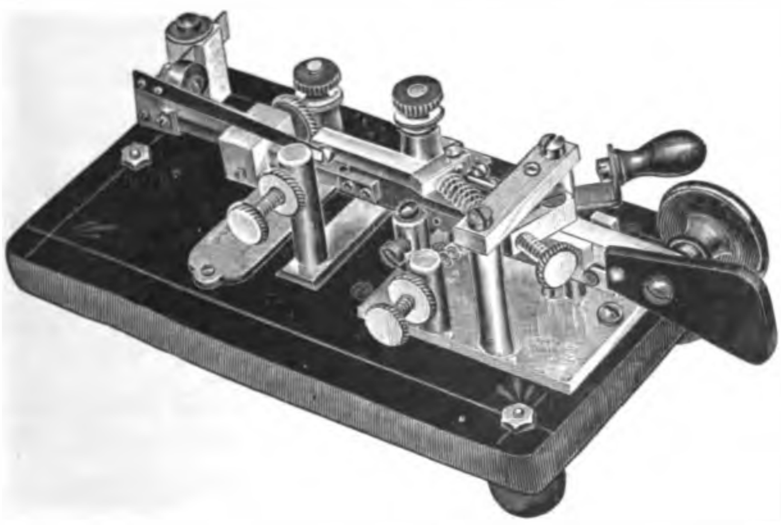
The signaling feature is such that the line can instantly be converted into a non-interruptible selective signaling circuit by the pressure of a button; is inoperative to the Morse impulses; free from interference by the operators, and provides a good, clear answer-back. It also provides a means to prevent the circuits being left open at the keys.

With the exception of the selective apparatus, only the standard telegraph apparatus is used and consequently it is very simple and stated to be reliable as well as inexpensive. Selectors may be operated at a speed not obtainable on circuits where retardation and impedance coils are used. The system may be installed, one station at a time, increasing it as is desired.

The entire cost of installing this system on a line is stated to be less than one year's interest on the bonds necessary to cover the expense of the installation of a telephone system for dispatching over the same distance—and is a system which, when telephones are used, will permit the use of a telephone of any make which feature should meet the approval of the railway companies. The system is especially adaptable to short lines of railway on which the telegraphers are employed in other capacities. It is the invention of Mr. J. A. Hulit, 1421 West Adams Street, Chicago, Ill.

Wireless Telegraph Books.

Wireless Telegraphy and Telephony, by C. I. Hoppough, price $1.50; A B C of Wireless Telegraphy, by Trevert, price $1.00; Operators' Wireless Telegraph and Telephone Hand Book, by V. H. Laughter, price $1.50; Wireless Operators' Pocket Book of Information and Diagrams, by L. W. Bishop, price $1.50; Wireless Telegraph Stations of the World, published by the United States Navy Department, price 35 cents. For sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.



Development in the Telephone and Telegraph Business.

BY P. KERR HIGGINS, SAN ANTONIO, TEX.

It is assumed that all employes are ambitious, anxious to please and trying to make a success of their position as such. As a co-worker for several years with telephone managers all over the United States, I have noted that many were weak on the important duty of developing the city, town or territory assigned them. They failed to appreciate the importance of the confidence the telephone company was placing in them, by appointing them to care for an investment of many thousands of dollars, and so, while they kept the plant running and made fair reports, they completely lost sight of the fact that in order to avoid competition and keep the public pleased the plant must be kept growing.

Anyone can keep a plant going, but it takes initiative to improve and develop the situation so that the interests of the company may be fully and properly cared for. The object, therefore, of this article is an attempt to interest managers in developing their plants, by bringing to their attention some of the essential elements necessary in carrying on development work. Some of the important features are:

1. Hold the business you have by efficient service, personal attention and making every effort possible to serve the patrons.

2. Develop new business, wherever plant facilities are available, soliciting subscribers at every possible opportunity.

3. Keep the commercial department posted as to the requirements of territory when, for any reason, plant is not available, and keep after them until you are told to stop.

4. Organize and utilize every employe of your exchange or district in the collection of information in regard to prospective telephone users.

5. Solicit from your present patrons the names and address of people with whom they would like to have telephone connections.

6. Advertise, under direction of your department or general manager, both your local and long distance service.

7. Personally test and supervise the service to see that the service given is what your patrons have a right to expect.

THE MANAGER.

In order to successfully carry out the plan outlined, it is necessary that managers develop in themselves "salesmanship" ability. The ability to sell anything is a study as important and difficult as any other study. It is based upon the fundamental study of human nature, and no one is competent as a manager who does not study human nature. We have then four essential factors in successful development; first, the manager; second, the patron; third, the thing sold, and fourth, the sale. It is possible then to arrange and classify successful telephone salesmanship under these four heads.

First, we have the manager. Who are the successful managers? Is it not the developer? As a matter of fact, all life, commercially, is absolutely dependent upon salesmanship; the ability to market what we have to sell, be it goods, goodwill or services. The employe in any position is a salesman, selling his services, and his ability as such is dependent upon the quantity and quality of the service he has to market. If he "delivers the goods" he is a success and is a failure if he does not. The expert is usually a past master in salesmanship; knows how to place his services to the best advantage; studies his employers and passes on up the ladder of advancement. The attorney and the physician cannot (without a breach of the ethics of their profession) advertise, but the successful ones are those who develop and build up a business through their clients. Another feature worthy of attention is that corporations, firms and individuals in business are all salesmen, selling their goods, in various ways, at a profit. Salesmanship is, therefore, not the mere selling of goods, but selling them at a profit. When the balance is struck, it must be on the right side, and the item of profit depends very largely on how well our managers perform their duty. This means that the managers must care for the company's interest to the extent of knowing that each and every one is faithfully and loyally carrying out the instructions of the company. The successful manager must possess the power of persuasion, and persuasion properly and fully analyzed is excellence of service and courteous treatment. The patron who receives excellent service will hesitate to order his telephone out, and the satisfied patron is your very best advertisement. Therefore, as a means to an end, great care should be taken in writing letters; the word combinations should be carefully studied; letters carefully constructed and neatly typewritten, and the greatest possible care taken with the punctuation, spelling, paragraphing, etc.—all are important features in successful development. Sometimes a letter is the best kind of a salesman, and should receive the very best attention. The method and means of collection, be it a letter or an individual, will undo in a few moments the work of months. The messenger boy, the janitor, the clerk, the bookkeeper, the troubleman, the operators—in fact, every one who comes in contact with the patron—are your partners in the development of your exchange, and your success is dependent upon the manner in which they approach or come in contact with the patrons.

Full and complete success can only be attained by the local force acting as a unit, working for the interests of the management of the company as a whole; co-operation is therefore absolutely essential to success as a manager.

(To be Continued)

Burglars in a Telegraph Office.—A newspaper reports several burglaries in a small town, and states that the work was evidently done by strangers, inasmuch as one of the places robbed was a telegraph office.

Telegraphy in Turkey.—The Turkish government has decided to build a second telegraph line between Constantinople and Smyrna. Faik Bey is inspector-general of Turkish posts and telegraphs.

Mr. Harry Morlan, manager of the Postal Telegraph-Cable Company, Salt Lake City, Utah, writes: "I thank you for taking care of the renewal, as I feel that I cannot afford to lose a single number of your publication."

Big Business and Its Regulators.

Under the caption "Big Business and Its Regulators," *Harper's Weekly* comments favorably on a recent interview with Mr. Theo. N. Vail, president of the Western Union Telegraph Company and the American Telephone and Telegraph Company, which was published in the New York *World* August 11.

"Of all the great corporation heads," says that paper, "there is not one who has a better right to speak for 'big business' than President Vail; for there is not one who has recognized more candidly the public's interest in 'big business' and the public's rights concerning it. This journal has more than once called attention to the breadth and fairness of his views, and to his progressive spirit, particularly as exhibited in his annual reports of the immense interests he directs. It was doubtless such men as President Vail that Governor Wilson had in mind when he welcomed as a happy omen the signs of a new and liberal temper in certain of our greatest men of business."

Construction Gang's Home on Wheels.—A telegraph construction gang in Indiana, according to a newspaper, travels and lives in a seven-car train, arranged like a city flat. Their families are with them, and the cars are equipped with all the home comforts, including pianos, victrolas, children, etc.

Mr. W. E. Vanarsdale, recording secretary of The Electrical Aid Society of Philadelphia, and a well-known old-time telegrapher, in renewing his subscription for another year, writes: "I always want the AGE and will ever commend its usefulness among the fraternity. Each issue is interesting and instructive."

Two dollars for a year's subscription to TELEGRAPH AND TELEPHONE AGE is a wise investment for every progressive telegraph and telephone man who wishes to keep to the front.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL.

Manager J. A. McNichol, loop chief P. G. Murphy and repeater chief C. S. Almes have returned from vacations.

Superintendent C. E. Bagley and general foreman J. R. Gorsuch have returned from an inspection of the lines between Wilmington and Delmar, Del.

Mrs. M. G. Smith and Miss M. V. Bartley have been assigned to help out at Atlantic City, N. J., during the summer increase of business there.

Mr. J. E. Albright, 253 Broadway, New York, general sales agent of the Martin Improved Vibroplex, states that for every improved Martin Vibroplex sold at least one flattering testimonial is received. Mr. C. O. Crisenverry, general chairman of the Order of Railroad Telegraphers, at South Whitley, Ind., writes: "The new model Vibroplex received. It gives perfect satisfaction. The men along the line state that it has improved my sending fifty per cent over the old machine."

T. M. B. A. Assessment.—Assessment 541 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of William H. Dolbear at Hinsdale, Ill.; James Stephenson at Clevedon, England.; Charles H. Dickinson at Bristol, N. H.; Edwin Borden at Clifton Springs, N. Y.; Laurens T. Parry at Elmhurst, N. Y.

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 employe. 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 employes not otherwise provided with adequate life protection.

Telegraph and Telephone Age

No. 18. NEW YORK, SEPTEMBER 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Replies to Questions of Our Correspondents.

One correspondent writes: "Now that enamel is to supersede silk and cotton quite generally for insulating relay and other magnet wire used in the coil windings, can you give us any information concerning the advantages derived by its use other than that of its being less liable to destruction by an excessive current?"

Yes; enamel insulation possesses other advantages besides the one mentioned. Its protective nature probably represents its most valuable property. Another advantage of equal value and importance is the thinness with which it may be applied and yet provide proper insulation. For example, with enameled wire it is possible to construct a stronger magnet of given dimensions than can be made with the same gauge of silk-covered wire.

It is also possible to construct a magnet having the same strength as another wound with silk covering, yet possessing less ohmic resistance than the latter.

In order that the student may understand this statement, a few words concerning magnet winding may be interesting. The strength of a magnet depends upon the volume of current flowing through the convolutions comprising the surrounding coils; in other words, to the sum of the volume of current flowing in all the convolutions. The total represents the amperage supplied for the magnetizing energy. Hence the maximum strength of a magnet depends upon the total amperage and number of turns of wire the coils possess, other conditions being equal. Unfortunately, the number of useful turns that can be placed around an iron core is limited. It has been found that when the outer layers of wire are at a distance from the iron core, greater than the diameter of the core, the outer convolutions do not return magnetic energy sufficient to warrant the additional necessary current and copper wire. Here is where the enamel wire proves useful. Owing to its having a smaller diameter than the same gauge silk-wrapped wire possesses, a much greater length of it, and consequently a greater number of turns, can be placed around the same core within the prescribed coil-thickness limit. In this case the resistance of the coil would of course be slightly increased, but that objection would be more than offset by the advantage derived through a greater proportional gain in convolutions and magnetic strength.

On the other hand the resistance of high-wound relays and other magnets wound to the prescribed limit with silk-covered wire, may be appreciably reduced by rewinding with a larger size enameled wire, and yet have the same number of turns. Hence they should be equally efficient magnetically and in all other respects. It is apparent that in a long circuit the elimination of but a few ohms resistance in each of a great number of instruments connected in series will help such circuit materially. Probably this fact had much to do with the adoption of enameled wire, as already several standard types of instruments now in use will hereafter possess a somewhat lower ohmic resistance and yet retain their former high degree of merit.

Another valuable property of enamel is that humidity has practically no harmful effect on the insulation, while dilute acids, alkalis, and other chemicals, that would quickly destroy silk and cotton covers, are also harmless.

The amount of space saved or gained by substituting enamel-insulated wire for fabric-wrapped wire—gauge for gauge—may be judged from the fact that the enamel coating required for the same degree of insulation, is only about one-quarter as thick as silk or cotton wrapping would be, hence the actual outside diameter of every gauge of wire is necessarily larger for fabric-insulated conductors than for enameled.

A prominent manufacturer of enameled wire says:

"A given winding space will, with No. 32 gauge wire, hold 30 per cent. more enameled wire than silk insulated wire. With No. 40 gauge, the increased number of turns is 120 per cent. more than for single silk. With wire insulated with No. 100 cotton a saving in favor of the enamel wire is for No. 24 gauge, equal to 30 per cent., and for No. 40 gauge, equal to 500 per cent." These figures vary somewhat, however, according to the manufacturer.

Furthermore, enameled wire does not become coated with carbon dust and cause leakage between the various turns as do fabric-covered conductors when overheated any considerable length of time by an excessive current. The life of a relay modernly wound should therefore be much longer than that of the old types. If there were no other reasons for preferring enamel the three specified are in themselves sufficient to warrant the assertion that it has come to stay.

Another correspondent writes: "Can you explain the following action of a relay? The other day I noticed that my relay, as adjusted, would not close with forty-five milliamperes of current flowing in the wire, but would close on fifty. I then cut in an additional relay and although this brought the current again down to exactly forty-five milliamperes the first relay did not then open, but remained closed on the same adjustment. Now why didn't it open after first refusing to close on forty-five?"

The explanation is very simple. The conditions were different. The adjustment really was changed although you did not make the alteration yourself. In the first instance your relay contact points were open, thereby withdrawing the armature slightly further from the magnet than was the case with them closed, hence a wider air-gap in the open than in the closed position. For this reason the magnet would be stronger while the points were closed than when open no matter what volume of current was flowing. In your case you happened to catch the relay with such a tension adjustment that with the wider air-gap forty-five milliamperes of current did not make the magnet strong enough to overcome it, but after the additional five milliamperes had done the work, and at the same time reduced the air-gap, the relay magnet even with but forty-five milliamperes of current was then so much stronger than before that it was able to hold up the armature and thus prevent opening.

Telegraph and Telephone Patents.

ISSUED AUGUST 20.

1,035,958. Protective Apparatus for Radiotelegraphic Stations. To E. Girardeau, Paris, France.

1,035,971. Selective Signaling Apparatus. To D. W. Kneisly, Dayton, Ohio.

1,036,443. Telegraph Key. To G. V. Buqoui, St. James, La.

ISSUED AUGUST 27.

1,036,796. Selective Signal. To L. W. Carroll, Anamosa, Ia.

1,036,805. Telephone. To W. W. Dean, Elyria, Ohio.

1,036,809. Telephone Apparatus. To C. F. Dolle, Cincinnati, Ohio.

1,036,961. Telephone-Exchange System. To E. E. Clement, Washington, D. C.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange September 10:

American Telephone and Telegraph Co.	143⅞
Mackay Companies	87
Mackay Companies, preferred	69¾
Western Union Telegraph Co.	87¼

Personal.

Mr. R. R. Hobbs has been appointed superintendent of telegraph of the Louisville & Nashville Railroad Company, with headquarters at Louisville, Ky.

Mr. James R. Mayer, superintendent of telegraph Texas Company, Houston, Tex., was a recent New York visitor. Mr. Mayer was accompanied by his wife.

Hon. W. S. Jordan, mayor of Jacksonville, Fla., an old-time telegrapher and president of the Old-Time Telegraphers' and Historical Association, was a recent New York visitor. While in the city he awakened considerable enthusiasm in the old timers' reunion which is to be held in connection with the old timers' reunion which is to be held in Jacksonville October 22, 23 and 24.

Mr. Jeff W. Hayes, an old-time and well-known telegrapher, of Portland, Ore., accompanied by his son Laddie, were recent New York visitors. Mr. Hayes is traveling through the country in the interest of the Portland *Oregonian*, and his book, "Tales of the Sierras." Mr. Hayes meets many old friends at every stopping place and is entertained by them.

Dr. A. E. Kennelly, professor of electrical engineering at Harvard University, Cambridge, Mass., and a former cable telegrapher, attended the meeting of the British Association for the Advancement of Science in Dundee, Scotland, early this month. He presented a paper recording the result of recent researches in telephone-receiver impedances.

The Metropolitan Telephone and Telegraph Company has let the contract for poles and equipment for three hundred miles of line, the first section of the New York-Chicago Trunk Line. Construction work will begin at once. Mr. L. Lemon, managing director of the company, New York, is on a trip through the West in connection with company affairs.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, and Minor M. Davis, electrical engineer and superintendent of telephones, New York, have returned from vacations.

Messrs. H. A. Tuttle, president and general manager, and E. C. Cooke, treasurer, North American Telegraph Company, Minneapolis, Minn., were recent executive office visitors at New York.

Mr. Theo. L. Cuyler, Jr., assistant treasurer, New York, has returned to his desk after a three months' rest.

Mr. E. B. Pillsbury, general superintendent of the Eastern Division, New York, was a guest at President Taft's lawn party in Washington a few days ago.

Mr. C. A. Richardson, superintendent at Boston, Mass., has returned to his office after a vacation spent in the woods of Maine and New Hampshire.

Miss T. N. Brown, private secretary to Mr. E. J. Nally, vice-president and general manager, New York, has returned from a two-months' trip through Europe.

Mr. M. W. Gothelf, of the Postal Telegraph-Cable Company, at Baton Rouge, La., has been appointed manager of the Mackay Telegraph and Cable Company, at Shreveport, La.

The following appointments of managers have been made in the district of superintendent E. Kimmey: Frank Albert at New Britain, Conn., vice Geo. F. Graff, resigned; Paul Moldenhauer at Malone, N. Y., vice A. Dumas, resigned.

Miss Jennie M. Chase, for twenty-three years manager of the Oshkosh, Wis., office of this company, died August 22, after a long illness.

The important branch office located at 112 Front St., New York, Mr. Hugo Weiss, manager, is being removed to a better location at the corner of Front and Wall streets.

The Cincinnati, Ohio, office of this company is being remodeled to facilitate the handling of business. The interior equipment is being rearranged into a more convenient grouping. The company started its own messenger service September 1.

Switchboard improvements in the main office at Chicago have been authorized which will greatly facilitate the wire service at that point.

Mr. B. S. Durkee, chief operator, has been appointed manager of the Portland, Ore., office, vice Mr. J. Annand, who has obtained a leave of absence for six months. Mr. D. E. Ross, traffic chief, has been promoted to be chief operator, vice Mr. Durkee. Mr. Annand has become manager of the Commercial Club of Portland, a business men's organization with about 1,000 members.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Newcomb Carlton, vice-president of this company, has returned to his office after a vacation spent in cruising along the eastern coast.

Messrs. W. H. Baker, secretary, and G. M. Yorke, engineer of this company, New York, have returned from their vacations.

Mr. J. C. Nelson, formerly general superintendent at Denver, Col., has assumed his new duties as assistant to general manager Belvidere Brooks.

Mr. W. J. Lloyd, general superintendent, Denver, Col., was a recent New York visitor on company business.

Mr. G. H. Boothby, supervisor of the soliciting department of this company at Boston, Mass., has resigned to enter other business in Boston. As a token of esteem he was on his departure presented with a gold watch and chain by his associates, manager F. W. Barth making the presentation.

Mr. John F. Wallick, special agent, Indianapolis, Ind., was a recent New York visitor.

Mr. L. B. Thompson, division supervisor of equipment, Atlanta, Ga., was in New York recently on company business.

Mr. J. S. Calvert, superintendent, Richmond, Va., announces the following appointments of managers, etc., in his district: Miss D. C. Schwem at Rocky Point, N. C., vice Miss E. P. Wood; O. S. Beardon at Winnsboro, S. C., vice M. O. Martin; C. L. Patterson at Lexington, N. C., vice Miss Alyce H. Alexander, transferred as manager at Lancaster, N. C., vice W. R. Staples; R. W. Kennedy at Barnwell, S. C., vice Mrs. Annie E. Parks, transferred to Orangeburg, S. C., to succeed Mrs. L. D. Palmer who leaves the service; Mr. Mossett Daughtry at Clinton, N. C., vice Samuel Cain transferred to the operating department at Raleigh, N. C. Mr. F. H. Muire, formerly all-night wire chief at Richmond, Va., has been appointed district traffic supervisor with headquarters at Richmond, Va.

Mr. W. R. Edmonson, manager at Jacksonville, Fla., has been promoted to be manager at Memphis, Tenn. Mr. M. H. Lines, manager at Tampa, Fla., succeeds Mr. Edmonson at Jacksonville, and Mr. E. L. Williams, traffic chief at Jacksonville, becomes manager at Tampa. Mr. Edmonson first entered the service of the company under superintendent John R. Terhune, in Nashville, Tenn., and from that point he was made manager of the office at Greenwood, Miss., from which position he was promoted to that of district manager of Mississippi. He was transferred to Jacksonville as manager last December. During his incumbency in Jacksonville the office records show that the business has increased 30 per cent. as compared with previous records.

Mr. Joseph Marshall, chief operator, Savannah, Ga., accompanied by his daughter Anna, was a recent New York visitor.

G. C. Felton, aged 69 years, manager of the Laredo, Tex., office of this company, died suddenly in that city on September 3. Deceased was widely known and at various times occupied prominent positions with the company, being at one time assistant superintendent at St. Louis, Mo., and afterwards and for many years superintendent at Dallas, Tex.

An independent office was opened at Clearwater, Fla., September 1, with Mr. R. K. Harris as manager.

This company on September 1 occupied a new and up-to-date office at Plant City, Fla.

The Cable.

Two New North-Sea Cables.—The Great Northern Telegraph Company of Denmark has petitioned the English government for license to land two additional cables at Newbiggin-by-the-Sea, England, one from Denmark and one from Sweden.

Submarine Telegraphy.—M. Roscher, in an article in the *Elektrotechnische Zeitschrift*, of Berlin, of July 18, gives a review of the technical development of submarine telegraphy during the past sixty years, with special reference to changes in the types of cables, the methods of laying and the apparatus and connections.

The Marthas Vineyard Telegraph Company, of which Mr. H. G. Haddon is general manager, has laid a new cable connecting Woods Hole with Marthas Vineyard, Mass., a distance of five miles. This cable replaces a condemned cable laid by the United States Government about forty years ago, and which was purchased by the Marthas Vineyard Company about fifteen years ago. The new cable was manufactured by the Kerite Insulated Wire and Cable Company, New York, and the cable steamer "Robert C. Clowry" laid it in position.

Municipal Electricians.

Fire Alarm System in Los Angeles.—A fire alarm and police telegraph system is to be established at Los Angeles, Cal., at a cost of $250,000. Mr. Frank O'Neill is secretary of the bureau of fire alarm and police telegraph.

Underground Fire Alarm Wires in Morristown.—The work of placing the fire alarm wires in underground ducts in Morristown, N. J., is practically completed. The work has been in progress for some years.

Obituary.

Wirt Wheeler Casterlin, aged 46 years, a telegrapher, well known throughout the East, died at his home in Washington, D. C., August 20. He was one of the traffic supervisors of the Western Union Telegraph Company from which position he resigned July 31, on account of ill health.

Thomas F. Ryan, aged thirty-six years, in charge of the telegraph bureau of Harry Content & Co., brokers, New York, was killed near South Orange, N. J., in an automobile accident on Sunday, August 25. Mr. Ryan was a member of the Board of Governors of the New York Broker Telegraphers and was exceedingly popular among a large circle of acquaintances.

Generation of Electricity.

It is a popular error, caused probably by careless phraseology, that an electrical generator—so called—generates electricity. A familiar sight in our stores is a tube through which a carrier containing money and sales slips is forced by a current of air set up by an engine—or motor—driven air pump. The air pump in no sense generates the air; it simply causes the pressure at one end of the tube to be higher than at the other, and the current of air which we utilize to move the carrier is the natural and inevitable result of connecting two sections of tubing which are at different pressures. If we pump water into a tank on the roof of a building in order to draw it from the faucets, we do not in any sense generate or make the water, nor do we, except in an indirect and limited sense, generate the current, but we do raise the water to a higher level and the resultant flow simply represents its effort to relieve the pressure, or to seek the lowest possible level. While electricity is not, at least in the ordinary sense of the term, a material substance like air or water, it follows in this respect, precisely the same law; and an electrical generator, whether it be a battery, a dynamo, or any other of the many causes of the current, is simply an apparatus for disturbing the equilibrium of the normal charge of electricity existing in all substances; raising its pressure or potential at one point and lowering it at another. The current which ensues on connecting these two points is simply nature's effort to restore the disturbed equilibrium.

Ocean Steamers Connected by Telephone.

The New York Telephone Company, has found its latest field for public telephone activity on the large trans-Atlantic liners sailing out of New York, says the New York *Telephone Review.* On several boats of the Cunard Line coin box telephones have been installed. As soon as the steamer reaches her pier and before the passengers start to come ashore the public telephone department's attendant goes aboard, carrying with him a flexible cable, one end of which is plugged into a jack box on the wharf and the other end of which he plugs into a jack box on the steamer and connects the coin box telephone with the central office. Passengers are then in a position to immediately telephone to home, hotel, or office. The company has also closed a contract to equip the boats of the New York and Porto Rico Steamship Company with portable sets, which permit a telephone communication while the ships are moored at the pier.

The Telephone.

Arthur D. Wheeler, aged 51 years, chairman of the board of directors of the Chicago Telephone Company, Chicago, died at his home in Lake Forest, Ill., on August 30.

Mr. Union N. Bethell, vice-president of the American Telephone and Telegraph Company and president of the New York Telephone Company, has returned from his vacation.

Mr. N. T. Guernsey, a member of the law firm of Guernsey, Parker & Miller, Des Moines, Iowa, will retire from the firm on November 1 to become associated with the American Telephone and Telegraph Company in New York.

Mr. Stanley J. Goddard, president of the Constantinople Telephone Company (Société Anonyme Ottomane des Téléphones de Constantinople) and Mr. W. W. Cook, consulting engineer, left London, August 24, on a visit to Constantinople.

Mr. W. R. McGovern, formerly engineer of the Wisconsin Telephone Company, and for the past year engineer of inventory and appraisals for the Central Group of Bell Companies, has been appointed engineer for the State of Illinois, covering all the property of the Chicago Telephone Company and the Central Union Telephone Company in Illinois.

New Telephone Line in Russia.—A second telephone line is to be erected between St. Petersburg and Moscow, Russia.

Increase of Capital and Change of Name.—The Southwestern Telegraph and Telephone Company proposes to increase its capital stock from $20,000,000 to $100,000,000 and change its title to Southwestern Bell Telephone Company.

Large Switchboard at Little Rock.—The Southwestern Telegraph and Telephone Company has recently installed a switchboard of 8,800-line capacity at Little Rock, Ark., which, with the old board, gives the exchange a capacity of 14,200 lines.

New York Telephone Company Absorbs an Independent.—The New York Telephone Company has acquired the property and business of the Citizens Standard Telephone Company operating in Kingston, Rosendale, Shokan, N. Y., and vicinity in the sum of $152,700.

Protection of Telegraph and Telephone Lines.—M. Girousse read a paper before the Société Internationale des Electriciens, in Paris, in which he described the dangers and troubles to which telegraph and telephone lines are exposed by close proximity to high-tension lines. He also described methods for their protection.

A Telephone Time Saver.—For the purpose of saving the time usually wasted in holding the line, a telephone "Time Saver" has been invented by Mr. H. Waymouth Prance, of London, England. In brief, the device consists of a sound magnifying trumpet, behind which is a platform adapted to support the telephone receiver. Upon receiving or making a call upon the telephone, and being asked to "hold the line a moment," the user, instead of holding the telephone receiver pressed to his ear, merely drops the receiver on to the platform of the "Time Saver," where it automatically slides into position with the earpiece against the small end of the spiral trumpet. The user is then free to go on with his work until the voice from the trumpet shows him that the person at the other end is speaking. Conversation can then either be carried on using the loud-speaking trumpet—thus affording the advantage of leaving the user's hands both free for the purpose of turning up references, taking down a message from dictation, etc., or the receiver may be lifted off the instrument and used in the ordinary way. It is possible for the user of one of these instruments to move some little way from the telephone and yet hear when the person at the other end is speaking.

Radio-Telegraphy.

Mr. A. H. Morse, for several years associated with the wireless industry in Canada, United States and England, is now identified with the Marconi International Marine Communication Company, at the Marconi House, London.

Largest Wireless Station.—The new high-power trans-oceanic wireless station to be erected at Carnarvon, Wales, by the Marconi Wireless Telegraph Company under contract with the British postoffice will be largest in the world.

Wireless Between Norway and New York.—A London dispatch states that the Marconi Wireless Telegraph Company has contracted to erect high-power wireless stations in Norway and in the vicinity of New York for the purpose of conducting a commercial telegraph service between northern Europe and the United States.

High-Frequency Generators for Wireless.—A company is being formed in Paris to undertake the international working of the foreign patents for the Goldschmidt high-frequency generator, excluding those for Germany which are held by the Lorenz Telegraph Company, while the High-Frequency Machine Company of Berlin, owns the foreign patents. French, German and American industrial and banking interests will participate in the new company.

Wireless Distress Signals.—Mr. H. Rial Sankey, a director of the Marconi Wireless Telegraph Company of London, England, announced at the recent meeting in Dundee, Scotland, of the British Association for the Advancement of Science, that he had devised an apparatus to enable a ship to pick up a distress call from another vessel, whether the operator was on duty or not. The arrangement has been tried at the company's experimental station, he stated, and has been very successful.

The Development of Florida.

About four centuries ago, Ponce de Leon landed on the east coast of Florida. He came with a splendid following, seeking the fabled "Fountain of Youth," but he failed to find the life-renewing spring. It remained for Mr. Henry M. Flagler, who was seeking restoration of health in the balmy surroundings of St. Augustine, to evolve the idea of making that city a refuge for invalids and a winter home for the chilled northerners.

The surface of the east coast is rather low and flat, and comparatively smooth.

The St. Johns River, the largest in Florida, is 350 miles long. It is navigable by large vessels for more than 220 miles, and is one of the few rivers that flow north. The Halifax and Indian rivers are the two rivers best known for their oranges and for their beautiful scenery. Fish and shrimp industries are developed there.

The east coast has two of the largest lakes in Florida, Lake Okechobee, which is situated in the Everglades, a lake which covers more than 1,000 square miles; and Lake George, second largest lake, is in Volusia County.

The climate of Florida is the most equable in the world. This climate is what has attracted so many pleasure seekers. The east coast has the richest soil in the State, and, since Mr. Flagler has built the railroad from Jacksonville to Key West, the development of the country has been marvelous. Land is now selling from $10.00 to $100.00 per acre when formerly it could be bought for 35c. and 40c. per acre. Since the rich soil has attracted the attention of the tourists, they have made this part of the State one of the greatest truck farming sections in the world. This has lead to the growth of many of the east coast cities. The largest Irish potato growing section in the world is that surrounding Hastings. Other vegetables and all kinds of fruits are raised there and shipped to the northern markets. This brings millions of dollars to the east coast each year.

Since the railroad has been built, lumbering has become an important industry, especially the shipping of yellow pine.

The best fishing south of Virginia is found in Florida. It employs thousands of men. All kinds of fish are caught and shipped to northern markets.

The sponge industry is quite important, especially in Key West. It brings as much as $250,000 a year.

Dotting the east coast of the Peninsula State are half a hundred cities and towns and settlements, centers of large and various interests. They vary in importance, from Jacksonville, the largest city in the State, to little flag stations, which have been established to receive shipments of fruits and vegetables in the harvest time. While we shall select only five of these cities for special mention, scores of others are quite as interesting and almost as important. Each has its attractions, historically or industrially. A few of these are: Hastings, famous for its potatoes; Palatka, known for its lumber and vegetables, and Sanford, the celery center of the South. Other places of interest are Titusville, the sportsman's paradise, and Palm Beach, which is reputed to be one of the most beautiful seaside resorts in the world.

Jacksonville—No city in all the Southland is better known than Florida's commercial capital and metropolis. Though Jacksonville has had a number of disasters, it has recovered and is today one of the greatest commercial cities in the South. This city no longer depends on the tourist trade, yet Jacksonville's guests each year number tens of thousands. Its hospitality is typical of the State. It is located twenty-two miles from the ocean on the famous St. John's River, and has the bustle, hurry and life of a northern city with all the southern climatical advantages. The city is beautifully laid out with fine broad streets and park system, which together with the character of the government, municipal and other buildings, make it one of the most attractive and advanced cities of the South. It is well equipped with excellent and elegant hotels, churches, schools, theatres and places of amusement. Among the pleasant features are automobile trips in and around the city, a drive along the picturesque St. John's River and the famous ostrich farm. Dixieland Park, located just across the St. John's River, is open the year round and affords the traveler the opportunity of seeing all of the life and amusement that would be found at any of the Atlantic seashore resorts.

Next in importance is St. Augustine, of most historical interest, dream of artist and inspiration to the student of the earliest history of civilization. St. Augustine was founded by Ponce de Leon in 1565. This is the oldest existing city on the continent. Within its limits is Fort Marion, built in 1756, a venerable suggestion of Spanish methods of conquest. Primitive residences are inhabited today. St. Augustine is the "Showplace" of Florida's east coast. It is due to Mr. Flagler that this city's wealth of history has been preserved to the world. He is the modern discoverer of St. Augustine, for he erected the two magnificent hotels, the Ponce de Leon, which is more a gallery of art than a stopping place for transients, and the Alcazar, the picturesque model of Spanish architecture. Among the interesting relics is the old city gateway. In the Plaza de la Constitution stands the old slave market, also the cathedral, the oldest church in America. For amusements there are surf bathing, boating, yachting, driving, shooting, excellent fishing, dancing and golf.

No visitor to Daytona, on the Halifax River, can fail to be impressed by the earnestness with which it puts forth the claim that it is the prettiest winter resort in the world. The Daytona-

Ormond Beach course is famous for automobile races and is the most beautiful in the world.

Miami, "The Magic City," ranks as Florida's fifth city, and with its palm avenues, winter gardens and happy people draws thousands of tourists each year.

The last we will mention is Key West. The century-long isolation of Key West has been broken by the development of the railroad. Now Key West is looked upon as one of United States most important cities. Since Mr. Flagler has extended the railroad to the "Island City," the growth and population has increased enormously and commerce has developed.

The Florida East Coast Railway has been the real developer of the east coast. The part it has played in the development of the State is unparalleled in the history of railroading. It has transformed, in a few years, an unexplored wilderness into a rich empire, dotted with cities and covered with groves, orchards and farms. No one who has not seen for himself can form any estimate of the magnitude of this great undertaking.

Passing down the west coast, the place of first importance commercially is Tampa. It is one of the most interesting cities of the State, as well as one of the most active. It is situated at the head of Tampa Bay, and more clear Havana cigars are manufactured and shipped from Tampa than from any other city in the world. It is also the center of the citrus fruit producing section.

South of Tampa a charming country has been opened up and made accessible by the extension of the Seaboard Air Line Railway. Already there are excellent hotels with accommodations for several thousand visitors. The coast here is a succession of beautiful bays with the picturesque vegetation of the tropics lining their white curving beaches. The land itself undulates gracefully and the grass grows down to the edge of the beach, shaded by great live oaks, hickories, splendid palmetto trees, pines and magnolias. At a short distance from the shore is a line of long narrow keys, between which there are frequent passes into the Gulf of Mexico. The climate is influenced by the Gulf Stream and the vegetation is much more tropical than it would be otherwise. The large bodies of warm salt water, together with the night breezes blowing from the Atlantic through the pine trees of the interior, make the region as perfect a sanitarium as could be desired.

There is no finer fishing anywhere than in the rivers and bays from Tampa Bay south.

The Manatee River gives a distinctive character to a large part of this region. It is one of the most beautiful rivers in the world. It is about two miles broad at its mouth and for several miles up the stream it is more than a mile wide. On its banks are a number of little towns and villages. About all of these places are large orange groves and great stretches of the richest uncleared hammock land, awaiting the settler.

Bradentown is the county seat and principal town of Manatee County.

Manatee is on the south bank of the river, a mile or two east of Bradentown. Some of the largest and best orange groves in the county are immediately round Manatee. A mineral well of valuable medicinal qualities is a boasted feature of the town.

Sarasota is located on a point of land running out into Sarasota Bay. Boats from the Gulf and Tampa put in here and it is the mecca of all fishermen.

Seminole Hotel, Jacksonville, Fla.

As the time approaches for the holding of the reunion of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, at Jacksonville, Fla., October 22-24, the hotel question naturally arises in the minds of the members who expect to attend. Jacksonville has several fine hotels, the Seminole being considered one of the best in Florida. The members and their families who select this hotel will feel quite at home because Mr. Fred E. Meyer, one of the stockholders, is an old-timer and will be on hand during the reunion to welcome his old friends.

The Seminole is a modern hotel in construction and furnishing and is fireproof. It is ten stories high, and contains a large convention hall on the tenth floor, from which a fine view of the city and the beautiful St. John's river is obtained.

One of the features of the hotel is the Indian Café. This is decorated with tropical scenes and has a rare collection of curios and Indian bead work. The dining room is stated to be one of the finest in the United States, and has a seating capacity of over 400 persons and the cuisine is said to be unsurpassed. The rates at this hotel are reasonable, and members and their families who stay there will find every convenience of a first class hotel at their disposal.

The hotel is centrally located and convenient to all places of amusement and other points of interest in the city.

Mr. J. W. McMahon, district commercial manager, Western Union Telegraph Company, New York, writes: "It affords me much pleasure to enclose herewith $2.00 for another year's subscription to your interesting journal. Its progressive scientific pages and low subscription price, in my opinion, make it the most economical education to those engaged in the telegraph or telephone service."

Mr. G. W. Lloyd, superintendent, Western Union Telegraph Company, Atlanta, Ga., writes: "I believe I am one of your oldest subscribers, and would feel slighted if you allowed me to lapse. You are publishing a splendid paper, and I will do what I can, in my rounds, to have members of the profession subscribe for it."

Peoria Convention of Association of Municipal Electricians.

The seventeenth annual convention of the International Association of Municipal Electricians was held at the Jefferson Hotel, Peoria, Ill., August 27, 28 and 29, and there was an attendance of over one hundred, president John W. Kelly, Jr., of Camden, N. J., occupying the chair. Mayor Woodruff, of Peoria, made an address of welcome which was responded to by Mr. C. E. Diehl, of Harrisburg, Pa., treasurer of the association.

President Kelly's address was comprehensive and of special and live interest to the members. He urged the enlargement of the powers of municipal electrical inspectors in order that all electrical matters in city government be included in the duties of the inspectors. The chief of the electrical bureau in a large city, he said, is much more than a signal engineer. He has important problems to solve in electrical engineering which require a high order of technical skill.

Papers were read during the convention as follows. "Underground Cables for Fire and Police Telegraph Service," by Mr. E. G. Loomis, Pittsburgh, Pa.; "Grounding Street Boxes," by Mr. T. C. O'Hearn, Cambridge, Mass.; "Ornamental Street Lighting," by Mr. A. M. Klingman, Cleveland, Ohio; "Electrical Inspection from the Underwriter's Viewpoint," by Mr. W. S. Boyd, Chicago, Ill.; "Municipal Inspection," by Mr. Charles H. Lum, New York; "Testing and Inspecting Fire Boxes," by Mr. W. L. Riehl, Cincinnati, Ohio; "Handling Fire Alarms," by Mr. John Berry, Indianapolis, Ind.; "Police Call or Flashlight System," by Mr. W. E. Wolgamott, Peoria, Ill.; "Locating Trouble on Lines and Cables," by Mr. Leo Firman, Philadelphia, Pa.

J. W. KELLY, JR.,
Camden, N. J., President.

In his paper Mr. Wolgamott described the police flashlight system in use in Peoria. To signal policemen while on patrol duty eighty lamps are used at night and the same number of bells in the day time. The bells and lamps are placed at street intersections, either on top of posts supporting fire-alarm boxes or on brackets extending from arc lamp posts. When a policeman sees or hears a signal he immediately communicates with headquarters by telephone. At each location there is a weatherproof box containing a polarized relay by means of which the bell can be rung or the lamp lighted as desired. The system, he stated, was very useful in police work, in tracing criminals or in cases of riot.

CLARENCE R. GEORGE,
Secretary.

In his paper on "Municipal Inspection," Mr. Boyd, who is connected with the underwriters in Chicago, advocated municipal regulation for electrical inspection for the protection of life and property. The regulation should cover outside as well as inside wiring. The present problem of electrical inspection relates to the small cities. Mr. Boyd advocated the creation of state departments for electrical inspection and inspectors should be paid better than they are. Losses from fires due to electrical causes are decreasing in all cities where there is municipal inspection on a rational basis, but the electrical fire loss can be reduced to a nominal amount with the present-day excellence of electrical fittings.

Mr. Boyd's paper was highly appreciated by the members and a vote of thanks was tendered him. He was afterwards made an honorary member of the association.

Mr. Loomis, stated in his paper on "Underground Cables for Fire and Police Telegraph Service," that his experience with saturated-fibre cables had been satisfactory. He called attention to a recent improvement which makes this type of cable approximate a rubber-insulated cable in moisture-resisting qualities.

Twenty-two active members and fourteen associates were elected. Captain William Brophy, of Boston, one of the oldest members of the association tendered his resignation but the association refused to accept it and elected him an honorary member for life. Captain Brophy has been one of the most enthusiastic and active members and his services in behalf of the association were referred to by Mr. Will Y. Ellett, of Elmira, N. Y., in a graceful tribute to Captain Brophy's work.

A committee was appointed to report on the subject of permissible voltage within the limits of municipalities.

The election of officers resulted as follows: president, Mr. John W. Kelly, Jr., Camden, N. J., (re-elected); vice-presidents, Messrs. O. C. Trussler, Indianapolis, Ind.; W. R. Arbuckle, Bayonne, N. J., A. G. Sangster, Saskatoon, Sask., and B. A. Blakey, Montgomery, Ala.; secretary, Mr. Clarence R. George, Houston, Tex.; treasurer, Mr. C. E. Diehl, Harrisburg, Pa., both the latter being re-elected.

Executive committee: Messrs. H. C. Bundy, Watertown, N. Y.; T. C. O'Hearn, Cambridge, Mass.; Will Y. Ellett, Elmira, N. Y.; W. E. Wolgamott, Peoria, Ill.; A. L. W. Kittredge, New Haven, Conn.; Clayton W. Pike, Philadelphia; H. A. Boneen, Cleveland; W. B. Martin, Albany; John Berry, Indianapolis, and Robert J. Gaskill, Fort Wayne, Ind. Owing to Mr. George's desire to retire from the secretaryship several candidates were placed in nomination for the office, but Mr. George was re-elected by a large majority and he consented to serve another term.

It was decided to hold the next annual convention in Watertown, N. Y.

The entertainment programme was a varied and enjoyable one. Among its features were a boat ride on the Illinois river, and a high voltage demonstration by Mr. J. W. Kelly, Jr.

The Sons of Jove on the night of August 28 held their first rejuvenation at a municipal electrician's convention and seven candidates were initiated into the mysteries of the order.

There was an extensive display of apparatus at the hotel in connection with the convention, and a number of well-known manufacturers were represented. Among the exhibitors were the Gamewell Fire Alarm Telegraph Company, New York, fire-alarm apparatus; the Central Electric Company, Chicago, which showed Alexalite fixtures, insulated wires and a line of general supplies; Duplex Metals Company, Chester, Pa., copper-clad steel wire; Sprague Electrical Works of General Electric Company, New York, interior conduit; Standard Underground Cable Company, Pittsburgh, Pa., copper-clad and insulated wires; and the Okonite Company, New York.

New Wave Meter.

The accompanying illustration shows a wireless telegraph wave-meter designed by Mr. R. H. Marriott, of the Marconi Wireless Telegraph Company of America, New York. It is a small, light and easily operated instrument and is intended for the use of ship wireless inspectors. It is made in two styles, the box style and the compact style.

In the outfit shown, the box style, either of the two inductances L_1 or L_2 may be used, the entire outfit, including telephone receiver, T, being contained in a carrying case, five inches by six-and-a-quarter inches in size.

The compact style is made for use where small wire and light weight are desired, and where telephone receivers are available. With this style of instrument inductance L is used.

In the illustration, C represents a calibrated variable disc condenser; D the detector; I lamp;

WAVE METER AND SEPARATE PARTS.

L, L_1 and L_2 inductances with flexible connecting cord F; S, short-circuiting switch, and P posts for connecting a telephone receiver.

The condenser is of the standard Marconi variable disc type, with zinc plates and hard-rubber dielectric, and is finished in brass with hard rubber base. There are two scales, one calibrated in ten-meter divisions and the other in .0005 microfarads from .0 to approximately .01. One scale reads approximately 200 to 810 meters and the other from 790 to 3,200 meters.

The detector is a tested carborundum crystal mounted on a brass base which fits in a cup, G. The upper contact, K, can be slid up or down to suit any size crystal, and the tension on the crystal is varied by the thumbscrew Z.

The miniature tungsten lamp, I, used for glow reading when testing closed circuits of transmitters, etc. It is so placed that the maximum glow and the scale reading can be seen at the same time.

The short-circuiting switch, S, is used to short-circuit the lamp when the detector and telephones are used. The detector circuit is open when the telephones are disconnected.

Inductance, L, is composed of a solid wire wound on a hard-rubber ring which fits the top of the condenser around the handle. Inductance, L_1 consists of twisted, stranded conductors wound on a square-wooden frame, and inductance L_2 is composed of two inductances on one frame. The switch, M, cuts in one inductance for 200 to 810 meters range, and the two inductances in series are for a range of 790 to 3,200 meters. A pair of 2,000-ohm telephones with headband and cord is supplied with the box outfit.

Meeting of the Institute of Radio Engineers.

A meeting of the Institute of Radio Engineers was held at Columbia University, New York, September 4. President R. H. Marriott made some interesting and timely remarks on the progress in wireless telegraphy since the last meeting of the Institute, in June. He referred to Dr. Seibt's direct-reading wave meter, also to the wave meter of his own design, which is described and illustrated in this issue. The station at Tuckerton, N. J., now being built by the High-Frequency Machine Company of Germany, was also touched upon. Mr. Marriott believed that Dr. Goldschmidt's scheme for transatlantic communication is very good mainly because he probably will be able to radiate a great deal of far-reading undamped energy without interfering with ships.*

"We should welcome all transoceanic and overland radio communication," he said, "if it is accomplished without interfering with ship communication."

Mr. Marriott's review was complete and brought the record of the world's progress in wireless up to date.

An interesting paper on the "Utilization of Both Waves Radiated from a Radio-Telegraph Transmitter" was read by Messrs. Tichikata and Yokohama.

This paper described extensive laboratory and long distance tests in detail, showing the energy received when the receiving sets were properly tuned and coupled to receive both peaks and to receive one peak alone.

Both peaks are received by tuning the open and closed circuits of both the transmitter and receiver to the same frequency with the same coupling. This, however, is apparently little, if any, better from the standpoint of energy received than tuning to one peak only, that is, tuning the open and closed circuit of the transmitter to the same wave length and tuning the receiver to the stronger peak the wave length of which is, of course, quite different.

By this latter method the receiver coupling is not so tight and the ability to cut out interference is greater.

Apparently it is the latter method which is unconsciouslv used by wireless operators when they are supplied with receiving tuners the coupling of which is easily variable. In this case their receiving tuner is not in tune with the transmitter circuits but with one of the two waves radiated from the antennae, usually the longer of the two, because, as a rule, it contains the greater amount of energy.

The next meeting of the Institute will be held on October 2 at the same place. At this meeting it is expected that some transmitting and measuring instruments of new design will be shown and explained. The committee on standardization will also report.

* Dr. Goldschmidt's apparatus will be used in the Tuckerton station and a brief account of this station was published in our issue for September 1.

First Telegrams Delivered by Telephone.

Mrs. Marjorie M. Grey is said to be the first woman telephone operator. She entered the service at Bridgeport, Conn., on March 24, 1879, and in reminiscences published in the *Southern New England Telephone Bulletin*, she refers to what was probably the first attempt to deliver telegrams by telephone.

"The most impatient and nervous subscribers we had," she writes, "were 'Sharp, Rifles' and P. T. Barnum. They had all their telegraph messages telephoned and as they were nearly all in cipher it was very important that I should not make a mistake."

The subscribers referred to by Mrs. Grey were the company manufacturing Sharp's rifles and Phineas T. Barnum, the noted showman, who maintained winter quarters for his circus at Bridgeport. Mr. Barnum is credited with many novelties and innovations in American life, but it would appear now that he was a pioneer among time savers, for the system of delivering telegrams by telephone has grown to be one of the recognized conveniences and economies of correspondence by wire.

Among the employes of the Western Union Telegraph office in Bridgeport in 1879 was Mr. W. A. Harris, who is still in the service as district superintendent of the American District Telegraph Company at New Haven, Conn. Recalling the events, Mr. Harris said:

"The Bridgeport telephone exchange was among the first to be established. It was installed by Mr. Thomas B. Doolittle, so widely known in telephone circles. I recall when Mr. Doolittle sold the exchange, as then being operated, to the Western Union Telegraph Company, Mr. George B. Prescott coming up from New York with vice-president Van Horne to complete the transaction. Mr. Prescott had with him various pieces of apparatus, such as a tangent galvanometer, bridge set, etc., which I saw then for the first time.

"When Mr. Van Horne handed Mr. Doolittle the check of the Western Union treasurer, a broad smile appeared over Mr. Doolittle's face and he turned to me with that twinkle which every one who know him will remember and said: 'I wonder if it is good?'

"Mr. Van Horne straightened up and icily replied: 'It is certified, sir.'"

From these reminiscences it would appear that Bridgeport, Conn., in 1879, was the first Western Union office to deliver telegrams by telephone and that P. T. Barnum was the first customer to receive the service.

Mr. H. R. Waterbury, manager of the Postal Telegraph-Cable Company, at Jacksonville, Fla., in renewing his subscription writes: "It gives me pleasure to enclose check for renewal of my subscription to the AGE. I can truthfully say that I have never received better returns on an investment."

Telegraph and Telephone Age

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CHANGES OF ADDRESS.—In ordering a change of address the old as well as the new address must be given.

REMITTANCES to Telegraph and Telephone Age should be made invariably by draft on New York, postal or express money-order, and never by cash loosely enclosed in an envelope. By the latter method money is liable to be lost, and if so remitted is at the risk of the sender.

New York, September 16, 1912.

The Municipal Electricians' Convention.

That the International Association of Municipal Electricians is a progressive and growing organization is evident from the record of its last annual convention, which was held at Peoria, Ill., August 27, 28 and 29. It has established itself upon a permanent footing and has reached the point in its career where it is attracting the attention of the technicians. When this point is reached in the life of any organization it means that there is something in the body worth while.

Municipal electrical engineering is a branch of the great electrical art, but not as much attention has been paid to it as to its technical features as has been given to other branches; but its turn has at last come. The attendance of so many prominent technical men at the Peoria convention augurs well for the future of the association, and the members and the municipalities they represent will derive great benefit from the uplifting of municipal electrical engineering into a higher technical plane.

As was pointed out in one of the papers read at the convention politics should not be allowed to interfere with the duties of municipal electricians. These officers should be free to exercise their duties in a manner which is right and best for the people and not be influenced by any political expediencies. Electrical engineering and politics do not mix well, and if engineering is entangled with politics it is not engineering at all; it is politics, pure and simple.

The municipal electricians as represented in their organization have a more promising future before them now than they ever had, and this is going to be brought about by giving closer attention to the technical features of their calling.

Wire-made Friends.

In a recent article in these columns giving telegraph reminiscences of forty-six years ago the author, in apologizing for the length of his story, wrote: "As the years flit by there is a temptation to retrospect and call to mind old times and old associates. I believe the inclination to do this is more pronounced among old telegraphers than among the members of other professions. Just why, I do not attempt to explain, but the early associations seemed to have established friendships that time cannot dim nor age destroy."

Perhaps no class of men have a wider circle of acquaintances than do telegraph operators and we do not need to go far to find the reason. Young operators as a rule are, like sailors, of a roving disposition and have a desire to see as much of the country as possible. In thus shifting about they naturally meet many people and make friendships that in most cases last through life. In addition to this they make many other acquaintances and friends over the wire in the course of their daily work, and friendships made in this manner are frequently of the most lasting kind. There is a subtilty about wire-made friendships that is quite undefinable and hard to understand by those who are not practical telegraphers.

In making acquaintances in person we are all more or less prone to judge character by personal appearances, and in many instances we are thus misled, for under a threadworn suit there may be a noble character; and, on the other hand, fine clothes may cover a bad heart and evil mind. But when the acquaintance of unseen persons is made over a wire, we do not see the clothes they wear or the expression of their faces; all we learn of them is their mentality and habits of thought, which is an unfailing index of their true character. It is thus explainable why friendships formed over a wire are likely to be more sincere and enduring. There is no mystery at all about the broad bond of fellowship that exists among telegraphers when by analysis we trace the effects to their cause.

Electricity from Sunshine.

During the past few days the announcement has been made to the world that a French scientist has discovered a means of turning sunshine into electricity. If he really has accomplished this he has made a great step in scientific progress, but we caution our readers not to be too hasty in their conclusions regarding this invention. It appears from the meagre information at hand that it requires 500 cells of battery placed on the roof to capture enough sunshine and transform it into sufficient electrical energy to light six lamps. The disproportion between the means and the end is very marked, and if this is the best that can be accomplished it does not promise well as a commercial success. Yet we dare say that if the idea were exploited by unscrupulous financiers the unsuspecting and unthinking public would eagerly bite at the opportunity to part with their money in order to get in "on the ground floor."

Some day some one may discover an economical way of transforming the heat, or chemical energy of the sun, or both, into electrical energy, but not much success has as yet attended efforts in this direction. It may be that this French inventor has produced something of real merit, but we must possess our souls in patience until more details of the process are available.

The London Telegraph Office Fire.

The fire in the Central telegraph office, London, England, on August 24, referred to in our issue for September 2, was not so destructive to property as was first announced. The chief damage was due to the fusing of the wires as a result of the burning insulation, but the service was completely disorganized for the time being. The principal damage was limited to a very small area. The water applied by the firemen found its way to the instrument room on the floor below but the firemen had covered the instrument tables with tarpaulins so no damage resulted there.

There were about 475 employes on the floor where the fire started, but they all left in an orderly fashion, and on the floor below, where there were 360 employes in the room, the same discipline prevailed.

A force of about six firemen is always stationed in the building and to their prompt action is probably due the successful minimizing of the damage, which was confined to the test board and the wires underneath. There was no damage to the instruments on the floor where the fire originated.

Valuable aid in the emergency was rendered by the telephone service. A special staff of telephone operators was sent to a branch postoffice and they dictated telegraph messages to provincial post offices from which they could be redistributed. Messages to Paris were also disposed of in this manner.

Altogether about 2,500 wire connections were severed by the fire. The "test box," which was damaged, was of the provincial circuits only.

The English Telegraph and Telephone Service.

During a recent debate in the British House of Commons over government operation of the telephone service, some interesting remarks were made regarding the telegraph in that country.

Mr. G. Colling referred to the fictitious and misleading profit officially declared to be made by the Post Office. The Post Office did not charge themselves with the cost of works and buildings £569,000 ($2,845,000), nor with rates and taxes £126,000 ($630,000); nor with £196,000 ($980,000) for printing and stationery. Therefore, the profit made was not as had been stated in the accounts, but 20 per cent. less. Attention ought to be directed also to the large and growing loss on the telegraph service, he said. Thirty years ago a committee reported that the loss on the sending of press telegrams was enormous. It was a public scandal that the taxpayers should have to find this money year after year in order that press telegrams could be sent a long way below cost price. It was an abuse of the public service in the interest of one section of the community. Then again there was a loss on sixpenny telegrams, and the senders should be charged a little more than sixpence. When the State took over the telegraph service it was not expected that there would be a loss of £1,000,000 ($5,000,000) a year upon it; and he feared that unless the postmaster-general was careful in fixing the charges for telephone service at the outset, the service also might show a deficit in the future. The State when investing large sums in such service and securing a monopoly had a right to expect a growing profit on the capital invested.

Sir F. Banbury, referring to the administration of the telephones, said his constituents had inundated him with letters complaining of the failure of the telephone system since the Government had taken it over. No one could have received his representations more courteously than had the postmaster-general, but for the life of him he could not understand why, when the State with all its resources had taken over the system and had had an experience of nearly five months, its working should be so bad. The explanation was that the State could never manage anything so well as private enterprise could, and that there was a very strong argument against establishing cables all over the world under the management of the State.

Mr. Herbert Samuel, postmaster-general, said Mr. Colling, had criticized the post office estimates on the ground that they did not include services rendered by other departments to the post office. The reason these were not included was that they were not borne on this vote. The loss on the telegraph service was due to several reasons. In the first place, a very large sum was paid forty years ago to the telegraph companies for their equipment and plant. In the second place, the press enjoyed many privileges which were remunerative to them but were not remunerative to the State, costing the post office, it was estimated, about £205,000 ($1,025,000) a year. But these were statutory conditions which it was not within his power to alter. Further, sixpenny telegrams, which were pressed upon the post office by the House of Commons a good many years ago, were ot remunerative ,and they had deliberately made many extensions in the rural districts at a loss for the sake of adding to the amenities of those districts. And lastly, the advent of the telephone had eaten up a large amount of the remunerative business of the telegraph system.

Nicaragua Rebellion.—The telegraph and railway service in Nicaragua are interrupted on account of the rebellion in that country.

Course of Instruction in the Elements of Technical Telegraphy—XXIII.
(Copyrighted.)

(Continued from page 557, September 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

The Key.

The key is an instrument for opening and closing the circuit.

The key lever is pivoted upon a steel arbor, and is in connection through the frame of the instrument with one side of the line, while the other side is attached to an anvil, insulated from the frame, which the lever rests upon when depressed.

When the hand is withdrawn an adjustable spring causes the lever to separate from the anvil and the circuit is broken. The contact points are made of platinum on account of the spark at breaking, which would tend to oxidize such a metal as brass and render it practically non-conducting. A circuit closer, or switch, affords a means of connecting the frame and anvil, in order that by closing his switch the operator may remove his hand from the key and yet leave the circuit closed. The arbor screws should be adjusted until the lever works freely but without lateral play. The spring may then be adjusted to suit the sending operator.

QUESTION PAPER.

(1) Why is a local circuit used in connection with a main line relay?

(2) Assuming a sounder to have 900 convolutions in its coils, what current is required to work the instrument satisfactorily?

(3) A sounder requires a greater magnetizing force than a line relay on account of its heavier lever and retractile spring; should not there be a large number of convolutions in the coils to obtain the necessary ampere-turns?

(4) A circuit of 1,000 ohms resistance is worked from a battery of 25 volts. How many cells would require to be added in order to work a four-ohm sounder on the circuit? Ans. 450.

(a) In order to work a twenty-ohm sounder on the circuit? Ans. 134 cells.

(5) Should the coils of a line relay be wound in the same direction or in opposite directions? Give your reasons.

(6) Explain how the armature of a relay is attracted when a current flows through the coils.

(7) Why is the armature released when the circuit is broken?

(8) Why have line relays a large number of convolutions?

(9) Can an increase in magnetizing force be obtained in any other way than by increasing the number of convolutions?

(10) Why is the lever of a line relay made light?

(11) How many ampere-turns are required to work a sounder?

(12) Sketch a local circuit and explain how the sounder duplicates the relay signals.

(13) When the sounder does not respond to the movements of the relay what would you do to locate the trouble?

(14) When, owing to weather conditions, your relay remains closed when the distant station breaks, a higher adjustment becomes necessary, what would you do?

(15) Why does a main line sounder require a greater number of convolutions than a local circuit sounder?

(16) What is the function of a Morse key?

(17) Explain how the circuit is closed when the key is depressed.

(a) How the circuit is opened when the switch is opened.

(18) Why does the distant relay respond to the movements of the home key?

(To be continued.)

Trunk Telephone Rates in England.—The British postmaster general recently announced that he had arranged for the use of telephone trunk lines during the less busy hours of the day under monthly contracts for daily periods of fifteen minutes or more, on payment at the following rates: For the first or second quarter-hour period, three-quarters of the ordinary rates, according to the time occupied; for the third and fourth quarter-hour periods, one-half of the ordinary rates; for each additional quarter-hour period, one quarter of the ordinary rates. The time for which such arrangements can be made necessarily depends upon the demands of the ordinary trunk service, but as a rule special contracts can be accepted for the use of lines before 9 or 9.30 a. m., between 1 and 2 p. m., and after 4.30 or 5 p. m. For long periods, of not less than six hours between 5 p. m. and 6 a. m., still more favorable rates of charge are in force, based on the actual length of the line used. For periods of between six and twelve hours the charge is as for six hours, with an addition of $1.20 per mile per annum up to a maximum of $17.00.

New Telephone Receiver.

BY ANDREW PLECHER, LAS ANIMAS, COL.

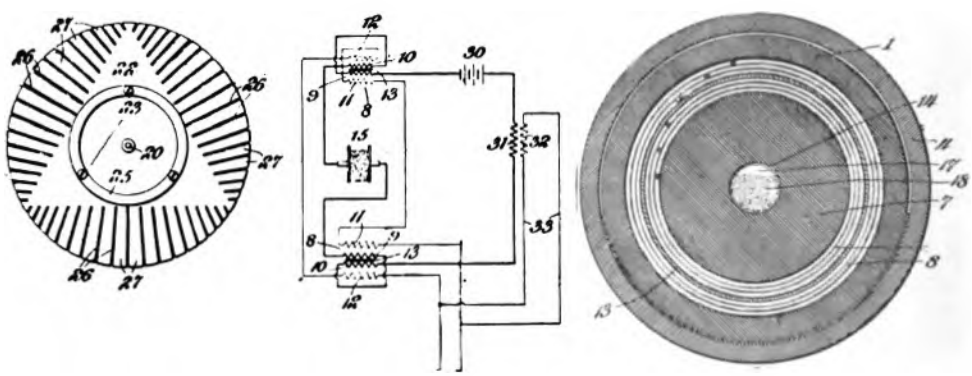
In the early stages of the art of transmitting sound-waves over wires by means of electrical waves a receiver was used. Reis first adapted the telegraph for transmitting sound waves. He used an ordinary telegraph contact actuated by a rubber drum as a transmitting device; and as a receiver the ordinary old telegraph magnet with or without an armature. The receiving depends upon the so-called Page effect, named after the man who first recognized the molecular vibrations of a magnet.

When Dr. Alexander Graham Bell invented his magneto-transmitter, the operation of which is due to the inductive action of a vibrating diaphragm-armature on a magnet, the receiver magnet had to be encased in the same way as the transmitter, since it served the twofold purpose of transmitter and receiver. However, it really was a transmitter and not a receiver; for, as a receiver it operated by the Page effect, as was proven by an investigator who used a diaphragm one foot thick without destroying its operativeness as a receiver, but it certainly did destroy its effectiveness as a transmitter. Since then could evidently not be a receiver with an ordinary telegraph magnet. My attention was directed to the wireless art, but I was disappointed, for the coherer needed a telephone receiver to be of any service. Patent No. 744,936 for wireless telegraphy was the result of this diversion, although by hook-or-crook the part especially referring to the wireless receiver was omitted in the application and the part referring to the telephone and annunciator was described as a wireless receiver. I was well aware that a telephone receiver comprising a liquid could never become popular, so I reverted to the magnetic principle.

A new magnet had to be designed, and the idea occurred to me of using the induction coil directly in the telephone receiver. The fact that every induction coil had to be constructed by the cut-and-try-method led me to invent a new induction coil.

This new receiver is made up of three separate, patentable parts, namely, a new induction coil, a new diaphragm, a microphone taking the place of the circuit-breaker of an induction coil.

The induction coil is built up to obtain a balancing or tuning effect in the different circuits by first winding the secondary on a non-inductive



DIAGRAMS SHOWING CONSTRUCTION OF NEW TELEPHONE RECEIVER.

nothing has been done even as regards shape, and few if any improvements have been made excepting in the use of better quality of materials and better construction.

A few years ago Mr. Charles J. Glidden, a well-known telephone official, offered a one-million-dollar prize for a device which would establish telephonic communication between San Francisco and New York. A paper containing this announcement happened to fall into my hands and I began investigations. After some trials I designed an alternating current transmitter in which the diaphragm operated a lever with a double contact. This instrument was not a commercial success, but it proved to my satisfaction that not the transmitter but the receiver prevented long distance communication by choking off high-frequency alternations.

Completely convinced, I set to work to find a receiver which would not choke off waves without having produced the desired effect. This spool, and upon this the primary, then slipping over these windings an annular magnetic core, winding another primary, then a secondary, on the outside of the annular magnetic core, and encasing the whole with non-inductive material. The primary circuit includes the battery and the microphonic element. The battery current produces permanent magnetism in the annular magnetic core, whereby the energy of the magnet can be controlled to the finest degree, a feature not possible in the old receiver. The interaction of primary and secondary on each other becomes a definite quantity, and the whims and stubbornness of a horseshoe magnet are avoided, thus the new receiver has a hundred possibilities not to be found in the old receiver.

An auxiliary induction coil is shown, not because such is necessary for the receiver, since its embodiment in the new receiver in place of the horseshoe magnet forms one of the principal ideas of the invention, but to show how a second receiver-coil may be connected into the different circuits. It is evident that the induction coil in the new receiver dispenses with the one necessary in the transmitting circuit of the old arrangement. Multiplex telephony has a chance unknown before.

The circular magnetic diaphragm has very fine incisions from the periphery inward, so as to form reeds or teeth similar to those in a music box, but leaving an inner circular space free of incisions. It is supported near the new magnet in such a manner that the supports form fulcra between the inner circular space and the outer comblike parts. The annular magnetic core acts on the tips of the reeds or teeth of the diaphragm. By reason of the spring-leverage of the new diaphragm due to its manner of being supported, the size of the new diaphragm is not limited to a few inches in diameter as in the old receiver, but may be made larger to meet requirements. Everyone is supposed to know that if the old receiver diaphragm is made any larger in diameter the middle part will dent inward towards the magnet and short-circuit the poles and stick permanently to them.

To the inner circular space of the new diaphragm is attached a microphonic element operated by the diaphragm. The microphonic element finds ample space in the bore of the spool of non-inductive material upon which the induction coil is wound. A granular carbon microphone is shown, not because it is the best for the purpose, but because it was easy to show on a drawing.

The use of a microphone in a receiver is an entirely new feature, and would lead the casual observer to think that the instrument was designed to serve two purposes, but this is not the case. The microphone in the new receiver makes receiving possible by augmenting and accentuating the fluctuations of the current in the primary circuit. The reader should observe now that the new magnet gives the highest electro-magnetic elasticity and the microphone in conjunction with the spring-leverage of the diaphragm give the highly desirable, unstable equilibrium of the mechanical parts of the new receiver. It is thus ever ready to respond fully and forcibly to the lowest as well as the highest frequency of incoming alternations and translate them into audible sound waves.

Platinum Production.—The world's production of platinum was 314,323 Troy ounces in 1911, compared with 286,952 ounces in 1910. All of the platinum mined in the United States in 1911 came from California and Oregon, the total being 628 ounces, valued at $18,138. As was noted in our issue for August 16 platinum has been discovered in the vicinity of Nelson, B. C., and several plat inum experts have examined the deposits. Siberia has been up to the present time the largest producing country of this valuable mineral.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

In testing the insulation of a cable what causes deflections to gradually decrease?

How frequently are the deflections read in cable testing?

If a piece of cable 1,000 feet long has an insulation resistance of 1,000 megohms, what will be the insulation of a piece half as long?

What is the rule employed to ascertain the average insulation resistance per mile?

Why do variations of temperature at which cable tests are made affect the results?

Can an insulation test be made with a telephone in place of a galvanometer?

Describe how this is done.

If clicks are heard in the telephone in making such tests, what are they due to?

How is a cable tested for insulation resistance?

How is a ground connection tested?

How is a cable tested for loss of charge?

How is a cable tested for capacity?

How is the conductivity of a cable tested?

In testing for faults in cables why is it necessary to use the Varley or Murray test?

Describe the Varley test for a fault or earth connection.

What is the difference between the Varley and Murray tests?

How are faults located by unreeling cables?

Is a voltmeter adapted for testing cables, and is it as serviceable as a galvanometer in such work?

What apparatus would constitute a good testing outfit, using a voltmeter?

Study the method of testing resistance with a voltmeter.

When a number of readings are to be taken, how is the voltmeter constant obtained, and how is it used?

If it is desired to ascertain the resistance of the voltmeter, how can it be done?

If the deflection of a voltmeter is, say 50, and enough resistance is added to the circuit to reduce the deflection to 25, what is the explanation? Can the resistance of the voltmeter be ascertained from such a result?

(To be continued.)

Development in the Telephone and Telegraph Business.

BY P. KERR HIGGINS, SAN ANTONIO, TEX.

(Concluded from page 574.)

As in baseball, football and other games, it is team work that wins, so in the telephone business we must have a "star team" rather than a "team of stars." The same remarks apply to the work in the operating room, which is the most important point in our organization, as it is here the patrons and company representatives are constantly in touch with each other. One little break of an operator can annul the work of the rest of the company for months. A good maxim of business is to get the employe into the right frame of mind, and the work and wages will care for themselves. The object sought is to get the employer and the employe to appreciate and know that their interests are mutual, and it is only as this becomes an accomplished fact that any real development or advance can be made.

Now comes the question of getting the employer into the right frame of mind. One of the fundamental laws laid down by that great teacher of business methods, F. F. Sheldon, is that "The value of the individual, no matter what he is doing, increases as the degree of supervision which his work requires, decreases. The greater the degree of supervision which your work requires, no matter what you are doing, the less your value." This is very plain language, and the facts are true and should be placed over each employes' desk in letters of fire, so that it could never get out of sight. The converse of the statement just given also holds true, namely: "The less supervision your work needs, the greater your value"—to the company. There will always be heads of departments wherever there are large employing units, but their efforts should be more and more spent in directing and not in supervising. This is the evil of business today and where the greatest leak lies, namely, that too much expensive help is wasted in supervising and enough help is not permissible in directing the work, hence the problem of the business of the future is to develop and train the employe up to the point where supervision is unnecessary, and the present supervision can then properly and efficiently direct the work and initiate new methods and develop new business.

Life is made up of two great factors, one positive, the other negative; one building, constructing, developing; the other destructive, critical, always on the lookout for something to tear down. "Light has its darkness, heat has its cold." and in man whom we find to be a physical and mental being, we find in the realm of the physical, health and sickness, strength and weakness. In the realm of the mental we find judgment and injudiciousness, reason and unreasonableness, memory and forgetfulness, faith and doubt, love and hate, honesty and dishonesty, tact and inexpediency, courage and fear, loyalty and disloyalty, decision and indecision, action and inactivity. It has been said that a close analysis of the qualities of man reveal fifty-two or more distinct varieties. The statement has been made that all errors are classed as of omission and commission, and that they are directly traceable to the negative characters, hence the elimination of errors can only be accomplished by the development of positive characters, not the "know it all" kind, but the cultured, trained, developed, positive character built along proper lines on a sure foundation; just as the night must go when the day breaks; so must the "destructives," "the critics" go as the builders and developers multiply. All growth is the result, directly or indirectly, of encouragement, and when the destructive critic is not encouraged, then the builders will get to work and progress, and advancement will be the order of the day. It is conceded that the positive characters are not always what they should be, but this is only a question of education in which modern thinkers and writers are doing the pioneer work. Pure, right, positive thought is, or will be, the prominent feature in the coming civilization. When a man is "all in" physically, what does he do, or rather what should he do?; develop his muscles. So it is when the mental condition is not what it should be, we must develop it along proper and scientific lines, which fortunately are now well defined and understood. If your memory is poor, develop it with practice; stop using your arm and it becomes paralyzed; so it is with the mind, we must use it, not abuse it, so as to get the best results, hence it follows if you are a negative character, you must develop the positive; if you are naturally of a destructive character you must cultivate the constructive and be constantly on the alert for opportunities to do so. Do not be a mental imbecile; if you do, the fault is yours and yours only; stir about and develop in yourself the traits that you see make for success in the life of others. Thought (mind) is made up of three prime factors, knowing, feeling, willing, and the thought may be cultivated or stopped at any one of these stages by developing the will. Education (mind)—we must develop the power to know, the power to discriminate, the power to feel and the power to do. "Do you lack courage? develop it. Do you lack power? develop it. Do you lack money? work for it. Are you unsuccessful? think success and go after it, as it will not come to you."

To succeed as a manager you must be a well developed, rounded individual, developed and educated so as to command and receive the loyalty and support of those subordinate to you, and the respect and confidence of the subscribers to your exchange, and these will compel the company to respect and recognize your eligibility for promotion. The true philosophy of life is, "I can do what I will, and I will do what I should."

THE PATRON.

So far, we have spoken to the manager in regard to himself principally; now we must consider him in regard to his association with and treatment of the patron. First of all, he must be a student of human nature. He must study his people, know them, as far as possible, personally; their habits, mode of living, temperament, etc. He must read and know them from their faces and actions. The expression on some faces is more pronounced than on others, but is developed more or less in all. What they think they usually feel and show in their faces and actions. Most of this education and training can only be learned in the school of life, hence the necessity for developing observation. Many books have been written along these lines and their perusal will save much time in acquiring this desirable talent. In dealing with the telephone patron, whether it be in regard to a complaint, a rebate, a collection, to retain or obtain new business, the consummation of the deal hangs usually in a most delicate balance, the scales of which go up or down on the right side, according to the success the manager has had in reading the patron as to his type and temperament.

FACILITIES FOR CONVERSING.

The thing we have to sell in the telephone business is service or providing subscribers with satisfactory facilities for communication with each other. In presenting telephone facilities or service to a prospective subscriber, it is well to remember that "Points" not words are the most effective. It is possible to talk too much, but every thing in favor of the telephone should be introduced up to the point of decision. This necessitates knowledge of what we are selling and few telephone salesmen make a success for the very reason that they are not fully posted as to the principal features of what they are selling; in other words, they have no telephone experience. You must know your goods; a mere repetition of points, without knowledge, is often fruitless as the prospective subscriber is likely to ask questions and will want intelligent answers.

The successful manager, or solicitor, must be able to analyze the whys and wherefores and speak intelligently of the telephone business. There is so much in connection with it that the public does now know that he is usually bombarded with questions. As soon as the prospect has been induced to subscribe and actually "signs-up," the conversation should be stopped or the subject changed. The science of business is the science of service, and he profits most who serves best.

The telephone business is no longer an experiment; it is an essential and necessary part of business machinery, and those who do not want or need it are few and far between; hence no apology is necessary.

There is a part of telephone development which has been very much neglected, namely, the necessity on the part of some subscribers for additional trunks or telephones for extension sets and private branch exchanges, and so on. Many telephones save steps, time, energy and labor, and it is only a question of time until no hotel will be up-to-date without a telephone in each room, and no desk important without a telephone on it. This is a mechanical age and more and more soliciting of business will be done by telephone. Telephone companies are becoming alive to this fact and are in many cases actually encouraging the habit. There are great possibilities in this portion of the work for the telephone manager or solicitor. The great talking points are: Economy of time, money and energy.

CLOSING CONTRACTS.

Three things are extremely important in telephone soliciting:

1st—Secure and sustain the interest of the prospect.

2nd—Develop interest into attention.

3rd—Augment attention into desire.

The study of mental psychology is a great aid to managers and others in closing contracts. The mind of the prospective customer must be gradually led up the psychological path that leads to decision using the steps as previously indicated, namely, interest, attention, desire and decision. In order to attract attention, in some way the mind of the customer must be emptied of everything but the proposition set before him. "It takes the personality that is born of the development of the positive qualities in the individual to command and hold attention and create confidence which is the basis of trade." Interest is made up of the same stuff as attention. No success ever was achieved without interest on the part of both buyer and seller. No man ever sold and bought without being interested; but we must not stop at interest as many people are interested that do not buy, but we must strive to culminate interest into desire and desire into decision and action on the part of the prospect.

CONCLUSION.

Above all be honest and sincere in all your dealings with the public, let your every statement bear the stamp of truth. It is not an easy task to develop, but it is interesting and profitable work. Work hard; better to "wear out than rust out," and very few people suffer from over-work. Remember that genius means hard work and lots of it, and before you can be a genius you must be a drudge. "When you get to the top of the ladder holler for more ladder." Many people want to be satisfied, but I want to tell you there is no happiness in satisfaction. It is that constant anticipation that keeps us alive and the realizations are lost in the struggle for success, being simply looked at by the aspirant as stepping stones to higher things. "Hitch your wagon to the stars and go after success." Think big, feel big and you will do big things and do not forget that "do it right now" is a great nerve saver; get your happiness out of your work and work will never be a drudgery but a pleasure. Remember that what is worth doing at all is worth doing well; inject thoroughness into your work and you will succeed as a holder of present business and a developer of new business.

Methods of Testing Dry Cells.

(*Concluded from page* 568.)

The test is considered completed when the impulse current at the end of a period falls below four amperes. Report the results as the number of hours of actual discharge to the limiting value of impulse current.

Particular care should be taken to keep the temperature of ignition test batteries as nearly constant as possible, as the service obtainable is greatly influenced by this factor.

Flash-light Batteries.—Discharge the battery to be tested through a resistance of four ohms for every cell in series (eight ohms for a two-cell battery and twelve ohms for a three-cell battery), for a period of five minutes once each day until the closed-circuit voltage at the end of a discharge period falls to 0.75 volt per cell (1.5 volts for a two-cell and 2.25 volts for a three-cell battery).

The following readings are taken:

1. Initial open-circuit voltage and short-circuit current.
2. Initial closed-circuit, or working voltage.
3. Closed-circuit voltage at the end of the first, third and seventh periods of closure, and after each seventh period thereafter.

Report the results as the number of minutes during which the battery was discharged through the resistance to the given end point.

In case the circuits are not operated mechanically, the results are not materially changed if the batteries are discharged only on working days. Four ohms per cell is chosen for the resistance in circuit, since the tungsten bulbs generally used with a three-cell battery have a resistance of approximately twelve ohms.

Miscellaneous Service.—In addition to the telephone and ignition services, which are by far the most important services, may be mentioned the operation of automobile horns, sewing-machine motors, small fans, toys, massage vibrators, cigar lighters, bells, buzzers, etc. In the aggregate these miscellaneous services consume energy from an enormous number of cells, but they are so numerous, and there are such variable conditions prevailing in each kind of service, that it would be useless to attempt to develop standard tests covering them.

It is not difficult for anyone particularly interested in any special service to arrange a suitable test for himself. Care should be taken to make the conditions of test, viz., number of cells, resistance in circuit, period of drain, etc., approximate those of the service in question.

Rate of Deterioration on Open Circuit.

The voltage and short-circuit current of the cells for test are read initially in order to insure that the cells are in good condition. The cells are then stored in a dry place at normal room temperature.

The following readings are taken:

1. Initial voltage and short-circuit current.
2. Short-circuit current at the end of four weeks, eight weeks and each eight weeks thereafter.
3. Voltage at the end of six months.

The cells are kept on the shelf until the short-circuit current has fallen below ten amperes. This point is arbitrarily chosen, as it represents a point below which it would be difficult to market the cell. For practical purposes, the results are expressed as the number of months during which the short-circuit current remains above this cut-off point. Much more meaning, however, is attached to the rate at which the current falls, generally reported as the drop in amperage for a given period expressed as a percentage of the initial amperage. This is especially true when investigation of the quality of cells is the object. For practical purposes, however, the first rating given, i. e., months to ten amperes, is perhaps preferable.

The results from this test are largely indicative of increase in internal resistance, and bear no definite relation to the service which the cells may give. However, this information, coupled with familiarity with a brand of cells, becomes a very good indication of its quality. It also serves to indicate any serious defects of manufacture.

The ammeter for reading short-circuit current should be deadbeat, and with its leads should have a resistance of 0.01 ohm. Particular attention should be given to the temperature at which cells are stored, as the rate of deterioration is influenced to a marked degree by the temperature of the cells.

The ideal method for an open-circuit deterioration test would be the determination of the decrease of service capacity due to storage over definite periods. This practice, however, would entail much labor and expense where the amount of testing to be done is large.

The question may arise in the mind of the consumer as to what extent the cells he purchases shall be tested. It obviously would not be practical for the small consumer to conduct tests on the same scale as those carried on by a consumer using many barrels of cells per year.

It is impossible to formulate any set rules for sampling and testing for any consumer or group of consumers, as the amount of testing done must be regulated by the relation of the cost of testing to the value of the cells purchased. However, we present here suggestions as to the adaptability of these methods to several roughly classified groups of consumers.

The Small User.—In this class may be included the great percentage of consumers. We advise that every cell purchased be read for short-circuit current. Although this reading gives no direct indication of the service capacity of the cell, yet, if the reading is normal for that brand, it may be reasonably certain that the cell is in good condition. It would be impractical for the small user to provide himself with an expensive ammeter, as, for his purpose, a good make of pocket instrument will give readings sufficiently accurate.

THE SMALL DEALER.—This class comprises those dealers who may dispose of from a few hundred to a thousand or more cells per year. The dealer is particularly interested in keeping the quality of his stock up to the standard. As cells are received, a representative sample, say ten per cent chosen at random throughout the lot, should be read with a reliable ammeter. If the readings are normal it would scarcely profit to make any further tests. For his protection all cells should be read with the ammeter before being delivered to customers.

THE JOBBER.—The jobber buys and sells dry cells largely by barrel lots, and in many cases conducts no tests whatever. If he is desirous of keeping his quality strictly up to standard, it would be well to open several barrels in each shipment and test with an ammeter a dozen cells chosen at random throughout the barrel. If the large jobber wishes to carry the best grade of cell for any service, it would probably pay him to conduct the recommended telephone and ignition tests on a small scale.

TELEPHONE COMPANIES.—The small telephone company consuming less than ten barrels of cells per year could install a standard telephone test of small capacity by fitting suitable electrical contacts on a clock and connecting these with a telegraph relay in such a way as to cause the latter to open and close the dry-cell circuits. We would advise that such a test be maintained by each company and that periodical tests (at least four per year) be made on the shipments of cells received and also on small lots of other brands purchased from time to time for the purpose of test. The small company should also test a representative sample (say, ten per cent) of all consignments received, with a good ammeter.

The large telephone company using many barrels of cells per year can well afford to install an apparatus for carrying on the test suggested in this report. We would advise that a battery of three cells from each consignment received be placed upon the telephone test. In addition, the short-circuit and open-circuit voltage should be read upon a representative sample of all cells received.

The Office at Spirit Lake.

BY JEFF W. HAYES, PORTLAND, ORE.

Mr. Hugh McPhee, the genial district commercial superintendent of the Western Union Telegraph Company at Los Angeles, Cal., was night operator at Spirit Lake on the trans-continental line in his early boyhood days. Every operator that worked for the trans-continental line knows Spirit Lake because each one of them served an apprenticeship at that station.

The O'Shaughnessys kept a boarding house at Spirit Lake, the only house at this dismal place, but because young McPhee insisted upon wearing a "boiled" shirt and white collar, he found himself debarred from putting his feet under the O'Shaughnessy table. The young man, however, was full of resources and determined to do his own cooking and sleep in the office.

The first station east of Spirit Lake was then called Hades and the station west was named Satan. McPhee would get his milk and eggs from Hades and his staple groceries and meats from Satan. The names of these stations have long since been changed to something more euphonious.

The fact that there was an operator in Spirit Lake office at night induced the belated trainmen to call upon him repeatedly for orders helping them over the road and presently McPhee found he was working as much at night as he was during the day. An appeal to the superintendent was made and a few days later the train stopped at Spirit Lake and a tall young man, very dudishly dressed, stepped into the office.

"My name is Archibald Merriman and I am to be night operator at this station," began the young man. "Where can I find a boarding house?"

Young McPhee told him that he would have to take "pot luck," that there was no hotel or boarding house, but that he could share his commissary.

This did not seem to greatly enthuse Merriman, who stated that he did not know how to cook or make a bed. He was from Nova Scotia and he thought if he could go back there he would never return.

He worked for five nights and one morning he was missing and nothing was ever heard of him afterwards.

An old Indian called "Big Thunder," but better known as "Medicine John," was a frequent visitor to this lonely depot and he suggested that the "Evil Spirits" in the lake might have kidnapped the night operator and thrown him into the lake, and in-as-much as no claim was ever made for the five days' work performed by Merriman, the matter was so very unusual to the telegraph company that one is lead to believe that the old Indian was correct.

Big Thunder had purchased from Merriman a big brass watch and chain, which he carried on the outside of his coat. The Indian had also fallen heir to Merriman's plug hat and it is still historical in Spirit Lake. When Big Thunder was asked the time, he would gravely open the watch, gaze for a minute at the hands and give out the information "Just half an hour." Were he asked a hundred times a day, he would never deviate from his reply, "Just half an hour."

Spirit Lake, Mr. McPhee says, is now a great summer resort. The O'Shaughnessy hovel has made way for a very pretentious hotel, "Big Thunder" no longer gives out the correct time to enquirers and the spirit of progress is marching on.

Uplifting the Craft.

Editor of Telegraph and Telephone Age:

Sir: In the issue of August 16 there appeared an editorial contribution under the caption "Uplifting the Craft." The writer of the article says in part: "It has always been regarded as an obligation upon a successful business man that he owes something to his *alma mater* for his success, whether he be a banker, a lawyer, a railroad man or a telegrapher."

Why not emulate the printers? The late Hon. George W. Childs and Hon. Anthony J. Drexel, both of my native city, whose interests in the newspaper publishing were closely allied, realizing the arduous nature of the work to which their employes were subjected, formulated a project for establishing a home for old and disabled members of that craft. It was their belief that if a man was faithful and conscientious in his work, he should have something to look forward to in his old age, and not be dependent on charity.

With this object in view—and they were not rich men as the term is now applied—they donated a very substantial fund to establish the Printers' Home in Colorado, making the stipulation that the printers throughout the entire United States should contribute a certain amount each year for its up-keep.

The home has been successfully conducted for a number of years, and the last annual report of the trustees show an accumulation of many thousands of dollars, notwithstanding the large number of members who were taken care of alive and who received decent interment after death.

The printers themselves do not look upon it as accepting charity, as they have for years been setting aside the amount of money earned by each during one hour in the year, on the birthdays of the illustrious founders, the eastern printers adopting the birthday of one and the western printers that of the other.

Why could not the successful ones in our craft, with our co-operation, do likewise? The mention of Mr. Carnegie as the richest former telegrapher does not necessarily infer that he should be asked to shoulder the task, as we have many other illustrious examples, such as Mr. Thomas A. Edison, Mr. Theo. N. Vail, Mr. Frank A. Munsey and many others that I might mention, who, although perhaps not so well endowed with worldly goods as is Mr. Carnegie, are at least fairly well to do, and no doubt would be willing to help us if we displayed any interest in such an undertaking and approached them in a proper way.

I feel reasonably certain that the many thousand commercial, railroad, broker, newspaper and private-firm operators throughout the country would willingly contribute a small amount yearly to such a fund for establishing a home similar to that of the printers.

You will readily understand, this is merely an acceptance of your invitation for an expression of individual views, and is written as an appreciation of the interest you take in the welfare of the humble operator and in the hope that it may induce others to give expression to theirs.

D. A. Mahoney.

[The "Home" proposition for telegraphers has already been thoroughly thrashed out. Many so-called homes for aged employes have been failures because after their establishment it was found that old people would not leave their former associations and enter a home away from where they have been accustomed to live. Some fifteen years ago a canvass was made of the very old-timers, and the opinion then expressed by each was that they preferred to live in the locality where they were well known and be permitted to earn enough to keep them alive rather than become members of a home located perhaps hundreds of miles away from the scenes and associations to which they had become attached.—Editor.]

Retirement of Mr. J. L. Newton.

Mr. Jerry L. Newton, who recently retired from the managership of the San Antonio, Tex., Western Union office, after a service there of thirty years, in a recent letter to the publisher of this paper writes:

"Now that I have finished playing my part in the great telegraphic drama, and have retired from the stage and am trying to enjoy the halcyon days, though with a degree of sorrow and keen longings (at times) for the olden haunts, I find comfort in perusing the Age; and its semi-monthly calls, for the nonce, drives dull moments away.

"May the frosts of coming winters,
"Never pale or chill your brow;
"May the touch of gentle Spring-time,
"Keep you vig'rous then as now."

Mr. Newton served three years in the Union army during the Civil War, and in 1866 and '67 he was a justice of the peace and taught school. He entered the Western Union service in 1868.

Patent Insurance.—A new insurance company has been formed in England, whose purpose is to "undertake insurances to cover the liabilities of patentees and others for the costs and expenses of prosecuting and defending actions in connection with letters patent, designs, and trade-marks, and other monopolies, including any damages awarded against defendants in such actions." The proposal is to insure the validity of patents after examination. Both British and foreign patents will come within the scope of the company's operations.

This Messenger Got There.—An English telegraph messenger climbed a scaffolding around a village church spire, which was being repaired, 150 feet high, in order to deliver a message to the foreman in person.

Telegraphones on the Chicago Great Western Railroad.*

BY G. O. PERKINS, SUPERINTENDENT OF TELEGRAPH, CHICAGO, ILL.

Since the advent of telephone train dispatching, we see little in print about the telegraphone, yet there is a large field in which that useful and inexpensive device can be used to excellent advantage. Recent improvements have so increased its efficiency that telegraphone circuits are successfully operated under conditions which have heretofore been prohibitive. Nearly every railroad has territory where the volume of traffic does not justify the expense of installing telephone train dispatching circuits, yet the improved communication afforded by telegraphones will so reduce operating expenses that the installation would pay for itself in a few weeks.

The first extensive telegraphone installation on the Great Western was made on the Western Division. The only wires available were No. 8 iron with telegraph instruments cut in at every station. Circuits were established as follows: Clarion to Oelwein, 100 miles with five telegraphone stations; Clarion to Hayfield, 100 miles with five telegraphone stations; Clarion to Carroll, eighty miles with five telegraphone stations; Carroll to Council Bluffs, eighty miles with four telegraphone stations.

At Clarion the three circuits are equipped with extension howlers and terminate in a jack box. Two instruments, one for the exclusive use of the dispatcher and one for general use, are provided. Either instrument may be used on any of the three circuits by plugging in at the jack box.

At Carroll, one telegraphone and one extension howler are so arranged that they may be transposed from one circuit to the other by means of a double-pole, double-throw switch.

Instruments were installed permanently in all cabooses, and portable telegraphones were furnished for passenger trains. The results obtained have been highly satisfactory. During the unprecedentedly severe weather of the past winter the telegraphones proved veritable life savers. In every case of trains stalled in snow-drifts or stopped by other causes, the conductor was in communication with the dispatcher in less than five minutes, and relief trains were started without delay. This meant not only saving in time but saving in men, who otherwise would have been obliged to endure the exposure of tramping possibly five miles to a telegraph station during a blizzard with the thermometer forty degrees below zero.

In several cases where the telegraph service was completely interrupted by crossed, broken and grounded wires, train orders were issued without difficulty by telegraphone to points beyond the interruptions.

Telegraphones have also proved of great benefit to the maintenance of way, mechanical and traffic departments, and have noticeably reduced the burden on the telegraph wires.

Circuits on the Northern Division were arranged as follows: (1) St. Paul to Red Wing, fifty-eight miles No. 8 iron wire, seven telegraphone stations; (2) St. Paul to Oelwein, 187 miles No. 10 copper wire, four telegraphone stations; (3) Red Wing to Rochester, forty-nine miles No. 8 iron wire, three telegraphone stations; (4) Randolph to Mankato, sixty-seven miles No. 8 iron wire, three telegraphone stations.

The superintendent and dispatchers are located at St. Paul, and the assistant superintendent at Red Wing. Circuits 1 and 2 pass through Randolph and No. 4 terminates there. Switches are installed at that point by means of which either Red Wing or St. Paul are given direct telegraphone communication to Mankato without disturbing the telegraph circuits.

On the Southern Division pole line there are from fifteen to eighteen duplexed and quadruplexed wires, and the inductive disturbance is so severe that standard telegraphones cannot be used for distances greater than fifty miles. The only wires available for telegraphone purposes are No. 8 iron, and over a large part of the division they have telegraph instruments at every station. To meet these conditions, a special telegraphone has been developed and has made possible the successful operation of the following circuits: Des Moines to Oelwein, 132 miles No. 8 iron wire, four telegraphone stations; Des Moines to Conception 120 miles No. 8 iron wire, four telegraphone stations; Conception to St. Joseph, forty miles No. 8 iron wire, four telegraphone stations; St. Joseph to Leavenworth, thirty-four miles No. 8 iron wire, six telegraphone stations.

An experimental circuit, Des Moines to St. Joseph, 160 miles, on No. 8 iron wire with thirty intermediate telegraph offices on the wire, worked successfully. The special features of the new telegraphone consist of a high efficiency transmission device with push button, such as that used on telephone train dispatching circuits; also a double head telephone with a receiver for each ear, and an improved method of eliminating telegraph inductive disturbance from the receivers.

* From "Great Western Employes' Magazine."

New French Printing Telegraph.—Mr. B. Soldatencow, Paris, France, has invented a printing telegraph which comprises an electro-magnetic device having two distinct actions and provided with a single solenoid by which means it is possible to obtain different and distinct effects. It is thereby possible to reduce the consumption of current, as well as size and cost of apparatus.

Cape-to-Cairo Telegraph Line.—The Cape-to-Cairo, Africa, telegraph line which was projected by the late Cecil Rhodes was extended in 1905 to Ujiji on Lake Tanganyika, but has not been built any further. The development of wireless telegraphy is thought to have rendered the project less vital than it was several years ago.

Reduction in Western Union Cable Rates.

A reduction in the rate for press dispatches between New York and London over the Western Union cable system went into effect September 1 and formal announcement of the reduction was made at the same time in England by Postmaster-general Samuels of Great Britain.

Following are the new rates: General day and night press rate between London and New York, seven cents a word. Former rate, ten cents a word. London to New York, 12 midnight to 6 a. m. (London time), five cents a word. New York to London 12 midnight to 6 a. m. (New York time), and 1 p. m. to 4 p. m. (New York time), five cents a word.

This reduction is intended to facilitate the transmission of news at the periods most useful to the newspapers on both sides of the ocean.

On September 6, the following announcement was made by the Western Union Telegraph Company:

"The Postmaster-generals of Great Britain and Canada announce that at an early date reduced rates for cable messages will become effective over the Western Union cable system between Great Britain and the United States and Canada. The precise date will be announced later when detailed arrangements have been completed.

"The rates quoted apply to all points in Great Britain and to such points in the United States and Canada as hitherto have been within the so-called twenty-five-cent zone. For points beyond this zone, certain land line charges will be added as at present. These reductions will not apply, for the present at least, to continental countries of Europe.

"The new rates are as follows:

"1. Regular messages, twenty-five cents per word. Code or any language permitted. These messages will have priority in transmission.

"2. Reduced rate messages, nine cents per word. No code, except code address. To be written in plain language of country of origin or destination, including French in Canada. These messages will be sent at such times during the day or night as the company finds convenient.

"3. Night letters, twelve words for seventy-five cents, with five cents for each additional word. No code except code address. To be written in plain language of country of origin or destination. Night letters may be filed at any time up to midnight, and will be delivered at the convenience of the company within twenty-four hours of the hour of filing.

"4. Week-end letters, twenty-four words for $1.15 with five cents for each additional word. No code, except code address. To be written in plain language of country of origin or destination. Week-end letters must be filed before Saturday midnight and will be delivered Monday morning.

"5. Press rate (already announced and in effect) regular rate seven cents per word. Reduced rate for certain hours, five cents per word, as follows: Eastbound between 12 midnight and 6 a. m., and between 1 p. m. and 4 p. m. New York time; Westbound between 12 midnight and 6 a. m. and between 6 p. m. and 9 p. m. London time. This latter period is equivalent to 1 p. m. to 4 p. m. New York time."

The Postmaster-general of Great Britain made a like announcement in London.

Referring to these new rates, president Theo. N. Vail, of the Western Union Telegraph Company said:

"The great bulk of the cable business is handed in during a few hours of the business day which results in an overload at certain hours and lack of load at other hours. Any new or uniform cheap rate which does not discriminate as between important and unimportant business of recognized urgency would bring disaster to international established business relations, because of the congestion which would occur during the limited business hours common to the two continents. This applies particularly to trans-Atlantic business because the difference in time gives to both sides only a limited part of the business day in common.

"Neither English, Australian nor English South African business is affected by difference of time to nearly such a degree. Urgent affairs are entitled to some preference, and it is necessary that the facilities should be ready for prompt transmission when business men of the two continents require rapid intercommunication. Therefore, any system of rates must be like freight tariffs, based on the character of the business and of promptness of transmission and delivery.

"The codes now in use have been made up without any reference whatever to the standpoint of cable transmission either as to speed, transmission efficiency or chance of error and had it not been for reasons beyond control of the cable companies would never have been accepted by them. These codes are for the most part intricate and much too costly for the occasional or ordinary user.

"We think there is a considerable field for the plain language message and that the rates which have been arranged for such messages will be availed of by many large customers and almost all of the smaller regular customers, particularly by the occasional and transient customer or traveler to whom an elaborate code is not only expensive but inconvenient."

Conductor and Insulator in One.—A piece of wood freshly cut from a tree is a good conductor; heat and dry it and it becomes an insulator; bake it until it becomes charcoal and it becomes a good conductor again, and finally, burn it to ashes and it becomes once more an insulator.

Mr. R. M. Ross of Detroit, Mich., in renewing his subscription for another year, writes: "TELEGRAPH AND TELEPHONE AGE is a good thing. Send it along for another year."

The Railroad.

Mr. W. F. Williams, superintendent of telegraph, Seaboard Air Line, Portsmouth, Va., was a recent New York visitor.

Mr. C. A. Vermillion, Portland, Ore., has been placed in charge of the car service and telegraph departments of the Spokane, Portland and Seattle and the Oregon Trunk Railways.

Mr. William B. Scott, a former telegrapher and train dispatcher on the Canadian Pacific Railway, has been elected president of the Harriman Lines in Texas and Louisiana, with headquarters in New Orleans, La.

Mr. E. L. Kemp, freight agent for the Illinois Central Railroad, at Louisville, Ky., and a former telegrapher on the same line, has been appointed assistant superintendent of the system, with headquarters at Princeton, Ky.

Mr. Andrew R. Taylor, superintendent of the Louisiana Division of the St. Louis, Iron Mountain and Southwestern Railway, with headquarters at Monroe, La., is a former telegrapher. He studied telegraphy while attending college at Abingdon, Va., and served as operator and train dispatcher on various railroads in the South.

Mr. J. F. Caskey, superintendent of telegraph, Lehigh Valley Railroad Company, South Bethlehem, Pa., announces that a telephone train dispatching circuit is now being established on the last section of the main line, from Manchester to Buffalo, N. Y., including four branches, which is the last of eight circuits between Buffalo and New York, including branches. An additional circuit will be erected on the Auburn, N. Y., division, and on another piece of road later.

The Flying Office.—A prominent railroad official recently said: "We railroad men don't have to be tied down to our city offices any more. We can get around over the lines, and see what is going on with our own eyes. Neglect our routine business? Not much! We do just as much if not more, with modern methods." This is all brought about by the fact that the majority of the private cars in the United States are now equipped with Western Electric telephones, which may be connected at each stopping place to the telephone line by means of a line pole. Over the telephone circuit thus established, the official transacts his routine business as well as takes care of any emergency which may arise. His private car is his office and without neglecting every-day matters he can make inspections or personally supervise any work. In the days before the telephone began to supplant the telegraph for dispatching the message work on railroads, this would not have been possible, for even if a temporary telegraph circuit had been rigged up, it would have been necessary to employ experienced operators at both ends. This would have meant that a personal message between the general manager and the superintendent would have had to pass through two intervening minds, which would of course have detracted from the personal-touch element. This is one of the many points wherein the telephone is vastly superior to the telegraph for use on railway systems.

History of the Harriman Monument.

The final act in the work of establishing the monument at Harriman, N. Y., to commemorate the sending of the first train order by telegraph has been closed in the issue of a handsome pamphlet giving a history of the movement, its execution and its completion.

The story is an extremely interesting one, and it covers the project from its conception in 1910 to the dedication of the monument May 2, 1912. It contains portraits of the committee having the matter in charge and of those who took a prominent part in the dedication exercises. A portrait of Mrs. George S. Minot, of Brookline, Mass., niece of Charles Minot, whose progressive ideas and achievement the monument commemorates, is also shown. Among the other pictures are two of the monument and two taken of the assemblage at the dedication.

The pamphlet is artistically gotten up and copies are being sent to the subscribers to the fund as a record of the work and as such it will undoubtedly be highly valued by them. It contains a list of all the contributors and closes with a financial statement of the Fund Committee.

Believe in Your Business.

How a man feels towards his business is a strong factor in determining his success, says the *Commercial Review*. If he doesn't care for his business, and is always wishing he were in some other, he isn't likely to get ahead very fast or very far. Even though he says nothing, his lack of interest sticks out all over him.

It is human nature to think other kinds of business are better than our own. We see the pretty part of the other fellow's business, but not the other side. For hundreds of years men have looked with envy on those in other vocations. And it will always be so.

Success comes to those who work, to those who are dead in earnest, who believe in what they are doing, while the doubtful man, the fellow who wishes he were doing something else, is handicapped.

Feel that your business is a good, honorable one, and if things are quiet, try some new plan, remembering that most any business is just what we ourselves make it.

Mr. A. B. Cowan, superintendent Western Union Telegraph Company, Chicago, Ill., writes: "I would like to see your publication in the hands of every operator and manager in this district, as I know that a careful study of the educational articles it contains will mean more efficient and valuable employes for the telegraph company."

New Wage Schedule on Canadian Pacific.

The Canadian Pacific Railway Company's Telegraph, as noted in our issue for September 1, adopted a new schedule of wages for its commercial telegraphers, which took effect July 1. Following are some of the main provisions of the new rules:

Telegraphers' right of promotion shall extend over each telegraph superintendent's division and will be governed by merit, fitness and ability. Where those are sufficient, the senior telegrapher will be given preference.

Any telegrapher in good standing whose services have been dispensed with on account of reduction of staff will be given preference of reemployment when a vacancy occurs.

Telegraphers will be given an opportunity to learn the electrical branch of telegraphy, provided this is done on their own time.

Transportation optional with the company.

Telegraphers after four years service will be granted two weeks' leave of absence each year with pay at regular wages.

Half holidays will be allowed on public holidays.

At offices where four or more telegraphers are employed, except at repeater offices, the hours of duty shall be as follows:

Nine hours shall constitute straight day duty beginning between 8.00 a. m. and 9 a. m.

Eight and one-half hours shall constitute early morning duty commencing between 6.00 a. m. and 8.00 a. m.

Seven and one-half hours shall constitute split trick or early night duty.

Seven hours shall constitute late night duty and rate at which overtime shall be computed.

At repeater stations nine hours shall constitute day duty; eight hours night duty and seven hours all-night duty.

The average minimum performance on all Vancouver-Winnipeg, Montreal-Winnipeg, Montreal-Vancouver and Toronto-Winnipeg circuits shall be thirty messages per hour and on all other first class circuits thirty-three messages per hour, allowing thirty words to count as one message in case of press and twenty shall be counted as one message in railway service business and night lettergrams. Chief operators and traffic chiefs shall determine the carrying capacity of the circuit and any loss through interruption shall not be charged against telegraphers' average.

The schedule of wages shows that at Vancouver eighty-five per cent of the staff will receive $85 to $100 per month, and in Calgary the same percentage will receive $80 to $100 per month. In the Winnipeg main office eighty-five per cent gets $85 to $100, while at the Winnipeg station office the entire staff receives from $80 to $95 per month. In Toronto forty per cent of the staff will receive from $75 to $90 and in Montreal sixty per cent gets $75 to $90 per month.

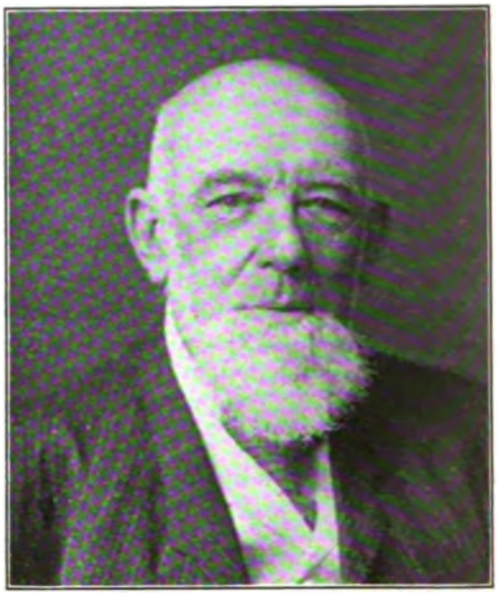
It appears from this schedule that the Canadian Pacific is now paying higher salaries than at present prevail in the United States.

Telephone Pioneers of America.

HENRY S. HYDE.

Mr. Henry S. Hyde, whose portrait we present herewith, is vice-president of the New England Telephone and Telegraph Company, and entered the telephone service in July, 1879, as treasurer of the Springfield, Mass., telephone company.

Mr. Hyde became vice-president of the New England Telephone and Telegraph Company soon after its organization and has been with that company ever since. He is interested in other business enterprises and has been treasurer of the Wason Manufacturing Company of Springfield, Mass., since its organization in 1862, which company manufactures railway cars of all descriptions; a director and chairman of the audit committee of the Massachusetts Mutual Life Insurance Company and vice-president of the Hampden Savings Bank.



HENRY S. HYDE,
Vice-President New England Telephone and Telegraph Co. (1879).

Mr. Hyde resides in West Springfield, Mass.

Electricity from Sunshine.—A French inventor has, according to a London dispatch, succeeded in producing a battery by which sunshine can be stored and transformed into electricity. It is stated that 500 large cells placed on the roof will in the day time store enough electricity to light six lamps at night. This seems to be a large equipment for such little results.

The Sins of a Telegraph Company.—A woman in Fort Smith, Ark., has sued a telegraph company for negligence in delivering money cabled to her husband in Greece for his return, and for deprivation of her husband's companionship and loss to her business entailed by his absence.

Wireless Telegraph Books.

Wireless Telegraphy and Telephony, by C. I. Hoppough, price $1.50; A B C of Wireless Telegraphy, by Trevert, price $1.00; Operators' Wireless Telegraph and Telephone Hand Book, by V. H. Laughter, price $1.50; Wireless Operators' Pocket Book of Information and Diagrams, by L. W. Bishop, price $1.50; Wireless Telegraph Stations of the World, published by the United States Navy Department, price 35 cents. Wireless Telegraphy, by Wm. Maver, jr., price $3.00; The Story of Wireless Telegraphy, by A. T. Story, price $1.00; Wireless Telegraphy and Wireless Telephony, by A. E. Kennelly, price $1.00. For sale by Telegraph and Telephone Age, 253 Broadway, New York.

Telegraphers of Today.

An excellent opportunity is offered to telegraph people in general to become acquainted with over 600 prominent telegraph officials and others identified with the telegraph, the railroad, the submarine cable service and press associations of the past generation, through their portraits and sketches of their careers as published in "Telegraphers of Today."

This work was issued in 1894 and includes biographical sketches of all the individuals connected with the interests mentioned at that period, many of whom have passed away from their earthly labors. The younger generation, however, will find much of interest in looking upon their portraits and reading of their achievements in life. Many of them are still alive and in harness, in the telegraph and other fields of activity.

This book, which is 11½ x 14 inches in size,

Mr. F. C. Lacey, manager of the Mackay Telegraph and Cable Company, Houston, Tex., writes: "I take pleasure in enclosing my check for $2.00, necessary to put me on the fair list of the Age for another year. Having read your publication almost continuously since its inception in the early eighties, I would regard this as a poor time to turn quitter."

The Old-Timers' Reunion.

Mayor W. S. Jordan, of Jacksonville, Fla., president of the Old Time Telegraphers and Historical Association, made a trip to New York recently and while there did some active work in connection with the reunion of that association and the Society of the United States Military Telegraph Corps in Jacksonville, on October 22, 23 and 24. President Jordan is giving much time and thought and putting forth every effort to make a great success of the reunion, and he is ably assisted by the members of the various committees. Judging from the preparations being made and the enthusiasm manifested in Jacksonville over the event, the visitors are assured of a hearty reception and a good time.

The reunion will be held at the Windsor Hotel. The business sessions of the two component bodies will be held October 22, and the two following days, October 23 and 24, will be spent in sight-seeing. At 8:30 p. m. October 22 the members and their families will be entertained by the Jacksonville Board of Trade, and the reunion will be brought to a close by a banquet at the Windsor Hotel in the evening of October 24.

HON. W. S. JORDAN,
Jacksonville, Fla., President Old Time Telegraphers and Historical Association.

Following are the names of the various committees and their chairmen: Reception, Old-Time Telegraphers, George H. Usher; Reception, Military Telegraph Corps, M. F. Robinson; Ladies, Mrs. A. E. Heston; Hotels, Mr. G. D. Ackerly; Badges, John S. Arnold; Banquet, L. J. Maxwell; Finance, W. F. Coachman.

It is desired to impress upon the members the importance of communicating with Mr. G. D. Ackerly, city recorder, Jacksonville, chairman of the hotel committee, who will be glad to make hotel arrangements for those applying to him, and to Mr. F. J. Scherrer, 30 Church street, New York, secretary, in regard to steamer transportation from New York to Savannah.

Jacksonville Enterprise.

No better evidence of the enterprise of the Jacksonville business community can be given than the hearty manner in which several of the most prominent institutions in that city have availed of the opportunity to call attention to their business through the columns of TELEGRAPH AND TELEPHONE AGE. The old-timers and military telegraphers who will visit that city in connection with the reunion of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, October 22, 23 and 24, would do well to note the enterprise of this southern city and return good for good.

We have repeatedly stated that the old timers would meet with a hearty reception in Jacksonville, but when the business men have seconded us in so substantial a manner as they have, there can be no doubt that the words will materialize into deeds at the proper time.

Our local advertising agent, Mr. J. S. Ernest, has shown great enterprise in getting Jacksonville people interested in the reunion, and we hope that the visitors will remember those who have favored us with their patronage.

Excursion of Western Union Electrical Club of St. Louis.

The second annual outing of the Western Union Electrical Club of St. Louis, Mo., was given on the evening of August 23. The officers of the Club chartered the excursion boat "Alton" for the occasion. There were about 250 members of the club, their families and friends on board. The steamer went down the Mississippi as far as Jefferson Barracks and returned at 11:30 o'clock. During the evening, music, dancing and social intercourse was indulged in and light refreshments were served, and all expressed themselves as having enjoyed a most pleasant evening. The work of the officers and the several committees was well done and they deserve much credit for the succees of the affair.

Among those present were: Messrs. W. R. Chapman, district commercial superintendent, W. J. Armstrong, district traffic superintendent, G. R. Alger, chief operator, T. J. Drohan, district cable agent, G. E. Sharp, H. A. Leslie, plant chief, C. W. Frey, assistant supervisor, E. A. McKnight, wire chief.

The officers of the Club are G. R. Alger, president; A. Turner, secretary; Miss L. M. Hood, treasurer.

The club will resume its regular winter's work on September 12.

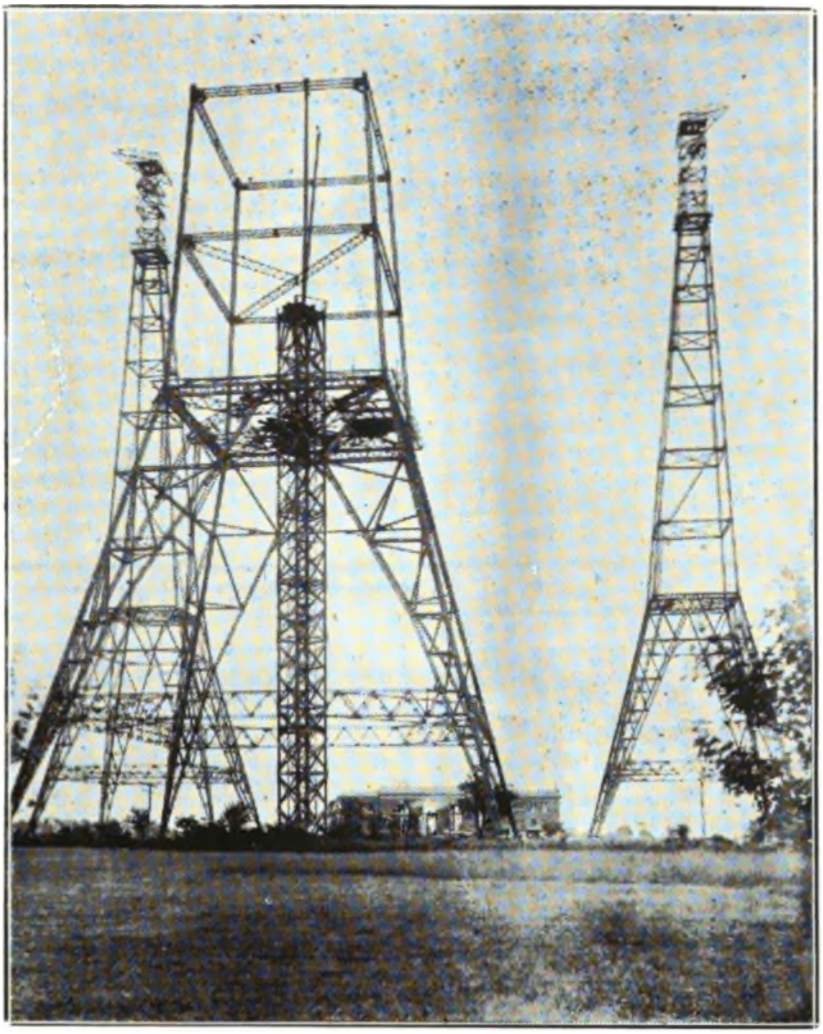
Arlington Wireless Towers.

The accompanying illustration loaned by *The Nation's Business*, shows the three towers and station being erected at Arlington, Va., by the United States Navy Department.

This station is to consist of three steel towers. One tower is to be 600 feet high and 150 feet square at the base, and the two smaller towers 450 feet high and 120 feet square at the base. All three are to be of ornamental steel construction. There will be three buildings connected with the station, to be of tapestry brick and in keeping with the ornamental construction of the towers. The first of these buildings will be the house of the officer in charge of the station. The second will be the receiving building, which will contain a sound-proof room for the apparatus, the dormitory for twenty operators, a library, a living room, kitchen, laundry, operator's office, the office of the officer in charge of the station, and a large laboratory for the test of apparatus. The third building will be the transmitter building, which will contain the engine room, a machine shop, a laboratory, and several rooms for a radio museum.

In the engine room will be installed a 200-hp. motor belted to a 100-kw. generator; a 15-kw. oil engine-driven generating set for charging storage batteries, and various other generators for test purposes. A low-powered set of about 5 kilowatts will probably also be installed, as will a 200-hp. oil engine set, and storage batteries for the large set in case the other sources of power should fail.

The station will cost approximately $250,000 and will have a range of about 3,000 miles.



VIEW OF WIRELESS TOWERS AND STATION AT ARLINGTON, VA.

Radio-Telegraphic Compass.*

The Prussian Department of Public Works, some years ago, commenced some interesting experiments intended to find out a method for determining the position of ships, dirigibles, aeroplanes, etc., in foggy weather. On the Müggel Lake, near Berlin, were installed, at fixed points, transmitter antennæ, each comprising thirty-two small poles placed at equal distances apart, on the circumference of a circle 650 ft. in diameter. Each pair of opposite poles communicated with a wireless transmitter situated in the centre of the circle. This transmitter was successively connected with each pair of antennæ, and a different signal was given out from each. If an ordinary acoustic receiver with non-directed antenna happened to be in the plane of the pair of antennæ actually working, this receiver would get a maximum amount of energy. As the wave-length chosen was approximately equal to twice the distance between the poles, the wave impulses emanating with opposite phases from the front and back poles respectively would add themselves in this plane. If, on the contrary, the receiver was situated at right-angles to the pair of poles, the two opposite impulses would strike the receiver simultaneously, thus neutralizing one another. As each pair of antennæ (corresponding to a given position in space) gave out a different letter, the telegraph operator only had to ascertain which letter was received with a maximum or minimum intensity. The position of each station and each pair of antennæ, with its corresponding letter, being marked on a map, the directions between the ship (or airship) station and two such fixed stations would allow the position of the former to be determined. It is true that the necessity of remembering quite a number of letters and comparing the intensities of these signals put the memory of the operator to considerable strain.

The Wireless Telegraph Company, of Berlin, on the basis of these experiments, developed a new method which greatly facilitates the work of the operator. While retaining the general arrangement of the antennæ, another (non-directed) antenna is added. Before beginning an experiment, the transmitter is connected to this non-directed antenna (which gives out a short time-signal), and afterwards, by a self-acting switch, successively with each pair of directed antennæ, giving out each time a radio-telegraphic signal. These signals are identical with one another, and always begin at a given antenna, e.g., the north-south antenna, continuing in a clockwise direction at the constant speed of a stop-watch. The latter is graduated like a compass card, and works at the speed of rotation of the transmitter, its starting point being the north-south direction from which the transmitter starts its rotation. On hearing the time signal, the operator presses the button of the stop-watch, and thus sets this working. At this moment the transmitter begins giving out directed signals, first in a north-south direction, and so on, simultaneously with the rotation of the stop-watch. As soon as these signals are heard with a minimum intensity, the operator stops his watch, the hand of which then marks the direction corresponding to the minimum of intensity in the reception of signals. Since each rotation of the transmitter (and the stop-watch) lasts just half-a-minute, ten complete rotations, and accordingly ten series of readings, are effected in five minutes. As the transmitters work quite automatically, they do not necessitate any superintendence.

* London Electrical Review.

If only a single stationary transmitter be available, only the direction of the receiver (on the balloon or ship), with regard to this transmitter can be determined. If, however, there be two fixed stations, the point of intersection of the two lines thus determined gives on a map the exact position of the receiver.

This arrangement, called the Telefunken compass, comprises at each sending station a vertical shaft, carrying at its upper end—on the circumference of a circle—a number of insulated contact points, communicating with the correspondingly directed antennæ. Two contacts, set rotating by an electro-motor, successively connect the sixteen pairs of antennæ with the transmitter. After each half rotation the transmitter is for a moment connected to the non-directed time antenna.

In order to utilize this radio-telegraphic compass in the interests of aerial navigation, it has been suggested to install along the German frontier a series of fixed transmitter stations, so that the distance between these stations and an airship crossing the frontier district would at most be thirty miles. The airship passengers would thus be able accurately to determine their position and the moment they were passing the frontier. A similar series of stations installed on the north coast of Germany would protect aeronauts against the surprises of an involuntary flight over the sea. The maximum consumption of power of each station would be ½ kw., which could be derived from existing supply stations. Chimneys or the like could in most cases be used to carry the antenna systems.

Wireless in Siam.—Wireless installations on the Siamese fleet are projected, also three wireless stations. The Telefunken system will be used. The Post and Telegraph Department is making wire telegraph extensions.

Death of E. A. Calahan.—E. A. Calahan, aged 74 years, the well-known inventor of telegraphic apparatus, including a stock-ticker and a multiplex telegraph system, died at his home in Brooklyn, N. Y., September 12.

What Is Electricity?

We often hear the statement that electricity is mysterious and elusive beyond all other natural agencies and cannot be handled in accordance with fixed rules. This statement is not only entirely erroneous, but is confusing and discouraging. It is true that we do not know what electricity is, but it is also true that we do not know what matter is, what force is, or even whether these things have any separate existence of their own aside from mind. What we do know, and all that—for our purposes—we need to know, are the general rules and formulas in accordance with which they manifest themselves; and in no other branch of physics have we so full and exact a code of natural law as in electricity. A prime essential to accurate work is definite standards of measurement, and in this we have a system ideal in its simplicity and convenience. The unit of quantity, which corresponds to the gallon or cubic foot in liquid measure, is the coulomb. This, while not in everyday practical use, forms a convenient starting point and a basis to which the others may be referred. It is the quantity of electricity which, under proper conditions, will deposit 0.017253 grains of metallic silver from a solution of silver nitrate. The first essential to intelligent study of current is a correct idea of values of measurement. If we lead two wires from the terminals of a battery into acidulated water or a solution of copper or zinc sulphate or silver nitrate, forming a voltameter, and connect in series with it a galvanometer, an electromagnet, and a piece of fine wire, we will find a certain amount of chemical decomposition in the voltameter, a deflection of the needle of the galvanometer, an attractive force exerted by the electromagnet, and a heating effect in the fine wire. If we increase the strength of the battery, these results will be increased, but not at all in the same ratio. If the chemical action in the voltameter is doubled, the deflection of the galvanometer and the pull of the electromagnet may be either more or less than doubled, while the heating effect on the wire will be much more than doubled. To determine which result is an accurate indication of the proportional change in current strength, we may add a second set of apparatus of totally different shapes and designs, and we will find that the chemical decomposition is the only effect which shows the same value in the two sets of apparatus, irrespective, within wide limits, of variations in shape, size, or design of the apparatus. Chemical decomposition, then, is the only one of these different methods of measurement which furnishes us, at least without elaborate precautions and calculations, with a definite and uniform standard, and we can say that an ampere of current, or a flow of one coulomb per second, will, for example, always deposit 0.017253 grain of silver per second. With this as a standard, we may take a properly designed galvanometer, find, by comparison with a silver voltameter, the actual values of its deflections, and by marking its scale accordingly we have an ampere meter, or, more briefly, an ammeter, which will tell us at a glance the amount of current in the circuit to which it is connected. As a rough approximation to the value of our unit, an ordinary sixteen candlepower 110-volt lamp takes about one-half ampere.—*Electricity and Magnetism in Telephony.*

Properties of a Triangular Aerial.

Mr. Charles A. Culver describes in the *Electrical World* some investigations made by him of a new type of wireless aerial. The aerial is constructed in the form of an equilateral triangle, with wires radiating from the middle of the base line. He states that such a construction would constitute a mechanically stable system and would occupy less land area than several of the other types in common use. These possible mechanical advantages led him to investigate the efficiency of such a system as both an absorber and a radiator of electromagnetic waves.

Briefly, the conditions under which the tests were made were as follows: The source of energy consisted of a 25-watt induction coil operated on storage cells and connected to suitable inductance and capacity. A delicate thermoammeter served to indicate resonance between the primary and secondary oscillating circuits. A sheet of tin plate laid upon the grass answered as "earth." As an indicator of the intercepted energy a regular loosely coupled silicon detector with shunted telephone was employed. Wire netting laid upon the grass served as an "earth." The tests were carried out across a part of the Beloit College campus over a distance of 250 meters, the soil consisting of coarse gravel covered with grass and trees. The wave-length employed was 285 meters.

The efficiency of the triangular aerial as a receiving system was compared with that of a simple aerial composed of two vertical wires 62 centimeters apart and 4.5 meters long in vertical height. The triangular type, in its least efficient position, was found to be only 50 per cent as efficient as the two vertical wires.

As a radiator the triangular system exhibited different properties from those manifest when functionating as a receiving system. When connected to the oscillator it was found to radiate equally in all planes, and its efficiency was found to be equal to that of the parallel-wire radiating aerial.

Though the system tested possesses certain desirable mechanical features, he states, it proves to operate at a comparatively low efficiency, at least when employed as a receiver. Notwithstanding this, however, such an aerial exhibits several interesting properties. The fact that it does not functionate equally well as a radiating and as an absorbing system is not readily accounted for.

The English Empire Wireless Scheme.

In an article in a recent number of the *Marconigraph*, Hon. H. L. Samuel, postmaster-general of England, gives some interesting facts regarding the Imperial wireless scheme, to connect the English colonies with the mother country.

The chain of stations at present decided upon, he states, represents only the beginning of a scheme which will be still further extended in the near future throughout the Empire, so as to enable the Empire to be, to a great extent, independent of submarine cables. The terminals will have a capacity of between 100 and 200 words per minute. The scale of charges will, of course, be fixed by the Government as the predominant partner in the working of the system, and it is anticipated that long-distance telegraphy will very soon be much cheaper than has ever been the case before. The indications are all in favor of a revolution in the cost of communicating by wireless telegraphy between the five continents.

The agreement now concluded with the British Government will be followed hereafter by others of a similar nature with other countries. There can be no doubt that stations will be established in the neighboring countries to the colonies for communication with them, in which case the colonies will be in a position of being able to communicate cheaply and directly with any country they are doing business with within a range of two or three thousand miles. The erection of such stations should within a short time enormously reduce the rate charged to many of the colonies for telegraphic communication with other colonies and the home country.

As an instance of telegraph rates likely to be affected by the Imperial wireless scheme, the following may be cited: The cable rate to British Guiana is at present 7s. ($1.68) per word; a wireless station erected in that colony would enable the inhabitants there to communicate directly with similar stations erected in Central America, Brazil and the United States, also with other stations placed in the British Indies, and, through the stations in Spain, with the United Kingdom, at a rate probably not exceeding 1s. (24 cents) per word, and in every case with the greatest ease. This is a typical instance of the extreme flexibility of wireless communication, and illustrates some of the far-reaching advantages of the Imperial scheme. Under present conditions messages must be sent to some of those countries by very devious routes and at very high rates.

The importance of this practical solution of the problem of independent electric wave telegraphy in which each wireless circuit is as private as one with a wire is obvious without comment. Wireless telegraphy is only in comparative infancy with a vast field to conquer. The constituents in the form of unconnected routes are there; the means for effecting this communication exist.

Practical Joint Pole Construction.

BY J. E. MACDONALD.

Independent operation, accompanied by very rapid development and expansion, had permitted pole conditions in Los Angeles, Cal., to become extremely objectionable to the public as well as to the corporations responsible for them. This reached a critical stage in 1906, when agitation for underground subways for all public utilities marked the beginning of the present co-operative policy. Distribution by the underground method, except in the business district, is impracticable, for the reason that the populated districts demanding service are scattered over a very wide range of territory, there being entire absence of congestion anywhere.

The problem of joint pole construction was taken up for solution by the principal companies and the result was a general agreement covering the different phases of the work as seemed best fitted for local conditions. There were some problems in the older districts which were not so readily solved, chief of these being difficulty of eliminating the capital charges against the existing overhead system of each operating company. It is evident that if any poles are removed before the expiration of their natural life, or if wires are transferred which are providing adequate service, then a certain portion of the original investment must be absorbed in some manner in reconstructing on joint poles. This factor was given proper consideration in the preliminary investigations made in arriving at a satisfactory working agreement. A policy was adopted making the participation in such joint construction entirely optional with each company. However, when any poles are set, it is always with a view to providing space for all parties operating in such location. Even with this liberal policy, there have been but few cases where all companies have not found it to their advantage and profit to immediately join in such construction.

The working agreement, which was executed by nine companies operating in common territory assigned the executive powers to a committee, acting without compensation. This committee is comprised of one representative from each member company, the expenses being prorated uniformly against these member companies.

The agreement makes certain fundamental stipulations; it defines the general purpose and intention of the agreement; it places certain necessary restrictions on joint work, defining the limits of good practice; it specifies the method of operating under the agreement; the term of agreement and responsibility of each company is predetermined as far as practicable; it limits the manner of occupying and space to be occupied by each party; it fixes valuations and charges, and prescribes regulations governing special expenses and maintenance.

In addition to the foregoing fundamentals, certain general regulations have been adopted.

Combined Use of Existing Poles. In the combination use of existing poles, the combining parties use the highest or most satisfactory poles in the location where it is desired to make combination.

Reconstruction by Owning Parties. When it is desired to reconstruct a pole line in location where none of the existing poles are suitable for combination use, one of the parties operating in this location sets new poles of standard size and length sufficient for the combination use of all parties operating in this section and for any other party which may desire to obtain space on poles. The constructing or owning party then sells a proportional interest to each party making the combination at the rate which has been fixed for the valuation of such poles. Each party transfers its wires and removes its poles at its own expense.

Reconstruction by New Coming Party. When the party is occupying a favorable location on any street or highway, and a second party desires to build a pole line in the same location, if the construction of the first party is entirely satisfactory and adequate for present and future needs, that party is not obliged to assume any expense in connection with the joint occupation of the new pole line built by the second party. The latter builds pole line suitable for combination use of both parties, and grants and assigns an interest in same to the first party without charge, except that the first party transfers its wires, cross arms and fixtures at its own expense from old poles to new poles. This party removes its poles at its own expense and they remain its individual property.

New Pole Lines in Undeveloped Territory. Any party desiring to construct a new pole line in location where heretofore no pole line has existed, notifies the other members, through the committee, of the proposed construction, and upon request provides space on such poles for the use of all parties who express their intention of combining in their use.

Renewing Poles Naturally Decayed. All poles which have been in use as long as the committee determines that they are safe or satisfactory, or as long as the parties owning shares in same desire to use them, are replaced by new poles.

Disposition of Joint Property Removed from Service. Joint poles removed from service may be removed at joint expense to a place designated by the committee, where they may be sold at auction, due notice having been given to each party prior to date of sale. The proceeds of the sale are divided between the owners in proportion to the number of shares owned by each.

Records. A record map is prepared for all combinations. Poles are numbered to correspond with house numbers of adjacent property. A complete file of all combination work is maintained for each company by the committee.

Bust of Joseph Henry.

Through past-president Gano Dunn, the American Institute of Electrical Engineers has been enabled to add to its historic collection an admirably executed bronze bust of the distinguished scientist, Joseph Henry, taken from the life-size statue of Henry in the Smithsonian Institution at Washington. The Institute, at its annual meeting last May, presented a similar bust to the Associazione Elettrotecnica Italiana, as an evidence of its appreciation of the cordial hospitality shown by the officers and members of the Associazione to the representatives of the United States attending the International Electrotechnical Commission at Turin last fall. At the directors' meeting held in Boston during the annual convention in June, a letter was read from president Dunn asking the permission of the board to present this bust to the Institute, which permission was granted in the following resolution:

"Resolved that on the part of the American Institute of Electrical Engineers, the Board of Directors hereby accepts with hearty appreciation the gift of the bronze bust of Joseph Henry from president Dunn, according to his letter of June 27, 1912, and wishes to place on record its pleasure, not only in counting among its possessions such an excellent likeness of one of America's foremost scientists, but also in having at Institute headquarters this reminder of president Dunn and of his effective administration."

The bust which has recently been received at the Institute headquarters, and the one presented by the Institute to the Italian society, were reproduced under the supervision of the distinguished sculptor of the original in the Smithsonian Institution, Mr. Herbert Adams, of New York.

Capacity.

The dielectric separating two conductors, maintained at a difference of potential, has the power of holding a quantity of electricity, which property is known as capacity. The capacity of a cable depends on the size and shape of the conductors, the specific inductive capacity of the surrounding medium, and the distance from other conductors. The unit of capacity is the farad (the practical unit, microfarad, is one-millionth of a farad), and is that capacity which will contain one coulomb at a potential of one volt. The effect of capacity on a circuit is to cause a current to flow in advance of the electromotive force. With bare aerial conductors, capacity is usually insignificant, but with insulated underground cables, capacity and its effects become quite marked, due to the higher specific inductive capacity of the insulating material and the greater proximity of the conductor to earth.

LETTERS FROM OUR AGENTS.

ST. LOUIS WESTERN UNION.

Mr. J. O. Miller, all-night wire chief in this office since March, 1910, who was recently assigned to a day position as assistant wire chief, is leaving the service of his own accord, with a record entirely satisfactory. Mr. G. A. Littell, former all-night wire chief, has been assigned to the position vacated by Mr. Miller.

Mr. J. M. Leeper, repeater chief, has been appointed all-night wire chief.

Telegraph and Telephone Age

No. 19. NEW YORK, OCTOBER 1, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Study of Electric Wires.

To those who have had little experience in the application of electricity a wire no doubt is merely an elongated piece of metal which in some mysterious manner is able to guide an electric current, without rule or regulation, other than that of stringing it along a line of poles.

They probably know that some wires are made of copper, while others are of iron, steel or other metal; also that some wires are larger than others, some bare, and others covered with rubber or other material, but why, they probably never inquired.

To the student, however, the subject is one of fascinating interest, while the problem of providing wires suitable to meet all conditions and requirements is one that often stretches the electrical engineers' thinking cap to the utmost degree.

While it is not the purpose of the writer to go into details very deeply some of the principal factors that govern wire construction may be mentioned and possibly prove interesting reading.

If one will take the trouble to look around any large telegraph office he will be astonished how many different classes of wire he will find both as to material and dress, yet none is used as a mere matter of choice. Each class is designed to meet certain requirements, and the construction of each conductor in the respective classes is the result of much forethought and experimentation on the part of the electrical engineer, so much so, in fact, that today he is usually able to tell the mark of merit or electrical expectation of each class of conductors by a mere glance at the bare wire or wrapper. This knowledge is due to his familiarity with the following laws which govern wire construction.

First—Although all kinds of wires will carry an electric current, the amount each will carry with a given number of volts depends upon its size and the material of which it is composed. The first step therefore is to compare the electrical output of different kinds of conductors one with another, as well as an estimate of the relative cost of each metal.

The principal things learned in this way are that if we take a number of conductors each of identical length and diameter, but consisting of different materials, the relative amount of current each will carry when supplied by the same number of volts is approximately as follows, taking 1 as the measure for copper: Copper, one; iron, one-seventh; aluminum, three-fifths; compound (copper and iron), somewhere between that of copper and iron, depending upon the proportions of each; German silver, one-twelfth.

It might then be asked, "If this is true why not use copper altogether?" Of course the difference in the cost of the different metals has much to do with the question when it comes to material for a long line, but there are other points of difference which must be considered. Each possesses advantages over the others and they are all utilized under certain conditions.

For example, if we want a long wire possessing a minimum ohmic resistance it should be copper; but if we want the same amount of resistance in a comparatively short length of wire and which must not occupy much space, then a small thin wire of German silver not only becomes useful but necessary.

Iron, compound and aluminum wires have individual merits. Iron is much cheaper and has a greater tensile strength than copper or aluminum and in some localities where a long span of copper wire might break, an iron wire of large diameter becomes necessary. But iron has the disadvantage of being magnetic and for that reason cannot be used for wiring switchboards and apparatus containing magnets. It must also first be galvanized before exposing it to outside atmospheric conditions to prevent rusting.

Aluminum would make a very good line wire if it were not lacking in tensile strength, but it is used nevertheless to considerable extent for power transmission. It is very hard to solder and for that reason small wires which might be used for instrument connections are not viewed with much favor.

Compound wire is a steel wire with a copper covering the purpose of which is to obtain the near equivalent of an all copper wire having a great tensile strength, but hard-drawn copper seems to meet all ordinary requirements.

The next thing to do after choosing the material is to determine the size or gauge of wire required for any particular use. This, of course, is determined by Ohm's law $\frac{E}{R} = I$, but in order to have a uniform rule for the manufacture of conductors each gauge number must represent some multiple of an original standard. Unfortunately there are several standard wire gauges, differing slightly in the diameter of the wires according to different manufacturers. The standard gauges used in this country are the B. & S. (Brown and Sharpe) for copper, and the B. W. G. (Birmingham Wire Gauge) for iron wires. The standard diameter for any gauge, however, is one mil or one one-thousandth of an inch, hence each gauge number of any manufacturer obviously represents a wire of so many mils diameter. Nearly all text books contain tables showing the diameters in mils of the gauge numbers of the different standards, hence when desired a comparison of their relative sizes, gauge for gauge, may be readily ascertained.

The basis for computing the resistance of any wire is to take the resistance of one foot of the metal, made in the form of a round wire one-thousandth of an inch in diameter, called a mil-foot, and multiply this figure by the total length of the wire, after which divide the product by the square of its diameter in inches or fractions thereof.

The cross-section of the small wire is one mil, and being round is called a circular mil, hence the C M area of any wire is equal to the number of circular mils it contains. This is found by squaring its diameter. The resistance of a wire increases directly with its length.

From this we get the following formula:

$$R = \frac{D \times \text{resistance of one mil-foot}}{\text{C. M.}}$$

Where R = total resistance.
D = distance or length of wire.
CM = circular mils, or square of diameter.

If the wire consists of copper, D would be multiplied by 10.7—the resistance of one mil-foot. For other metals each would have a different multiplier, but that would be the only alteration in the formula.

When it comes to braided and rubber covered wires their manufacture demands an equal amount of forethought. Before such a wire is wrapped or covered it must first be tinned (if copper) to prevent the sulphur in the rubber compound, with which it is coated, corroding the conductor. If iron, it must first be galvanized for similar protection. Then come two separate wrappers of cotton followed by a final covering of rubber or other material, the selection of which must be determined by whether the wire is for inside or outside use and other conditions.

Twisted pairs must be provided with a distinguishing mark on one conductor in order to be able to trace and make connections properly. In some instances these marks are in the form of different colored wrappers; in others a raised thread suffices, while three wire twists sometimes combine both marks.

Cables also demand special attention, too varied in nature to even attempt describing in one article, but the object sought in writing this article will have been attained if the writer has impressed upon the mind of the reader the fact that in studying electrical engineering there is no single part of the course so insignificant as not to be worthy of and made a subject of special study.

Telegraph and Telephone Patents.

ISSUED SEPTEMBER 3.

1,037,438. Telephone-Exchange System. To E. E. Clement, Washington, D. C.

1,037,452. Electrical Apparatus for Transmitting and Receiving Signals. To A. T. Dawson and G. T. Buckham, Westminster, England.

1,037,537. Ringer for Telephones. To H. J. Roberts, Evanston, Ill.

1,037,636. Telephone System. To J. Kennedy, Elyria, Ohio.

ISSUED SEPTEMBER 10.

1,037,927. Telegraphy. To I. Kitsee, Philadelphia, Pa.

1,038,037. Telephone System. To H. G. Webster, Chicago, Ill.

1,038,213. Selector for Automatic Telephone Exchanges. To B. Settegast, Karlshorst, Germany.

1,038,301. Telephone and Telegraph Relay or Repeater. To J. H. Cuntz, Hoboken, N. J.

1,038,419. Telephone Calling Device. To R. C. Nevin, Oakland, Cal.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange September 26:

American Telephone and Telegraph Co....	146
Mackay Companies	87¾
Mackay Companies, preferred...........	68⅜
Western Union Telegraph Co............	81¼

Personal.

Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York, accompanied by Mrs. Ghegan and his daughter Helen, has returned from Europe after a two months' absence.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mrs. C. H. Mackay, accompanied by her daughter Ellin, sailed from New York for Europe, September 24, on the steamer Kaiser Wilhelm II. She will join Mr. C. H. Mackay in Paris.

Col. A. B. Chandler, former president of the Postal Telegraph-Cable Company, New York, who has been spending the summer at his home at Randolph, Vt., was in this city recently on a business trip.

General superintendent E. B. Pillsbury of New York was a recent visitor at Buffalo and other points.

Mr. E. B. Pillsbury, general superintendent, New York, is arranging for a conference of the managers of the principal offices in the Eastern Division to be held in New York, October 21, 22 and 23.

Mr. Charles E. Bagley, district superintendent at Philadelphia, is again at his desk after an absence on vacation.

Mr. H. R. Waterbury, manager of the Jacksonville, Fla., office of this company, was a recent New York visitor.

Among recent executive office visitors was C. M. Baker, manager at Plattsburg, N. Y.

Frank Kingsbury, aged 58 years, for twenty years operator, solicitor and cashier for the Postal-Telegraph-Cable Company in San Francisco, Cal., died September 17. He retired from the service on a pension a few years ago.

Mr. Geo. W. Jackson, for several years chief operator in the Postal office at Rochester, N. Y., has been seriously ill at his home in that city. He has been a sufferer from rheumatism for a long time. He is endeavoring to maintain a small source of income by soliciting subscribers for several publications. Mr. Jackson was for seven years clerk in the office of superintendent H. D. Reynolds at Buffalo, before going to Rochester.

A storage battery plant has been established at Albany, N. Y., as a safeguard, in emergencies.

The Toledo, Ohio, office will be refitted, another ten-year lease on the premises having been secured.

This company is stringing one heavy copper wire between Denver, Col., and Salt Lake City, Utah, and two wires from Salt Lake to San Francisco.

The lines in western Louisiana of the Mackay Telegraph and Cable Company have been transferred from the district of superintendent W. C. Lloyd, Atlanta, Ga., to that of superintendent Jesse Hargrave, Dallas, Tex.

Suffragettes Cut Telegraph Lines.—Among the latest tactics of English suffragettes is the cutting of telegraph wires. Twenty-three trunk lines were recently cut near London.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of this company, entertained the members of the Hobby Club at a dinner at his home given in Lyndonville, Vt., Friday, September 27. The party was conveyed to Lyndonville from New York in two special cars, and they returned on September 29. The Hobby Club is composed of well-known jurists and business men.

Mr. Newcomb Carlton, vice president of the company, New York, will sail for Europe October 3 on the White Star steamer "Cedric," on company business. He will be gone four or five weeks.

Mr. S. B. Haig, of the traffic engineer's office, New York, has been appointed division traffic superintendent with headquarters at New York, vice Mr. J. A. Hill, transferred to special service, to be assigned by the general superintendent.

Mr. A. C. Terry, district commercial superintendent, Pittsburgh, Pa., was a member of the party who traveled through the West on the "Made in Pittsburgh" train sent out by the Pittsburgh Chamber of Commerce to boom the industries of that city. He is chairman of the Publicity Committee and had charge of the publication of the "Daily Live Wire" printed on board of the train.

Mr. P. W. Johnson, district commercial manager for New Hampshire and Maine has been transferred to the Boston district with the same title, vice G. H. Boothby resigned.

Mr. B. P. Hancock, supervisor of traffic, Atlanta, Ga., was a recent executive-office visitor.

Mr. C. H. Simpson, manager of the Worcester, Mass., office has been advanced to the position of manager of the Springfield, Mass., office.

Mr. C. Trent, former manager at Lakeland, Fla., has been appointed manager at Tallahassee, Fla., vice R. F. Sheldon, and is succeeded at Lakeland by Mr. E. C. Atkinson.

Mr. F. E. Smith, day chief operator at Duluth, Minn., has been advanced to the position of inspector, and is succeeded as day chief by Mr. W. H. Meacham, formerly night chief. Mr. N. H. Myers, of the night force, takes Mr. Meacham's former position as night chief.

Mr. L. G. Rosebery, chief operator at St. Joseph, Mo., has been promoted to be manager, vice J. A. Crawford, resigned.

Mr. D. F. Brown, traffic supervisor of the Washington, D. C., office of this company was a recent executive office visitor. Mr. Brown was identified with telegraph interests in New York many years ago and he called on numerous old friends while in the city.

The board of directors on September 11 declared the regular quarterly dividend of 3/4 of one per cent, payable October 15.

This company has purchased the United States rights to the Murray multiplex printing telegraph system, invented by Mr. Donald Murray, of London, England.

The new rates for deferred cable messages, night cable letters and week-end cable letters, which were referred to in detail in our issue for September 16, went into effect October 1.

A conference of officials of the Pacific Division of this company was held in San Francisco, Cal., September 12, 13 and 14. Among those present were Messrs. H. F. Dodge, division commercial superintendent, San Francisco, and the following district commercial superintendents: A. H. May, San Francisco; E. Boening, Seattle, Wash.; H. McPhee, Los Angeles, Cal.; division traffic superintendent H. C. Chase, San Francisco; district traffic superintendents, H. J. Jeffs, San Francisco; G. D. Hood, Seattle, and R. H. Miller, Los Angeles.

Mr. J. S. Calvert, superintendent, Richmond, Va., announces the following appointments of managers in his district: T. P. Bray at Beaufort, S. C., vice J. W. Jones, who has left the service; W. R. Clayton at Sumter, S. C., vice S. W. Rumph; O. W. Cottle at Rutherfordton, N. C., vice E. C. Seagle, transferred to Lincolnton, N. C., to succeed J. R. Moore, who goes to Rocky Mount, N. C., as manager vice Miss D. C. Schwem, resigned; J. W. Stephenson, Jr., at Monroe, N. C., vice Miss G. Moore, who has left the service.

The following transfer and appointments have been made in the Eastern Division: S. R. Crowder has been transferred from the district plant superintendents' office, Philadelphia, Pa., to the division plant superintendent's office, New York; J. W. Collins, plant chief, has been appointed district supervisor of equipment, at Philadelphia; P. E. Brown, plant chief, Washington, D. C., to be plant chief at Philadelphia; J. D. Steele, wire chief, to be plant chief, Washington, D. C.; O. McCullen, repeater chief, to be wire chief, Washington, D. C. Mr. P. E. Brown was presented with a diamond scarf pin by several of his associates in the Washington office, Mr. Niemeyer, equipment chief, making the presentation. Mr. Brown was deeply affected by the tribute.

The Chicago management of this company is taking a special interest in its messengers, and is striving to develop and cultivate their good qualities. It is also encouraging the boys to take an interest in out-of-door exercise and with this end in view the "Western Union Messengers Base Ball Club," was organized last May. The club has played fourteen games this season, winning twelve, thus showing the good effects of organization and discipline. Mr. J. Fitzpatrick, district commercial superintendent at Chicago, is doing active work on behalf of the boys and is justly proud of their record.

This company has issued a neat booklet containing the Western Union travelers' cable code and foreign money tables. It is for distribution on ocean steamers for the use of passengers, in foreign lands. It contains much other information useful to travelers. It is a handy pocket size, measuring 3¼ in. by 5¼ in.

Mr. W. H. Meacham, recently appointed day chief operator at Duluth, Minn., was born at Kinston, N. C., January 22, 1883. He entered the service of the Atlantic Coast Line Railway at the age of ten years, and in September, 1900, went with the Western Union at Atlanta, Ga. After working in various cities he settled in Duluth and became night chief operator in February, 1909.

W. W. Ryder,

MANAGER RAILWAY DEPARTMENT, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

Mr. W. W. Ryder, who, on October 1 assumes the newly-created position of manager of the railway department of this company, with headquarters in New York, is well-known to the telegraph fraternity as one of the leading members of the Association of Railway Telegraph Superintendents. At the time of his acceptance of this new position he was general superintendent of telegraph of the New York Central Lines west of Buffalo with headquarters at Chicago, and his wide knowledge of technical and practical railroad telegraph and telephone affairs eminently

W. W. RYDER,

fit him for his new duties. Mr. Ryder is a native of Aurora, Ill., where he was born April 6, 1865. He entered the service of the Chicago, Burlington & Quincy Railroad in 1883, and in 1887 became stenographer in Chicago for Mr. Frank A. Vanderlip, who is now president of the National City Bank of New York. The same year he returned to the Burlington System first as stenographer, finally, in 1893, becoming superintendent of telegraph for that road. He held this position until January 1, 1910, when he was appointed general superintendent of telegraph New York Central Lines west of Buffalo, which position he has just resigned to join the Western Union staff at New York.

The Cable.

Robert Morrell, superintendent of the West India and Panama Telegraph Company, with headquarters at St. Thomas, Danish West Indies, died on September 18, after a few days' illness.

Alaska Cable Interrupted.—The Alaska cable between Sitka and Valdez is interrupted and business is subject to indefinite delay via Seattle.

Report of Halifax and Bermuda Cable Company.—The annual report of the Halifax and Bermuda Cable Company presented at the meeting in London, September 5, shows a balance of £8,533 ($42,665) on June 30, as compared with £8,168 ($40,840) the previous year. Mr. G. G. Ward, vice president and general manager of the Commercial Cable Company, New York, and Frederick Ward were re-elected members of the board.

British Pacific Cable.

The accounts of the Pacific Cable Board recently published in London show gross traffic receipts for the year ending March 31, 1912, £159,051 ($795,255) and net £154,892 ($774,460), which, together with other minor items, brings the total up to £159,150 ($795,750). The surplus was increased by £7,712 ($38,560) over the previous year. The adoption of a contrivance for magnifying the signals on the long sections of cable on either side of Fanning Island, due to Mr. E. S. Heurtley, aided accuracy of transmission and increased the speed by as much as 25 per cent. The new Australia-New Zealand cable will complete the triangle Norfolk Island-Australia-New Zealand, thus duplicating the two southern sections and providing a short route for inter-colonial traffic, and at the same time saving £6,000 ($30,000) per annum; the total cost of the addition is expected to be under £175,000 ($875,000). It is hoped that the cables will be laid and in operation before the end of 1912. The Canadian land-line has, the report states, continued to give satisfaction, and improvements in its working are in progress.

The deficit for the year is £40,498 ($202,490), which has to be met by the various governments concerned in the joint ownership of the cable. To mitigate the trying conditions of life on Fanning Island, refrigerating plant has been installed, and electric lighting will be substituted for the present system of illumination by oil lamps. New offices are being obtained in Sydney at a cost of £10,000 ($50,000). The deferred-rate system, which came into force in January last, has proved very satisfactory, the report continues, the number of words carried in three months being 46,450, while the ordinary traffic also increased. The reduction of rates for deferred press messages made in December last led to no increase in the total volume of press traffic, about half of which was merely transferred to the deferred class. The total of international messages carried last year aggregated 2,131,376 words.

The Telephone.

Texas Independent Absorbed.—The American Telephone and Telegraph Company has obtained control of the Eureka Telephone Company, which operates a toll-line service outside of San Antonio, Tex.

London Telephones.—It is intended to open six new telephone exchanges in the London area. Since the Post Office took over the working of the telephones last January, over 18,000 new orders for installations have been received.

Germans to Study American Telephony.—Three engineering officials of the German Post Office Department are about to visit the United States where they will spend five weeks investigating American telephone systems. They will visit New York, Philadelphia, Boston, St. Louis, Chicago and Columbus, Ohio.

New Arizona Telephone Company.—The Navajo-Apache Telephone System has been incorporated in Arizona, with headquarters in Holbrook. The company will operate about 250 miles of line, three exchanges and eight small stations. Fred W. Nelson is president, W. B. Woods vice president and general manager and Lloyd C. Henning secretary-treasurer.

Some New Telephone Transmitter Attachments.—A new antiseptic device for telephone mouthpieces has been patented by a Newark, N. J., man. It is a lining for the mouthpiece, patterned after a collapsible drinking cup. A Richmond, Va., man has produced a muffler in the form of a miniature booth within which a person may place his head. The telephone is within the booth, the receiver being mounted on a supporting arm.

Canadian Notes.

Increase of Wages for Canadian Pacific Operators.—The railway telegraphers on the Canadian Pacific Railway have been granted an increase of wages of twelve per cent., including a twelve per cent. increase in overtime work, and the hours of work will be reduced from an eleven-hour to a ten-hour standard. The minimum wage paid under the old schedule to agents at the smaller stations was $65 per month and for night operators $53; the agents at the larger stations received from $80 to $110 a month and the operators $70. In addition to these straight salaries the majority of employes have free dwelling houses, free fuel and light and commissions on the telegraph and express business. They also received extra pay for overtime and for calls, and Sunday work, in addition to which everyone is entitled to two weeks' holidays a year with full pay. The linemen are included in the new arrangement of wages. The commercial operators on the Canadian Pacific Railway were granted an increase of wages, taking effect July 1. The details of this new schedule were printed in our issue for September 16.

Composite Systems.

(*Continued from Page 566, September 1.*)

Howlers. The howler consists of a special form of telephone receiver equipped with resonating horn. The diaphragm is operated by the high-frequency signaling currents produced by the interrupter and induction coil. The howler is mounted in the set if the latter is portable, or is separate for regular stations so that it can be located in any convenient place where it will attract attention when in operation. It is advisable, however, to mount it at a sufficient distance from the set so that it will not be handled by persons telephoning, and its adjustment thereby altered.

Condensers. The condensers and coils should be located as near to the telegraph line or the peg switch as possible, care being taken to avoid damp locations and places where they would be exposed to mechanical injury.

Resistance Coil. The resistance for shunting the telegraph should be mounted at some convenient point near the telegraphic apparatus, such as beside the telegraph relay on the table, under the table, or on the wall.

Protector. The protector should be mounted upon the inner wall of the building as near as possible to the point where connection is made with the telegraph line. An asbestos mat should be placed beneath it.

Battery. Six dry cells are usually employed with the station telephone set, four cells being used for talking and the entire set for signaling. Only four cells are used with the portable telephone, these furnishing current for both talking and signaling. The battery should be placed near the set in some out-of-the-way place, unexposed to mechanical injury and dampness, but accessible for inspection and renewals. The cells should be connected in series, that is, the carbon of one cell should be connected to the zinc of the next, throughout the battery, flexible cords being used for this purpose. Care should be taken to connect the terminal leads from the battery to the proper binding posts of the telephone set.

Size of Wire. With the exception of the ground wire from the protector, all interior wires from the telegraph line or the peg switch to the telephonic apparatus, should be of rubber covered and braided copper, not smaller than No. 19 B. & S. gauge. The ground wire from the protector should be of copper not smaller than No. 18 B. & S. gauge, and should be rubber covered and braided; if exposed to mechanical injury, it should be of No. 14 B. & S. gauge, rubber covered and braided.

Ground Connections. Where a telegraph equipment is already installed in an office, the ground wire of that equipment may be used for the telephone set and protector, connection with it being usually made at the peg switch. Where no telegraph equipment is installed it will be necessary to run a ground wire.

Locating Trouble. When the system is not working properly the trouble may be due to the line being out of order, to a defect in the apparatus or wiring in the telegraph stations; or to a defect in the apparatus or wiring in the telephone stations. Line trouble is cleared by the usual methods employed in all telegraph systems. Trouble at telegraph stations equipped with telephone apparatus must be either in the telegraph apparatus, the condenser, or in the resistance. Trouble in the telegraph apparatus should be cleared in the usual way. If the condenser is short-circuited, no telegraph messages can be sent from that station; if the condenser is open, there will be poor telephonic transmission beyond the break. In case the resistance is open, the telephone signaling currents may cause a chattering of the relay. Trouble at telephone stations may be traced to a ground across the protector blocks, to a loose or open connection between the telephone set and telegraph line, such as an open fuse; to defects in the apparatus or wiring of the signaling circuit in the set; to defects in the apparatus or wiring of the talking circuit; or to an open ground connection. Such troubles will not ordinarily interfere with the continued operation of the telegraph apparatus, but in any case, the following tests and remedies should quickly locate and remedy the defects and place the system in operation.

Signaling Trouble. When able to talk satisfactorily over a line but unable to signal other stations, it is well to first ascertain whether the interrupter operates when the signaling key is depressed. If it does not, test the battery, and if that is all right, try a different adjustment of the contact screw on the interrupter. If the interrupter operates satisfactorily and it is impossible to signal other stations, ascertain whether signaling current is delivered to the line when the key is depressed. This may be determined by replacing the receiver on the hook and disconnecting the line wire, short-circuiting the terminals and then pressing the signaling key, which should operate the howler at the home station. If the local howler does not then operate, it indicates that the trouble is in the telephone set at this station, and that the contacts of the switch hook and of the signaling key should be examined to see that they make good contact with each other. If this does not clear the trouble, it is advisable to look for an exhausted battery, loose connections, broken wires, or an open in the condenser.

An exhausted battery can be detected by bridging a low-reading voltmeter or battery gauge across each of the six signaling cells of the telephone set or across each of the four signaling cells in the other telephone set, while the switch hook is in the proper position for talking and after the signaling key has been closed for one minute. If the cells are not exhausted, the total pressure under normal working conditions should be at least 0.7 volt per cell. Loose connections or broken wires can readily be found by inspection. To test for an open in the condenser, short-circuit its terminals; if the howler then operates, it indicates a defective condenser. If the howler at the signal station operates satisfactorily after disconnecting the line wire and short-circuiting the terminals, it indicates that the trouble is not in the telephone set. It may, however, be due to arcing at the open space cut-outs in the signaling station, or to trouble at the receiving station where the howler may be out of adjustment or open, the condenser defective, or to an open circuit in the wiring. The removal of the copper blocks in the open space cut-outs at the signaling station will therefore determine at this stage in the tests whether the trouble is in the distant station.

Adjustment of the Howlers. The sound emitted by the howler can be varied by moving the diaphragm nearer to or further away from the magnets. One method of adjusting the howler is to have the most distant station keep signaling current on the line until the shell containing the diaphragm has been adjusted to give the desired tone; the locking ring may then be used to fix the shell firmly in place. As the locking of the metal shell in place tends to move the shell slightly away from the magnet, due allowance should be made in adjusting the howler to guard against this action, throwing the howler out of adjustment.

It sometimes happens that the magnets in the howler become demagnetized or weakened after being in service for a long time. In this case, the howler should be replaced by a new one and the defective howler returned for repairs.

(To be continued.)

Impedance or Retardation Coils.

An impedance or retardation coil consists of an iron core wound with a number of turns of insulated wire, and in this particular is comparable to an electro-magnet and induction coil. Its principal function in telephony is to bar or impede the alternating speech-bearing current so as to keep it on its destined line and off of a bridge between the limbs, or from an associated circuit, as in the test arrangement of a multiple switchboard or the battery wires of a central energy system. This result is to be achieved not by a high ohmic or metallic resistance in the windings of the coil, but by the reactance of the magnetized core. Thus, although the term "impedance" properly designates any form of check or obstacle met by the electrical curent, including true metallic resistance, it is most generally used as a synonym for the effects of magnetic retardation on alternating currents. In order to attain this effect to the best advantage it is essential that the core be made of sufficient mass to allow of the greatest desired degree of magnetic reactance, and of such length as to permit a large number of turns of the winding wire. With a core of the same mass and a wire of the same size or weight, the efficiency of two-given retardation coils is usually to be measured by the length of the core and the number of turns. Thus for the winding a wire of comparatively low resistance may be employed, and no particular check offered to the free tarnsmission of a direct current, whose strength and induced magnetic properties are moderately constant. An alternating current is impeded in proportion to its frequency. For this reason the long-wound bridging bells, used in connection with the central energy systems and bridged party-line circuits will bar the telephonic current, which is immensely irregular in phase and frequency, while the magnets may be readily energized by the low-frequency alternating current from the exchange ringer generator. In measuring the impedance of such instruments in ohms it is, of course, intended to express the sum total of all checks to the telephonic current including the "false" as well as "true" resistance.

The element upon which the operation of such coils depends is the hysteresis of the core, or the tendency of the iron to persist in a given direction of the magnetic force and to resist the efforts of the current to change it. The necessity of changing the polarity of the core at every reversal of the current involves, of course, a considerable expenditure of energy, which is an item of importance in large transformers, and, in fact, in every form of coil carrying alternating currents. As would be supposed, a long core tends to resist reversal of magnetization more effectually than a short one, and with increasing frequency of alternation, the impedance is so rapidly increased that beyond a certain point, it is practically impossible for a current to pass through the winding. The action may be illustrated as follows: If one work the pedal of a foot-power printing press so that the fly-wheel is put through half a revolution in one direction to a dead center, and then reversed, he will notice that the amount of energy expended in each start and stop of the machine is greatly in excess of that required to maintain an even drive through several revolutions straight ahead. In other words, the force needed to pass over the dead centre and begin the movement in the reverse direction represents the waste occurring in a magnetic coil with rapid reversals of current. Were it possible for one to urge the fly-wheel of a foot-driven press through a series of such half revolutions with great rapidity, we would have a completely parallel case to the one in hand, so far, indeed, as concerns the increasing ratio of exertion of energy and effect obtained.—*From A B C of The Telephone.*

Telephone Pioneers of America.

EDMUND S. WILLARD.

Mr. Edmund S. Willard, assistant treasurer of the New England Telephone and Telegraph Company, Boston, Mass., is a native of Massachusetts and his entire career has been centered in that State. He was born in Charlestown, Mass., March 10, 1854, and at the request of Mr. E. T. Holmes, general manager, entered the telephone service in May, 1879, as cashier of the

E. S. WILLARD.
Assistant Treasurer New England Telephone & Telegraph Company, Boston, Mass. (1879).

Telephone Despatch Company, at Boston. When the New England Telephone and Telegraph Company was formed in 1883 it absorbed the Telephone Despatch Company and Mr. Willard became cashier's clerk in the new company, Mr. Charles B. Wells being appointed cashier. When Mr. Wells severed his connection with the company in May, 1893, Mr. Willard succeeded him as cashier, and held that position until October, 1905, when he was appointed assistant treasurer, which position he still holds.

Resistance, Specific and Comparative.

The resistance of the conductor in an electric circuit is practically the most important element in calculating a line for the highest efficiency in any kind of service. The current will always move along the "line of least resistance;" that is to say, it always avoids the path that is most filled with obstacles to its flow, and chooses the one that is most easy. From the observations on this fact scientists have found that all substances are divided into two classes: (1) conductors, along which the electrical current flows with ease, transmitting its effects from one end of the line to the other; and (2) non-conductors, or insulators, in which it meets with difficulties, or is not able to flow at all.

The conductivity of substances having been computed at a common temperature, we have as correct an idea of their relative qualities as is possible, on a common standard. It has been found, however, that a number of conducting substances, including water and most acids, increase in power to conduct electricity with an increase in temperature.

There are besides a few substances, which, while they are capable of conducting electrical currents, vary in the capacity according to conditions. They are, briefly:

Animal bodies, cotton, dry wood, marble, paper.

The substances that will not conduct the electrical current, and will interfere with its transmission, are: Oils, porcelain, wool, silk, resin, gutta-percha, shellac, ebonite, paraffine, glass.

They hold the same relation to the electrical current that any solid body does to the flow of water—they check or dam it. On account of this property they are extensively used in all the branches of electrical industry where it is desirable to confine the current to definite limits, as to a wire, or to prevent it from spreading beyond the particular apparatus it is desired to energize. They are thus called "insulators" (Latin, insula, an island; insulatus, made into an island). For purposes of thus confining, or insulating, an electrical current, telegraph and telephone wires are attached to poles by the familiar glass caps, and the wires used about electrical machinery, or where likely to come in contact with wood or other combustible materials, are covered with silk-windings or india-rubber.

The insulation of the electric current is, of course, not absolute; rather is it correct to say that the resistance of insulators is so immense that the leakage through them is practically negligible. Thus, while certain poor conductors offer a high resistance to current—the human body opposing about 300,000 ohms at the closure of the circuit, falling to about 3,000 after the passage of current has raised the temperature sufficiently—the resistance of true insulators is vast in comparison. Thus, glass at 20 degrees Centigrade offers a resistance of 91,000,000,000,000 ohms, or 91,000,000 megohms (millions of ohms) per cubic centimeter; the gutta-percha insulation used on submarine cables offers a resistance of 450,000,000,000,000 ohms or 450,000,000 megohms per cubic centimeter; hard rubber or ebonite, 28,000,000,000 megohms, and paraffine, 34,000,000,000 megohms.

New York Electrical Show.—An electrical exposition will be held in the New Grand Central Palace, New York, October 9 to 19, and will commemorate thirty years of Edison service in New York. Working exhibits will be made showing many of the various ways of using electricity for light, heat and power in the home, office and factory. In addition to the electrical features an exhibition of automobiles will be made.

The Telephone and the State.

Mr. Sydney Brooks is the author of an article in *Harper's Weekly* under the title "The Telephone and the State," in which he makes a comparison of the telephone system in this country and that of Europe.

After pointing out what marvelous results have been made possible by the use of the telephone, he discusses the figures of the United States Census showing the remarkable growth of the industry.

It is worth while looking into these figures a little more closely, he continues. Of the cities possessing 10,000 telephones and over, considerably more than half are situated in the United States. There are, roughly speaking, about fifty American towns where there is a telephone to less than every ten of the inhabitants; in Europe there is only one, though that one, Stockholm, has the remarkable percentage of one telephone to every 4.3 of the citizens. London, with a population more than three times as great as Chicago, has fewer telephones; Paris is twice the size of Boston, but possesses little more than half as many telephones; Liverpool, three times as great as Los Angeles, has only a little over a third its number of telephones; Glasgow, twice the size of Cincinnati, has seven thousand fewer telephones; Birmingham, with a population of over half a million, has four thousand fewer telephones than Grand Rapids with a population of some 140,000; Manchester has fewer telephones than Louisville, though it is over four times as big; Moscow has fewer than Seattle, though its population is five times greater; Vienna, with four times the population of Detroit, has twenty thousand fewer telephones; Hamburg has ten thousand fewer than Cleveland, a city half its size; Leipzig, which is larger than Buffalo, has only about half as many telephones; Milan, with a population of well over half a million, has about a third as many telephones as Omaha with a population of 160,000; Breslau is considerably over four times the size of Spokane, and yet boasts five thousand fewer telephones; and Amsterdam, with a population of nearly 600,000, has fewer than Des Moines with a population of 90,000. In the whole of the United Kingdom there are only about as many telephones as in New York and Chicago; in all France there are fewer than in Chicago alone; in all Russia there are fewer than in Philadelphia; in Austria fewer than in Boston; in Italy fewer than in Los Angeles; in Spain fewer than in Toledo, Ohio; in Belgium fewer than in Kansas City; and in Hungary fewer than in Pittsburg. We may take the figures in yet another way. Roughly speaking, there is one telephone for every nine Americans. If the same proportion obtained in Europe, Denmark would have three times as many telephones as she actually possesses, Sweden three and a half times, Norway four and a half times, Switzerland five times, Germany six and a half times, Great Britain seven and a half times, the Netherlands eleven times, Belgium nearly eighteen times as many, France nineteen times, Austria nearly thirty times, Hungary thirty-seven times, Italy fifty-six times, Portugal and Spain about ninety times, Russia one hundred and five times, and Greece, Servia, and Bulgaria from one hundred and seventy to two hundred and four times as many.

* * * * * Not only are there far fewer telephones in Europe than in America, but those that exist are, as a rule, almost ludicrously inferior in quality. There are great and famous towns in Europe at this moment where a plant and apparatus of the kind that went to the scrap-heap in America twenty years ago still obtain, where the obsolete magneto system, long ago abandoned in the United States for the central battery, is still adhered to, where the old flat-rate scheme of tariffs is still the rule, and where the single exchange districts, with relatively high rates for distant parts of the town, still holds the field, while throughout the length and breadth of England and the Continent there is hardly a single efficient long-distance service to be found.

Now what is the explanation of this extraordinary contrast? I do not think any one who has looked into the question can avoid the conclusion that the main reason for the all-round superiority of the telephone in America over its counterpart in Europe is that in America the telephone industry has been left free to expand in its own way and without official restrictions, while in Europe it has been in most countries a state monopoly. Both policies have their advantages and both their disadvantages. The United States, by permitting free competition in telephones, has suffered more than a little from the collision of rival companies and by the growth in some parts of the country of two or more systems, each supplying the same locality but refusing to one another any co-operation of facilities; and now that the laws of economic consolidation, greatly as I believe to the advantage of the public, have brushed aside the confusion of earlier days and have resulted in bringing most of the telephone business of the country under a single, unified control, the government necessarily finds itself confronted with a huge corporation which practically monopolizes a great public utility. In Europe, on the other hand, these difficulties have been largely avoided by making the telephone from the first a state enterprise; but they have been avoided, as we have seen, at the cost of furnishing the public with a meager, exasperating, and totally inadequate and unprogressive service.

On the whole I have not much doubt as to which side the balance of advantage inclines. The more, indeed, one inquires into the history of telephone development in Europe the more convinced does one become that, while a monopoly in private hands is often objectionable, it may be ten times more objectionable in the hands of the state, and that, while a country may incur some political risks if a public utility is left under corporate control, it suffers far more if the same utility is furnished by the state in an inefficient and unenterprising form. A well-run, privately owned monopoly is of greater benefit to the people than the same monopoly badly run and owned and operated by the state. It is always easier to bring a privately managed utility under the proper supervision of the government than it is to raise a state department to the ordinary corporation level of business ability.

In countries where the telephone has not been made a government monopoly the system of issuing limited licenses, terminable at the end of a fixed and usually too brief period and under indefinite conditions as to the repayment of capital, has had the effect of hindering the flow of private investment; and even in countries where the telephone has been taken over by the state the governments have shrunk from putting the necessary money into the business. All the European states lose money on the workings of the telegraphs, and they have no desire to incur further deficits in connection with the telephones. But if the American companies had been afraid to pour out money without any immediate return, if they had neglected to adopt new improvements even at the cost of rebuilding their entire plant, America would not today enjoy the best telephone service in the world. In almost every country where the telephone is a government monopoly you will find that it has not been carried beyond the tentative and experimental phase that America left behind two decades ago. More rigid and with less initiative than private companies, hampered by political considerations, unwilling to concentrate responsibility, less disciplined and less elastic in their organizations, the governments of Europe, with perhaps two exceptions, have made their administration of the telephones a synonym for all that is wasteful and incompetent.

Mr. Brooks refers to the annual report of President Theo. N. Vail, of the American Telephone and Telegraph Company, and continues:

"As a mere outside observer of American conditions I get the impression that Mr. Vail's report, to which I alluded just now, is a very significant document. For in it the head of one of the largest industrial corporations in the country, first of all, publishes full particulars of the company's business; secondly, frankly states and discusses its general policy toward independent and opposition companies; thirdly, deals at length with the relations of the company with the public; and, fourthly, touches on the question of public ownership. All this marks a great and wholesome change from the days when corporations made a policy of secrecy and seemed to ignore the fact, or, at any rate, never dwelt upon it, that they owed any responsibility to the public. Mr. Vail, on the contrary, cordially admits that "our future success and prosperity depend upon the working out of the telephone and telegraph problem in a way that meets with the approval of the public as a whole." He believes that the public is fast coming to recognize that the ideal telephone service must be universal, intercommunicating, interdependent, and under one control—in other words, a monopoly, but a monopoly strictly accountable to the public. So far from opposing state or governmental control and regulation, he welcomes it, and he makes the extremely interesting remark that "in our relations with permanent bodies of control and regulation during the past year we have had so little in the way of difference or difficulty as to be almost negligible," while "wherever we have had serious difficulties with representative bodies or the public it has almost always been because those representing the public or legislative bodies were of a temporary nature." He draws from this the sound and incontestable moral that "all regulation and control of corporations serving the public should be by permanent bodies, judicial in their attitude, equitable in their purposes and actions, governed by a few simple laws based on the rights of the individual, the corporation, and the community, and applied after the fullest examination and consideration." That seems to me to be the healthy common sense of the "trust" problem; and, although the Postmaster-General, in his report last January, hinted at government ownership of the telephones and the telegraphs, I cannot understand how the American people, with the example of state operation of the European telephones before them, on the one hand, and, on the other, the achievements of the American Telephone and Telegraph Company, could for a moment conceive that they would be better off under public ownership than under their present system. I venture to say that a corporation that pays only reasonable dividends on its invested capital, that supplies a public utility on the amplest possible scale and in a state of unrivaled efficiency, and that is animated by the spirit that appears in Mr. Vail's report, is a corporation that renders the community a service beyond the scope of any government. Certainly an Englishman, grappling daily and even hourly with the embittering inadequacies of his own state-owned telephone system, can only envy Americans their good fortune in being exempt from any such experience.

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New York, October 1, 1912.

Uplifting the Craft.

In this issue we print a letter from Mr. S. D. Barger in answer to our recent invitation for suggestions as to the best method of establishing a fund for the benefit of unfortunate worthy members of the telegraph fraternity. This letter contains some suggestions which might form the basis of a practical scheme.

Many wealthy former members of the craft, now in other lines of business, are disposed to help their brothers of the key who need assistance on account of sickness or the infirmities of old age, and as we have already pointed out, are ready to join and support any practical method looking to that end. The same thing is being done in other lines of business and there is no reason why it cannot be done in the telegraph.

One plan suggested is to donate a generous sum of money to be applied to the reserve fund of the Telegrapher's Mutual Benefit Association for the purpose of reducing the assessments and, consequently, the costs to the members, thus making membership in this splendid organization more attractive on account of the lower rates. This in itself would not meet all the needs of the craft, but it is one way in which some good could be accomplished.

Other institutions through which much good could be realized with a liberal endowment are the aid societies conducted in many cities by and in the interest of telegraphers. These are worthy institutions indeed and deserve liberal financial support. They are doing excellent work among distressed members of the craft, but they perform their duties so quietly that they are rarely heard of except by the members. A commendable feature of these organizations is that they extend aid to deserving needy telegraphers whether they are members or not. Such institutions certainly deserve liberal financial encouragement.

Amplification of the aid society work would well cover the "Telegrapher's Home" idea, without providing an actual so-called "home," to which many of the members of the fraternity do not seem to take very kindly.

The cheapening of insurance on the one hand and, on the other, the provision of means of support for living telegraphers when they can no longer work, seems on the face to meet the essential requirements of the main proposition under consideration.

We would like to have a free expression of views on this interesting subject. There are many bright minds in the fraternity and if they will help the cause along in offering suggestions we are sure that the financial aid will be forthcoming when a practical plan is evolved.

The Telephone Under Private and State Control.

The excellent article of Mr. Sydney Brooks on "The Telephone and the State," printed in this issue, presents a fair and unbiased view of the telephone situation in the United States and in those European countries where this public utility is controlled by the State. The effectiveness of the argument lies in the "deadly parallelism" of cold type and facts. A one-sided argument is not convincing to one who wishes to learn the truth of a proposition; both sides of the question must be considered and weighed against each other in order to form a fair judgment. Mr. Brooks has done this in a masterly way, and, while he does not claim that private ownership of the telephone service is perfect without public supervision, he succeeds in proving that it is far preferable to State controlled service. Politics and business do not mix well together though there is no good reason why they should not if men were right-minded. The conditions, however, are against such a possibility and so long as such a state of affairs exists the best results are attainable only through private enterprise. The case against public ownership of public utilities of this character, as Mr. Brooks presents it, seems convincing, and the argument is unanswerable.

New Way of Producing Illustrations.

Whatever can be accomplished—equally as well but in less time than before—is certainly a distinct gain in business. One of the desiderata in the modern journal is uniformity in all its departments. Care in this respect gives a standing to a paper that cannot be acquired in any other manner. Uniformity makes a favorable impression upon the reader, and is a desirable distinction in any line of business.

This paper has adopted a method of reproducing drawings of telegraph and telephone apparatus and combinations of the same that gives uniform results with the expenditure of the least labor and time.

We have been experimenting with and developing a process and the results are shown in the illustrations accompanying the present instalment of the Elementary Lessons in Technical Telegraphy. What we have gained in this method of reproducing drawings is a great saving of time and labor and uniform results. By the latter we mean that a key, a sounder, a battery or any other piece of standard telegraph and telephone apparatus will always be of standard design and look the same when printed. Our plans along this line have not yet been fully developed, but the results in the case indicated are very encouraging. There is no secret involved, but we have never seen or heard of anything like it having been attempted in newspaper work. We mention it here merely to let our readers know that we are endeavoring at all times to improve the standard of the paper for their benefit, because we feel that our efforts are appreciated.

Office Management.

The following excellent advice is reprinted from a former issue of this journal and is particularly timely in these days of system:

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 manoeuver 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 his head.

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 office 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 wheel will throw out of gear the rest 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 alert 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 it; 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.

New Zealand Telegraphs and Telephones.—The annual report of the Department of Telegraphs and Telephones of New Zealand for 1911, shows that the year's revenue of the telephone exchanges was £179,124 ($895,620) and the revenue for paid telegrams, £288.432 ($1,442,160); total revenue for telegraphs and telephones was £479,280 ($2,396,400). Telegrams forwarded were 9,063,133, an increase of 702,486. On March 31 last there were 11,805 miles of telegraph lines and 39,370 miles of wire. Thirteen new telephone exchanges were opened during the year, making sixty central and 133 sub-exchanges. The total number of connections was 37,257. On March 31, there were 1,538 miles of telephone lines and 37,872 miles of wire. The report states that Mr. T. Buckley, chief electrician of the Post and Telegraph Department, of New Zealand, who visited America and Europe last year will report to Par-telegraph and telephone systems in the various liament the result of his investigations of the countries visited.

Course of Instruction in the Elements of Technical Telegraphy—XXIV.

(Copyrighted.)

(Continued from page 589, September 16.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order. The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

Morse Circuit.

Fig. 14 shows the arrangement of a Morse circuit between two terminal offices A and B.

At station A, MB is the main battery, K the key, R the relay, L B the local battery, and S the sounder.

When the circuit is closed, the current leaving the copper pole of MB at station A, passes through K, R, and line to station B, and through R, K, MB, to earth, which completes the circuit as shown by the dotted line.

The terminal offices of every single Morse circuit must have opposite poles of the battery to line; for if the batteries at A and B have an E. M. F. of 50 volts each, and both stations have copper to line, then the potential at A and B being the same, namely 50 volts positive, there is no difference of potential (assuming perfect insulation) and consequently no current on the line. But let B put his zinc to line, and we have 50 volts+at A, and 50 volts—at B, and the fall of potential in the circuit is 100 volts.

It is thus evident that if a battery is to be added to a circuit at an intermediate office it must have its poles reversed with those on either side of it. Thus, if in Fig. 15 an intermediate office, such as B, wished to add a battery to the main circuit, the pole connected with A would require to be zinc, since A has copper to line, and the pole connected with C would require to be copper.

The intermediate office could not use a ground on one side of his battery for the obvious reason that by so doing he would terminate one side of the through circuit at that point, and leave the other side open.

It is not uncommon to have 30 or 40 offices with their keys and relays connected as in Fig. 15 in one Morse circuit, with but two main batteries, one at each terminal office.

In this figure, A has his key open, and the relay cores at A, B, C, D are consequently demagnetized, and their respective local circuits broken at the points marked x. When A closes his key each relay on the line responds, and any station in the circuit can now "break" by simply opening his key switch.

Earths.

The best earths are obtained by connecting with gas or water pipes, and with the sheathing of submarine cables. If a gas pipe is used for ground the office lead should be soldered to the main gas pipe, and not to any part of the pipe indoors, on account of rusty joints and white lead packing. Never carry a wire within six inches of a lead gas pipe. There are many instances on

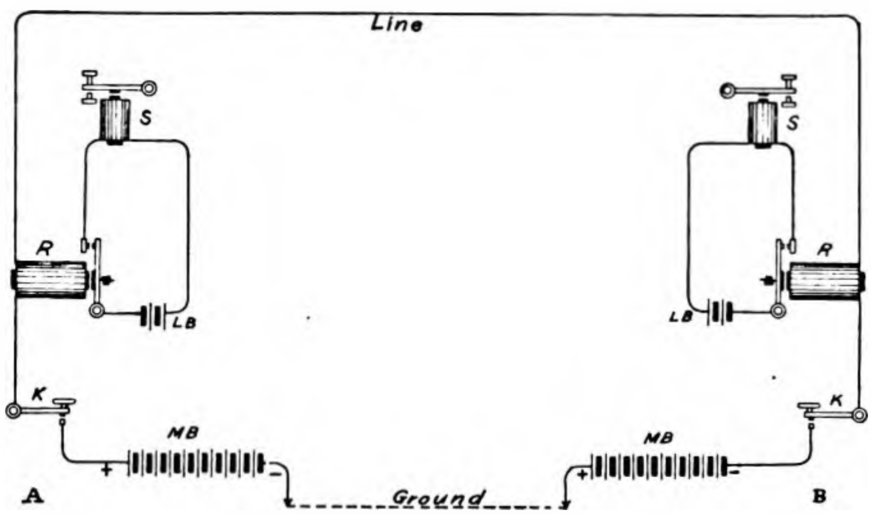

FIG. 14. DIAGRAM OF SIMPLE MORSE CIRCUIT WITH TERMINAL OFFICES ONLY.

record of lightning discharges between lead gas pipes and adjacent wires where the lead pipes have been fused, and the gas set on fire. When neither gas nor water pipes are available, earth plates must be used. They may be made of copper sheets, or of thick galvanized iron, and should be about three feet square.

The earth plates must be buried vertically, and in sheet form, in damp soil. Should the soil become dry the resistance of the earth would be greatly increased, and the currents from the different circuits, following the laws of derived circuits, would divide between the earth and the other wires connected with the plate. The plates at each end of a circuit should if possible be of the same metal; otherwise on short circuits a current will be set up owing to the dissimilar metals used. Should there be difficulty in securing a good earth, the resistance of the short circuits might be increased by inserting artificial resistances in the form of coils of thin wire, as the higher the resistance of the circuit the smaller will be the leakage current from the earth plate.

A rough way of proving whether the earth is good enough for ordinary working is to put the relay of the smallest resistance circuit on a low adjustment and notice whether the currents received from the other wires on the same earth plate affect it.

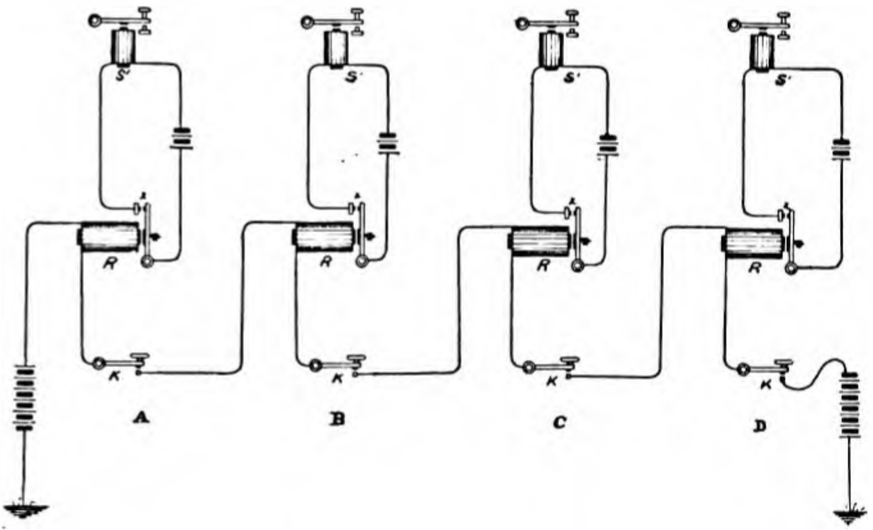

FIG. 15. DIAGRAM OF MORSE CIRCUIT WITH INTERMEDIATE OFFICES.

New Rates for Wireless Service.

The Marconi Wireless Telegraph Company of America will, on November 1, substitute a new schedule of through word rates for the rates now in force. The rates cover wireless and land lines, and delivery charges. The cable system of counting will be used, address and signature being counted and charged for, but messages containing less than ten words will be charged for as having ten words.

The wireless rate between coastal stations and ships at sea has been fixed at twenty cents per word, with the exception of Siasconset, Mass., where the rate has been fixed at twenty-five cents per word, and from the high power station at South Wellfleet, Mass., the rate will be fifty cents per word. To these rates have been added the land line word rates from all points in the United States. Code addresses registered with cable companies may be used in messages sent from ships for delivery on land.

The schedule gives the rates between offices in every State in the Union and in the Canadian provinces and ships via the coastal stations at New York, Sea Gate and Sagaponack, N. Y., Boston, South Wellfleet and Siasconset, Mass., Eastport, Me., Atlantic City and Cape May, N. J., Philadelphia, Pa., Baltimore, Md., Norfolk, Va., Hatteras, N. C., Charleston, S. C., Savannah, Ga., Jacksonville, Tampa and Key West, Fla., Mobile, Ala., New Orleans, La., Galveston and Port Arthur, Tex., San Francisco, Cal., and Seattle, Wash.

Note is made of the fact that the principal Atlantic steamers are equipped with special long distance receiving apparatus and can be communicated with from the high power station at South Wellfleet, Mass., when sixty hours from New York.

Edison Storage Battery Cars for Cuba.—Mr. Thomas A. Edison on September 19 received a delegation of railway men at his works in West Orange, N. J., who were invited to inspect some cars fitted out with Edison storage batteries for the Unidos Habana Railway, Havana, Cuba. Cars of a similar type have been ordered for Alaska and points in the Canadian Northwest.

Mr. F. T. Wilbur, superintendent of telegraph Illinois Central Railroad, Chicago, Ill., in renewing his subscription to this publication for another year writes: "Herewith $2.00. I want the AGE. Keep it coming."

Relation Between Telephone Service and Current Consumption*.

BY F. AMBROSIUS.

It is often of interest to the manager of a telephone exchange to know the relation between service and current consumption, and the present article will show the relations between the number of connections and operators as compared to the current consumption.

In trying to operate an exchange in the most economical way it is desirable to know how many connections are made simultaneously and how many operators must be at the switchboard, so that there shall be no idle operators and yet enough operators to give quick service. The thought came to the writer, a telephone engineer of Leipzig, Germany, that there might be a certain relation between the number of calls received and the amount of current used. To ascertain the correctness of this hypothesis, the current consumption was determined every hour in terms of amperes, and at the same time the number of connections made by the different operators was recorded. Connections included not only the completed connections, but also those about to be made, and calls received. The curves plotted as a result of the test show a gradual increase of the number of calls from 8 a. m. on. These reach their height at 10 and 12 o'clock, drop to a very low figure at 2 and rise again at 4 o'clock. Up to 6 o'clock service keeps at about the same level, and decreases after that very rapidly. A comparison of this curve with the curve for current consumption shows a great degree of similarity between them, so that the supposition of a relation between the two elements seems to be certain. The hours with the least number of calls show the greatest variations in curves. The current consumption is heavier than the consumption for heavy service later in the day, as might well be expected from the number of calls made simultaneously. This may be due to the fact that the storage batteries furnish current for other uses as long distance connections, feeding of call lamps, series connections, substation service, etc. The amount of current used for these purposes, is, however, relatively small, and has no effect on the curve, as soon as the number of calls increases. It must also be remembered in regard to the accuracy of the test, that it is very difficult to count the number of calls made simultaneously at any switchboard, as it varies constantly. This shows more with the small number of calls, of course, than with the large number. As the service increases, the similarity of curves for the two factors becomes very apparent, and the change in amperes is but slight. At 9 o'clock, for example, 53 amperes were used for 538 connections; at 10 o'clock 62 amperes for 630 connections; at 12 o'clock 60 amperes for 590 calls, and at 5 p. m. 53 amperes for 550 calls. This shows that the current consumption is an indicator for the number of calls received and answered, provided some standards of equivalents are determined. To determine how much of a correction would have to be made for other service, not classed directly under connections, the current was measured at the various switchboards. The amperage consumption at the different switchboards for purposes only indirectly associated with calls, is about 12 amperes when service is heaviest. At 12 o'clock, for example, 60 amperes were measured at the switchboard. Allowing for correction, we have $60-12=48$ amperes current used for connections proper. Measurements showed that a connection takes about 0.08 amperes of current, considering call received, connection made, lighting up of call lamp, and use of call bell current as a complete connection. Taking this current consumption of 48 amperes and dividing by current per call, or $48 \div 0.08 = 600$ connections. Verifying this theoretical result from the curve, it was found that 590 calls were received and answered, which is close enough for ordinary purposes.

To test the correctness of this assumption, for a longer period, tests were made extending over periods of four and six days, and curves plotted for the average current consumption and number of connections in the ten days. The curves for both factors were almost identical, showing a close relation between them.

The Leipzig exchange shows the maximum number of connections at any given moment to be 630, i. e., when service was heaviest. Since the exchange has 16,000 call lines, the number of connections is only equal to 3.9 per cent. of the trunk lines at the exchange. This proves that the growth of an exchange is not accompanied by an increase in connections made at any one time, but that this latter figure decreases in a certain ratio.

The curves plotted in this test, finally, may serve as a good basis for arranging the operators' time, and switchboard service during the different hours of the day. This is feasible, since, as was shown, the number of calls received is proportional to the current consumption. If, during heavy service periods all of the switchboards were to have one operator we would have

$$\text{at say 2 o'clock, } \frac{260 \times 100}{630}$$

$= 41$ operators, to give proper service. Since there are fluctuations from this figure, and since allowances must be made for sickness, arrangements should be made for 48 operators during the hour from, say, 1:30 to 2:30 p. m. Similar estimates can be made for the rest of the day, basing the results on the current consumption and number of calls made simultaneously at any time in the day.

*Telephone Engineer.

Development of Cable Manufacturing.*

BY H. D. AGNEW, HAWTHORNE, ILL.

The first cable of which there is any record was laid at Birmingham, England, in 1837. It was composed of a number of gutta-percha covered wires encased in an iron pipe. Owing to the imperfect protection afforded by the pipe its life was very short.

During the next half century the problem of an efficient protective outside casing for the wires remained the most difficult one in cable manufacture. The period from 1837 to 1880 was largely one of experiment. Many varieties of telegraph and telephone cables were tried out during that time, but all developed the fatal defect of being non moisture-proof when laid underground.

In 1880 a cable was finally introduced which attained some measure of success. It consisted of cotton-insulated copper wires bound together and drawn into 200-foot sections of lead pipe; the interior of the cable thus formed was then thoroughly saturated with paraffin throughout its entire length.

It was with one of this type that the Western Electric Company began its manufacture of cable in 1882, and continued with little change until 1891, when paper insulated conductors were introduced. The substitution of paper insulation for that of wool or cotton resulted in such a remarkable improvement in transmission and such a decided reduction in cost, that the paper core cable has almost completely displaced the older types.

Of the four principal manufacturing operations through which cable passes—insulating the copper wires, pairing the insulated wires, winding the wires into a cylindrical core, and sheathing the core—the insulating and sheathing processes only have undergone important changes.

The insulating operation was radically changed when the use of paper was inaugurated, a new design of insulating machine becoming necessary. The first method of applying paper insulation was to pull the wire through a die which folded a ribbon of paper lengthwise around the wire. Spirals of different colored threads were then wound around the insulated wire in order to keep the paper binding in place, the various colors serving to distinguish the different pairs of wires. This method is still employed by foreign manufacturers in the insulation of the coarser gauges of wire.

In America, however, it was almost immediately replaced by our present method, in which the paper ribbon is wrapped spirally around the wire; the covered wire being afterward run through a bushing ("polisher") in order to bring it to the required diameter.

The first type of machine used for this purpose was necessarily slow, as the supply of paper that was wound on a comparatively small bobbin could not be revolved about the wire at a very high speed. About 1897, however, a much faster machine was developed. In this, a revolving disk carries a pad of paper tape upon its face. As the disk and the pad revolve together, the paper is unwound at the same rate of speed, regardless of the size of the pad. The design of this machine has been constantly improved, until at present the paper insulation can be wound around the wire at the rate of 2,800 turns a minute.

The lead sheathing operation was, at the time the company began cable making, a very tedious and expensive process. At that time the lead pipe was purchased in approximately 200-foot lengths. Four of these usually constituted a cable length, and were laid out straight on the floor to receive the core. In order to start the cable core through the sheath, a ball attached to a cord was forced through the pipe by means of a hand air-pump—something like a bicycle pump. To the cord was attached a rope, by means of which the cable was drawn through.

The men employed to do this kind of work had to be a combination of sailor and plumber, as they had first to pull the core into the lead sheath, and then solder the joints. Those who remember having seen the "drawing-in" say that when the men settled down in their cleats and "yo-hoed" like regular sea dogs, it was like being aboard ship. The plumbing work followed the "drawing-in" operation, the ends of the pipes being brought together and the joints wiped in the regular way, except that the diameter of the joints was made as small as safety would allow.

After the sections had been joined, the length of sheathed cable was wound on a drum and placed in an oven. Here, by means of a vacuum, melted paraffin was forced through its entire length, until the core was saturated. The finished cable was then rewound on wooden reels ready for shipment.

In 1892 this slow and laborious process was replaced through the efforts of W. R. Patterson, one of the company's engineers at that time, and later plant engineer. By an ingenious invention known as the "die block" Mr. Patterson made it possible to form a continuous lead sheath around the core as it passed through a chamber filled with plastic lead. This process, which gave the name "Patterson cable" to the product, is, with some improvements in the die blocks and presses, still employed in forming the sheath.

The change to a continuous sheath made it possible to omit the saturation of the core with paraffin, as the cable could be taken direct from an oven and passed through the presses, without any danger of its taking up moisture.

*Western Electric News.

Mr. H. E. Marquardt, Western Union Telegraph Company, Wausau, Wis., writes: "I am very thankful to you for renewing my subscription for the Age as the arrival of each issue is like an old friend returned."

The Peoria Convention of Municipal Electricians.

Following is a list of the new members elected at the Peoria, Ill., convention of the International Association of Municipal Electricians, August 27, 28 and 29:

W. S. Boyd, Underwriters' Laboratory, Chicago, Ill., (honorary); C. M. Brown, city electrician, East St. Louis, Ill.; Thos. H. Beaning, superintendent fire and police telegraph, South Bend, Ind.; *Thos. G. Biddle, Philadelphia, Pa.; *Chas. Berst and *O. P. Crocker, Gamewell Fire Alarm Telegraph, Cincinnati, Ohio; *Central Electric Company, Chicago, Ill.; *Central Tube Company, Pittsburgh, Pa.; *A. J. Coffee, Gamewell Fire Alarm Telegraph, San Francisco, Cal.; *Detroit Fuse & Manufacturing Company, Detroit, Mich.; E. D. Fitzgerald, city electrician, Tampa, Fla.; Jay B. Franke, city electrician, Perth Amboy, N. J.; Leo D. Firman, chief operator electrical bureau, Philadelphia, Pa.; *Dr. Karl G. Frank, engineer Siemens-Halske, New York, N. Y.; Robt. J. Gaskill, superintendent fire alarm, Fort Wayne, Ind.; J. W. Graham, superintendent fire alarm, Ottawa, Canada; *H. L. Harris, engineer Dean Electric Company, Elyria, Ohio; *Johns-Manville Company, New York City; W. T. Jones, superintendent fire alarm, Suffolk, Va.; Geo. McD. Johns, superintendent fire alarm, St. Louis, Mo.; *C. S. Knowles, Alumaduct, Boston, Mass.; *Leeds & Northrup Company, Philadelphia, Pa.; John W. Leary, city electrician, Hammond, Ind.; *E. Marcusson, storage batteries, New York, N. Y.; *Chas. F. Maulin, Gamewell Fire Alarm Telegraph, Cincinnati, Ohio; *Wm. J. Murdock Company, connector blocks, Chelsea, Mass.; J. A. Morris, fire department electrician, Tulsa, Okla.; Wm. B. Martin, superintendent fire alarm, Albany, N. Y.; James J. McGuire, superintendent fire alarm, Fall River, Mass.; Moyses N. Marks, superintendent fire alarm, San Paulo, Brazil; Frank E. Maize, first assistant manager, electrical bureau, Philadelphia, Pa.; *National India Rubber Company, New York, N. Y.; *Nelite Works General Electric Company, Cleveland, Ohio; Clayton W. Pike, chief electrical bureau, Philadelphia, Pa.; Price I. Patton, second assistant manager, electrical bureau, Philadelphia, Pa.; Karl E. Pritchard, city electrician, Waterloo, Iowa; *Pass & Seymour, Inc., Solvay, N. Y.; *Fred. S. Peace, Gamewell Fire Alarm Telegraph, Pittsburgh, Pa.; *Queen & Company, electrical instruments, Philadelphia, Pa.; W. L. Reihl, superintendent fire alarm, Cincinnati, Ohio; Paul A. Reiche, superintendent fire alarm, Wausau, Wis.; *Frank F. Stover, Gamewell Fire Alarm Telegraph, Chicago, Ill.; Selwyn Smith, superintendent fire telegraph, Fort Worth, Tex.; A. J. Sproles, superintendent municipal water and light, Greenwood, S. C.; A. G. Sangster, city electrician, Saskatoon, Saskatchewan, Canada; *Thompson-Levering Co., Philadelphia, Paa.; F. S. Vincent, superintendent fire telegraph, Grand Rapids, Mich.; J. P. Williams, city electrician, Jackson, Miss.

*Associate members.

Among those present at the convention were:

W. Arbuckle, Bayonne, N. J.; A. J. Balizet, Meadville, Pa.; Arthur J. Bell, New Rochelle, N. Y.; John Berry and wife, Indianapolis, Ind.; B. A. Blakey and wife, Montgomery, Ala.; Adam Bosch, Newark, N. J.; L. S. Bosley, Springfield, Ohio; H. C. Bundy, Watertown, N. Y.; Wm. Crane, Erie, Pa.; Clark E. Diehl, Harrisburg, Pa.; M. J. Donahue, Niagara Falls, N. Y.; Chas. S. Downs, Altoona, Pa.; W. Y. Ellett, Elmira, N. Y.; W. H. Flandreau, Mt. Vernon, N. Y.; C. F. Gall, Louisville, Ky.; Clarence R. George, Houston, Tex.; A. G. Goldsmith, Davenport, Iowa; Jno. W. Kelly, Jr., Camden, N. J.; H. G. Kennedy, Rochester, N. Y.; A. L. W. Kittredge, New Haven, Conn.; P. H. McManus and wife, Wilkes-Barre, Pa.; Wm. J. Neave, Scranton, Pa.; Timothy C. O'Hearne, Cambridge, Mass.; A. L. Pierce and wife, Wallingford, Conn.; Robt. Stuart, New Brunswick, N. J.; Olway C. Trussler and wife, Indianapolis, Ind.; Wm. E. Wolgamott, wife, and daughter Ruth, Peoria, Ill.; C. M. Brown, East St. Louis, Ill.; Thos. H. Beaning, South Bend, Ind.; O. P. Crocker, Cincinnati, Ohio; E. D. Fitzgerald, Tampa, Fla.; Leo D. Firman, Philadelphia, Pa.; Robt. J. Gaskill, Fort Wayne, Ind.; Geo. McD. Johns, St. Louis, Mo.; John W. Leary, Hammond, Ind.; Wm. B. Martin, Albany, N. Y.; Clayton W. Pike, Philadelphia, Pa.; W. L. Reihl, Cincinnati, Ohio; Frank F. Stover, Chicago, Ill.; A. S. Sangster, Saskatoon, Canada; W. S. Boyd, Clarence B. Coleman, and Louis Trivot, Chicago, Ill.; A. M. Klingman, Cleveland, Ohio; Henry N. Remington, Peoria, Ill.; "Happy" Crawford, Arnold H. Friend, and Patrick F. Lyons, Chicago, Ill.; Avery P. Eckert, New York, and E. R. La Manquais, Chicago, Ill.

In a letter to the members, president John W. Kelly, Jr., gives some timely information regarding the association. He thanks them for their support and to those who were unable to attend the Peoria convention he extends his sympathy for what they lost. He is already laying plans for next year's convention, which will be held in Watertown, N. Y. He points out the fact that the membership of the association is scattered from San Paulo, Brazil, to Saskatoon, Saskatchewan, and Winnipeg and from San Francisco, Cal., to Cape Cod, Mass. It is the desire of the executive committee, he says, to revive the "Question Box."

The "K K" Detector.—The International Railophones, Ltd., Birmingham, England, has issued a pamphlet describing and illustrating the "K K" Detector. This instrument is a highly sensitive relay of special form, designed for use wherever sensitive alternating current relays are employed. It is stated that in telegraph and telephone work it may be used to relay currents that can scarcely be detected in an ordinary telephone receiver, and render them audible, and in wireless telegraphy for the detection of signals.

Uplifting the Craft.

To the Editor TELEGRAPH AND TELEPHONE AGE:

Sir: It is a peculiar coincidence that within a few hours after writing a letter on a similar subject, which letter was printed in the Chicago *Tribune* of August 22, the August 16 issue of your journal should reach me containing an editorial on "Uplifting the Craft."

I am not a radical who objects to the accumulation of large fortunes, but when any person has accumulated more than enough for his own needs and wishes to dispose of a portion of it it is my opinion that the industrious workers should receive direct benefits.

The best plan that Mr. Carnegie and other wealthy former telegraphers, who are favorably disposed toward the telegraph profession, could adopt, would be one that would give every telegrapher an opportunity to make sure of his future.

Every man who really amounts to anything, makes some provision for the inevitable "rainy day." He either carries life insurance for the protection of those dependent on him, or he tries to get a home, and frequently both. These are of much more importance to the average worker than the advanced education of his children.

Some operators prefer to own a city home and remain at the key until "30," while others desire a country home that can be put into such shape that it will support its owner in his declining years. Either are commendable.

Many who try to purchase homes find that the interest charges on the unpaid portion, together with their living expenses, nearly equals their earnings. If there is any sickness in the family, particularly of the income-earner, the margin disappears. Frequently the outlook becomes so discouraging that the savings are forfeited when a little substantial assistance would have made "the dream come true."

Our national government is very liberal with its land, but persons of small means cannot take advantage of this liberality because the funds necessary for the simplest of improvements, and the living expenses while putting the land on an income basis, are greater than the savings of the average worker.

The liberality of the government is not confined to the price of land, but includes terms as well. In many cases the charges against the land are divided into ten equal yearly payments, without interest.

If our philanthropic friends would formulate some plan whereby each telegrapher would have an opportunity to secure an improved home, either in the city or in the country, on terms as liberal as raw land can be secured from the government, the fraternity would be given a lasting benefit.

In order to put my ideas into definite form the following suggested outline of a plan is submitted. Additions and alterations by those most interested could perfect this outline into a working plan, providing my ideas are acceptable.

> "(———), (———), and (———) have placed in trust with (some reliable trust company) the sum of $— to be used in giving substantial assistance to telegraphers, for the purpose of acquiring homes.
>
> "To those who have already purchased homes and have not finished paying for them, The — Trust Company will advance an amount sufficient to clear the property, and the owner shall repay this amount in small monthly, or yearly, payments, without interest.
>
> "To those who have not purchased homes but desire to do so, The — Trust Company will advance to each an amount equal to the sum of his savings and his life insurance, to be used as first payment on such property as he desires. When the property has been secured, The — Trust Company will advance another amount, sufficient to clear the property, and the owner shall repay the total amount advanced, in small monthly (or yearly) payments, without interest.
>
> "The maximum amount advanced to any one person shall be $—. Should any beneficiary default in his payments—(the terms of forfeiture or penalty could be made so liberal that rarely, if ever, it would be necessary to enforce them. The only reason for including any such provisions is to put a sense of business responsibility on the beneficiary).
>
> "Any telegrapher of good moral character, steady habits and of a saving disposition, can secure assistance by applying to The — Trust Company. (This could be made stronger, if desired, by specifying age, length of service, or any other requirements that might be considered desirable)."

With his home assured, the average worker would use the money that otherwise would have gone for rent or interest, for the purpose of giving his children a better education. They, in turn, would become fitted for better positions, and the benefits of such a plan would continue indefinitely.

Naturally, my proposition contains a certain element of self-interest. You will, no doubt, receive many proposals in answer to your editorial, each of which will contain a certain amount of self-interest. By picking out the best points of the various proposals and combining them into one, it should be possible to formulate some scheme of lasting benefit to telegraphers.

S. D. BARGER.

Chicago, Ill.

Keep up to date on the progress in your work—why get the "leavings" when you can get every bit of progress in your chosen field at first hand through the leading telephone and telegraph publication.

Thirty Years After.

BY J. W. HAYES.

It was in the year 1882 that the writer turned his steps to the North from Los Angeles, Cal., toward what was considered a more congenial clime. There was little then in the "City of the Angels" to attract a "live wire"; there was but little business and no sociability, unless one cared to mix up with the native-born Mexicans. The streets of this Southern metropolis were irregular and straggling and the route to the depot was serpentine, with a stray adobe dwelling but no verdure or trees to gladden one's eyes. The population did not exceed 15,000, more than half being aliens.

The telegraph force was composed as follows: R. R. Haines, superintendent; G. Q. Stewart, manager; Mr. Kubal, chief operator, and Jim Decatur, Bert A. Worthington and J. W. Hayes, operators. Mr. Haines and Mr. Kubal have gone to meet their Creator; Stewart is with the Sunset Telephone Company in San Francisco; Decatur is with the Western Union Company in San Francisco and Bert A. Worthington is president of the Chicago and Alton Railroad, in Chicago. The city was built in a desert; the water supply was not good and there was nothing but the climate to recommend it, and it was the climate that won out.

Today Los Angeles has a population of 450,000 and is a paradise on earth. No city could be made more beautiful and attractive and thousands of new comers make it their home annually.

The ever present sunshine seems to inspire the people of the city to do good and there is less vice and better morals there than in other less favored California cities. The latter condition applies to the telegraphic field where the employes are happy, well treated and ready to show their appreciation for the new order of things.

The officials of the Western Union Company are Messrs. Ralph Miller, Hugh McPhee and Louis Messner, representing the new triple arrangement, and each of these gentlemen work in concord and with energy to accomplish the common end. The company, of course, reaps the benefit of this change in getting more conscientious service in every branch and it is better able to count upon its employes' faithfulness and loyalty.

Paul G. Tompkins, one of the old school, and a man of education, is in charge of the printers and multiplex machines and keeps well posted in the progress of his chosen profession.

Among the old-timers in the Los Angeles office are Ned Reese, E. H. Beardslee, both of whom are well and favorably known all over the country. Mr. George Lawrence is the manager and fills the position very acceptably.

Richard Allen is the manager for the Santa Fe railroad telegraph. "Dick," as he is affectionately called, is an old-timer in the city. Ed Somerville, erstwhile operator in San Francisco, is in business in Pasadena and doing well. Frank Richardson, so well known in the Chicago office, is also in business in Pasadena and is reaping a well-deserved golden harvest. Chas. Lewis is superintendent for the Postal Company at Los Angeles and has an efficient force under him.

One of the dearest of my old friends is Mrs. Annie Griggs Loomis, now manager for the Western Union Company at Santa Barbara, where she has been these many years. Mrs. Loomis, née Miss Annie Griggs, was once manager for the Western Union at Jefferson City, Mo., and later at Tacoma, Wash. She is as young and sprightly as she was thirty-five years ago. Miss Libbie Yeomans, formerly manager at Olympia, Wash., assists Mrs. Loomis as bookkeeper.

J. R. Bailey, who bears the doubtful distinction of having graduated sixty-eight first-class operators in his time, is still manager at San Jose, Cal., one of the beautiful suburbs of San Francisco. Eddie MacMannimon is Associated Press operator at San Jose for the San Jose *Herald*. He is the same handsome, good-natured Eddie as of yore.

Clarence Vincent is manager at Oakland for the Western Union, and Noah Waymire fills the same position for the Postal. Both gentlemen are courteous, obliging and full of business.

One of the finest young fellows in the telegraph business is Jerry K. Beede, manager for the past twenty-one years for the Postal at Sacramento, Cal. In his quiet, unobtrusive way, Mr. Beede has built up a great business for his company. William Dumars, formerly manager for the Western Union at Sacramento has temporarily been filling a similar position at Stockton, Cal.

William Mowatt, for more than twenty-five years manager for the Postal Company at Ashland, Ore., is still there in the same position and is a man of much value to his company. Frank Routledge is manager for the Western Union at Ashland, Ore., a repeating station. Mr. Routledge is an old-timer and well known in Portland and Seattle.

Monte Fickle is manager for the Postal at Roseburg, Ore., a position he has filled since the advent of the company into that State.

Miss Katie Buick is agent for the Wells Fargo Express at Roseburg, in which position she is assisted by Mr. Fickle.

These straggling remarks would not be complete were I not to mention the many startling and happy changes that have taken place in the telegraphic field in the last two years. One could hardly comprehend these changes unless he happened to be on the ground. "Efficiency" is the watchword of both companies and this idea is carried out with an intelligence and zeal that is marvelous to an antiquated old-timer. A wonderful spirit seems to have been infused into the old blood and in many cases the old blood is replaced by new people who are more ready to grasp new conditions. New, up-to-date offices specially equipped for the service, polite and attentive managers and clerks wait on the public, and the public is gratified and pleased with the innovations, and the company, no doubt, gets a substantial recognition.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What are wires tested for each morning?

How does the wire chief test the various wires under his supervision?

If the wire chief fails to get the distant station on a particular wire, what does that fact indicate? (See Figs. 106 and 107.)

How is an open wire indicated on the test relay?

If a wire is in contact with another wire how is the trouble disclosed?

How is a grounded or open wire tested in order to locate the trouble? (See Figs. 106 and 107.)

In the case of crossed wires what is the procedure to locate the trouble? (See Fig. 108.)

If both wires are opened at the distant station and a battery applied to one wire at the home station closes the testing relay on the other wire what does it indicate.

What is a "wreck" as applied to telegraph wires?

How are the wires in a "wreck" tested out?

When an "open" or ground is definitely located what is the next step in the work of clearing the wire of the trouble?

How is the wire chief informed when a wire has been cleared of trouble? (See Figs. 109 and 110.)

How is the Varley loop used in testing wires? (See Figs. 111 and 112.)

What should be the values of the ratio arms in the Varley loop test?

What is the advantage of cutting a milliammeter in circuit with the battery in making a test with the Varley loop?

How are measurements for crosses made, using the Varley test? (See Figs. 111 and 112.)

Study the formula for this test.

What other test besides the Varley is applicable to the location of faults on lines? (See Fig. 114.)

What are the necessary conditions to obtain correct results in the use of this second test?

Referring to Figs. 112 and 113 is it necessary to take into account the resistance of the cross between the two wires.

If a third good wire is not available for measurement for crosses how can the trouble be located? (See Figs. 114 and 115.)

In this latter test is the resistance of the fault taken into account?

Study the test illustrated in Fig. 115, and its formula.

Fig. 116 illustrates another method of locating a cross. How many wires are necessary in this case to make the test? Study the instructions given, in connection with the diagram.

Murray Printing Telegraph Journal.—The second number of the *Murray Printing Telegraph Journal* has just been issued from London, England. Its contents consist chiefly of an account of Mr. Donald Murray's recent trip to America, in which he reports the progress of printing telegraphy in the United States. He inspected the Buckingham-Barclay system, the Morkrum system, the Wright, Cardwell, Crehore, Delany Telepost, Giara Teletype and the Electric Press Bulletin systems, and describes the principal features of each. Besides these, Mr. Murray makes some observations on various other matters of interest to telegraph people, including the Edison storage battery. This interesting pamphlet is printed in English, German, French and Spanish. Mr. Murray is the inventor of the well-known printing telegraph system which bears his name.

Tug Dispatching by Telephone.—It may not be known generally that the large railroads centering in New York have a system of tugboat dispatching very similar to train dispatching, says the *Telephone Review*. Every time a tugboat completes an assignment the captain goes to the nearest telephone and reports to headquarters. On the other hand, when orders are to be given to the commander of any of the tugboats they are telephoned from headquarters to the local stations on piers along the water front and a signal, flags by day and colored lights by night, is at once displayed indicating that there is a message. When the tug comes within hailing distance the message is then delivered by megaphone, and the tug goes on its way. Without the telephone it would be impossible to handle the enormous freight traffic in and around New York as economically and expeditiously as it is done at present.

There is something of value to everyone in each issue of TELEGRAPH AND TELEPHONE AGE, and this value should not be measured by the cost of a subscription but by the influence the paper has on the individual.

American Methods Seen Through English Eyes.

Mr. Donald Murray, of London, England, the inventor of the Murray printing telegraph system, spent some time in the United States early in the year, and inspected the various telegraph systems in use in this country. In a pamphlet just issued in London he describes the results of his investigations, and makes some observations on miscellaneous matters.

"One of the most interesting minor points noted during the trip," he says, "was the extent to which silver is being used in the United States for contacts. The cost of platinum is so high that the employment of a cheap substitute is no longer a matter of indifference. Silver contacts are being used by both of the big telegraph companies in America and also by all the printing telegraph inventors, and the results appear to be satisfactory, in spite of the high voltages and heavy currents employed in telegraph practice in the United States. The French telegraph administration has used silver contacts for years. Silver has the advantage that the dirt on the contacts is a fairly good conductor; but silver is soft and much more easily fusible than platinum, and it is not unlikely that a more satisfactory contact metal or alloy would be discovered if some attention was devoted to the matter in telegraph laboratories. For instance, ductile tungsten appears to have special advantages for the purpose.

"Electromagnets are being quite largely substituted for permanent magnets in telegraph relays in America. The Post Office standard design of relay is being generally used with an electromagnet substituted for the permanent magnet. The Western Union officials state that they are using more of the electromagnetic relays than permanent magnet relays, as the electromagnetic relays give less trouble. They find that, at any rate under American conditions, the permanent magnets are not permanent, especially with high-speed working, as the reversals tend to demagnetize the permanent magnets. Messrs. J. H. Bunnell & Co., large American manufacturers of telegraph instruments, are supplying Post Office standard relays fitted with electromagnets in place of permanent magnets, the electromagnets being neatly packed away in the form of a long thin coil behind the armature pivots. Electromagnetic relays are used in the Morkrum system, and Mr. J. E. Wright, of the Wright printing telegraph system, also uses them. He says he gets better results with the electromagnetic relays. In this connection also it may be mentioned that the Eastern Telegraph Company has been experimenting with electromagnets in the Brown drum relay in place of the large permanent magnets hitherto used.

"In printing telegraph work in the United States plain block letter capitals are preferred thus—**A B C D.** They are employed on the Morkrum, the Wright, and other printers, and the Western Union is specifying this kind of type for the 10,000 Underwood typewriters that it has ordered. It is a good clear style of type, but the German system of using small letters (lower case) instead of capitals is undoubtedly the best from the point of view of legibility. I was informed in Berlin that the matter was carefully investigated by the German telegraph administration, the outcome being that small letters were found to be the best. The consequence is that now in all telegrams in Germany, even in the case of handwritten telegrams, only small letters and no capitals are employed.

"The commercial use of the Edison nickel accumulator is making rapid progress in the United States, and it is so durable and robust that it should be of interest to telegraph administrations. I went out to Orange, New Jersey, and was shown over the extensive and wonderfully equipped factory that has been built to manufacture the Edison accumulator. I also had the privilege of a chat with Mr. Edison. He and his associates have great confidence in the future of the Edison accumulator, and very large sums of money have been spent in equipping the factory with wonderfully intricate and ingenious machines and processes for the construction of the accumulator. In fact the whole secret of success in the case of this battery may be said to lie in the machinery and methods employed in its construction.

"It is a circumstance not without significance that Edison, the foremost inventor of our time, is drawing his main revenue from popular amusements, that is to say from his phonograph and cinematograph film factories. Amusing people is more profitable than inventing printing telegraphs."

Earth Antennæ.

BY ANDREW PLECHER, LAS ANIMAS, COL.

While inspecting a wireless station at Cabo Haro, State of Sonora, Mexico, in 1905, the writer was confronted with peculiar conditions. This wireless outpost was erected on a cliff rising out of the sea to a height exceeding that of the Eiffel Tower. It was fitted out with the old coherer; an electrolytic detector, my pioneer invention, had been received but was not used by the operators. The object of this station was the communication by wire with Guaymas and by wireless with Santa Rosalia on the peninsula of Lower California, thus doing the duty of a cable across the gulf, although out of working order at the time of my arrival.

My first task was to make sure of the earth connections. I found that there were two, one consisting of a heavy wire running into the sea and another running into a wire netting of large surface buried in the ground. In some way the wire running into the sea had become disconnected. After this connection was made and well soldered a great improvement in the spark was noticeable. Instantly the idea came to me that an artesian well might be drilled at every wireless station and the ground wire might be run down insulated to a water-bearing stratum and there grounded by a copper plate; and this same water-bearing stratum connecting all stations would bring about the ideal condition realized on the ocean, namely, the connection of all stations by the same sheet of water. I would thus have not only an antenna running up into the air, but likewise one running down into the ground; then, by this earth antenna I would not only have every former advantage, but the earth-antenna would also influence the earth directly, acting inductively on the earth proper all the way down. This was a great step forward, but what about using earth antennæ alone? This last proposition was forced upon me after establishing communication between the two stations and finding that most of the time no communication was possible on account of the interference of atmospheric electricity, the continuous discharges of which would obliterate all signals, even the well-known call.

Right there was a big problem, seemingly not yet solved by German imitators and perhaps not even understood by them, for they seem to be satisfied with the invention referred to. To speak more correctly, they seized upon the invention piecemeal, one got one piece and another the other piece.

In an article in *The Inventive Age*, dated August 1, 1911, under the caption "Secret Wireless," an anonymous writer falls in love with my new wireless "resonant" receiver and transmitter and credits Von Lepel for having invented it.

When an iron mast or tower is erected in electrical contact with the earth and forming, so to speak, an upward continuation of the earth, by means of which an insulated antenna is supported, and at the same time the other antenna is grounded in a deep well, the earth is influenced directly by one as well as by the other antenna. The dead-end still remains, however. How to avoid this dead-end is the problem. Everybody realized that to ground the dead-end would be to short-circuit the antenna, so some one got around the difficulty by grounding the same through a condenser. I have always contended that the dead-end must be directly grounded so as to obtain a complete antenna circuit in which even a direct current could flow, if necessary.

When, after correcting some faults at Santa Rosalia and establishing communication by the aid of the electrolytic detector, and making experiments with different wave lengths, the solution of the problem came to me. Suppose, I argued, we run aerial antennæ in all directions to such a length as to satisfy the wave by the resistance, inductance and capacity of each branch, using even the depth of the wells to make up the length, and further, the height of the iron masts to lend inductance, then there should not only be no objection to grounding the dead-end directly, but the branches might serve in giving waves a tendency to spread out more in a line than in a circle when transmitting and might be used to indicate the source of waves when receiving and, last, but not least, in making perfect and true resonance possible.

These and other ideas are embodied in U. S. patent No. 635,099 where a "Resonant System for Wireless Signalling," is claimed and which has found such great favor with my German friends, although I regret it has not come to them in the complete form and in the right way.

W. Noble, Assistant Engineer-in-Chief, British Post Office, London, England.

Mr. W. Noble, assistant engineer-in-chief, General Post Office, London, England, is a Scotchman by birth, having been born in Aberdeen in 1861. He entered the service of the Post Office in 1877 and was a telegrapher in the Aberdeen office during the earlier years of his career. He took much interest in the technical side of his work and was for some years lecturer in telegraphy and telephony and later also in electricity and magnetism. Mr. Noble is now one of the examiners of the City and Guilds of London Institute.

In 1893 Mr. Noble was appointed a second-class engineer at Aberdeen and in 1897 was promoted to a first-class engineership in the engineer-in-chief's office in London. Many of the important preliminary investigations and arrangements in connection with the telephoning of London by the State were carried out by him.

In 1900 Mr. Noble was made a technical officer and in the following year became assistant superintending engineer in the Central Metropolitan District and superintending engineer of the same district in 1907. From 1905 to 1907 Mr. Noble was first-class technical officer at headquarters. In May of this year he succeeded Mr. Slingo as assistant engineer-in-chief on the promotion of the latter to be engineer-in-chief.

Mr. Noble has filled other important positions, and as a member of various committees in connection with the post office has rendered much valuable service. In his new position he is well fitted by knowledge and experience to meet the exacting duties of the office. Under the English civil service rules Mr. Noble will automatically succeed to the position of engineer-in-chief of the post office, which position in the past has been filled by many brilliant telegraph enginers.

German Wireless Regulations.—The German Maritime Vocational Association, which drafts regulations for Germany's shipping, has adopted new rules requiring passenger steamers carrying seventy-five persons, including the crew, and freighters carrying a crew of sixty, to be equipped with wireless telegraphy having a radius of 100 sea miles.

The Railroad.

Mr. Charles Ware, general manager of the Union Pacific Railroad, at Omaha, Neb., was a former telegrapher. He has been with the Union Pacific Railroad since 1890.

Mr. C. Fred Kuehn, of the telegraph department of the Lake Shore Railroad general offices, Cleveland, Ohio, accompanied by his wife, was a recent New York vistor.

Mr. John H. Finley, formerly of the Western Electric Company, has accepted the position of railway telephone sales engineer of the Automatic Electric Company, Chicago, Ill.

Mr. John A. Kick, engineer telegraph department, New York Central Lines West, Chicago, Ill., has entered the service of the Western Electric Company in that city as railway sales engineer.

Mr. Barney A. Kaiser, who has charge of the railroad department of the American Telephone and Telegraph Company, New York, has just returned from an extended trip to the Pacific Coast states in the interest of the service.

Mr. R. R. Sutherland, recently appointed superintendent of the Kansas City Southern Railway, with headquarters at Texarkana, Tex., began his business career as a telegraph messenger, afterwards becoming an operator. He has filled various important positions in the railway service.

Mr. W. W. Ryder, general superintendent of telegraph of the New York Central Lines, with headquarters at Chicago, Ill., has been appointed manager of the railway department of the Western Union Telegraph Company, with headquarters in New York. He will take up his new duties October 1.

Mr. F. A. Secord has been appointed superintendent of telegraph of the El Paso & Southwestern System, with headquarters at El Paso, Tex. Mr. Secord was a chief operator in the Omaha general office of the Union Pacific Railroad Company, and has been in the service of the company about twenty-six years.

Mr. R. R. Hobbs, whose appointment as superintendent of telegraph of the Louisville and Nashville Railroad with headquarters at Louisville, Ky., was announced in the personal column in our issue dated September 16, had been in nominal charge of the telegraph and telephone system on that road for eight years under the title of chief operator, although the duties of that position were the same as that of superintendent of telegraph. On account of the growth of the telegraph and telephone service in the last few years the management decided to change the title to that of superintendent of telegraph. The new title carries with it increased authority and wider scope of operation.

Proceedings of New York Convention of Railway Telegraph Superintendents.—The proceedings of the thirty-first annual convention of the Association of Railway Telegraph Superintendents, which was held at the Waldorf-Astoria, New York, June 4, 5, 6 and 7, have been issued in pamphlet form. The book contains the constitution, by-laws, list of members, etc. This volume will be a valuable one to the members and others interested as it embodies some of the best papers and discussions ever brought before the Association. Secretary P. W. Drew is to be congratulated on the excellence of the work. Mr. J. B. Sheldon, superintendent of telegraph Union Pacific Railroad, Omaha, Neb., is president of the Association. The next annual meeting will take place at St. Louis, Mo., May 20, 1913.

Municipal Electricians.

Mr. Frank O'Neill has been appointed to the position of electrical engineer for the Bureau of Fire Alarm and Police Telegraph in Los Angeles, Cal.

Municipal Telephones for San Francisco.—An ordinance has been introduced in the San Francisco city council providing for a municipal telephone system in that city.

Municipal Fire Alarm Systems.—The Gamewell Fire Alarm Telegraph Company, New York, has just issued a very comprehensive and complete pamphlet on municipal fire alarm systems. It contains ninety pages and is very artistically illustrated. It covers fire alarm boxes, or street signaling stations; alarm apparatus; central station equipment; circuits, etc., and several full-page illustrations show fire-alarm central stations in various cities throughout the country. A full historical and practical description of fire-alarm systems is given, and altogether the pamphlet is a valuable addition to the literature on this subject.

Obituary.

Alfred F. Moore, aged 56 years, the well-known manufacturer of electrical wires, of Philadelphia, Pa., died in that city September 20.

John W. Skeele, aged 59 years, a member of the old time telegraphers' association, and president of the Lehigh Valley Coal Sales Company, died at his home in Madison, N. J., September 17. Deceased was at one time train dispatcher on the Delaware, Lackawanna & Western Railroad, at Syracuse, N. Y., and afterwards became interested in the coal business. He was well known in railroad circles.

John C. Hatter, a well-known member of the Society of the United States Military Telegraph Corps, died at his home in Brooklyn, N. Y., September 24, of paralysis. On the night of the assassination of President Lincoln, April 14, 1865, Hatter was in charge of the mounted messengers organized hastily by Major Thomas T. Eckert to carry the bulletins from Secretary Stanton to the Associated Press office. The funeral services were attended by a delegation of the United States Military Telegraph Corps, including president W. Bender Wilson, vice-president C. A. Tinker and secretary David Homer Bates.

INDUSTRIAL.

Telephone Train Dispatching on the Portland Electric Railway.—The Portland, Ore., Railway, Light and Power Company has recently placed an order with the Western Electric Company for apparatus to be used in equipping its electric interurban railroad lines with telephone train dispatching equipment. One division extends from Portland to Cazadero, Ore., approximately forty miles, while the other is the Mt. Hood division, extending from Portland to Bull Run, approximately thirty miles. The dispatcher will be located at Portland. Seventeen way-stations in all will be equipped with selector sets.

More Telephones for the Central of Georgia.—The Central of Georgia Railway has recently ordered from the Western Electric Company, the necessary apparatus for making the third installation of telephone train dispatching equipment within the year. The section of road to be equipped will extend from Macon to Columbus branching off at Fort Valley and going from there to Albany, Ga., approximately 180 miles. The dispatcher will be located at Albany. Plans are being made for the equipment of the division from Savannah to Macon. Seventeen way-stations will be equipped with selector sets and seventeen siding telephones will be installed in booths to be built along the right-of-way.

Large Reel of Telephone Cable.—The Western Electric Company recently shipped to the Cumberland Telephone and Telegraph Company, Vicksburg, Miss., the largest reel of duplex armored submarine cable ever turned out at the Hawthorne works. The cable contained twenty-six pairs of No. 13 gauge copper conductor made up into a cable 4,500 feet long. To manufacture the cable there were required over 1,000 pounds of paper, 15,000 pounds of lead, 47,000 pounds of wire and 7,500 pounds of miscellaneous material. The gross weight of the reel with its blocking was fifty-six tons. The cable has been laid across the Mississippi river below Vicksburg, Miss., connecting the toll lines between that city and Shreveport.

Western Electric August Business.—Returns of the Western Electric Company for the eight months ended with August give an indicated gross business for the year of approximately $68,000,000. July was about three per cent ahead of the same month in 1911 and August was three per cent ahead of the corresponding month a year ago. The eight months of the current year are also about three per cent ahead of the same period last year. Improvement in business has been fairly evenly distributed both in respect to territory and nature of goods shipped. About $750,000 will be spent in erecting new buildings at Hawthorne this year to take over the company's New York manufacturing business. The additions will be completed in about a year and are in line with the company's policy of concentration of the manufacturing branches at Chicago. Export business during August and the last eight months has shown a relatively greater improvement than the domestic business.

Great Northern Extending Its Telephone Dispatching Lines.—The continued success of its telephone train dispatching system has prompted the Great Northern Railway to install telephones for this purpose over a new section of road. The necessary apparatus for this installation is being furnished by the Western Electric Company. The new section of road will operate between Fargo and Minot, N. D., a distance of approximately 240 miles. The telephone circuit will cover the entire line. The dispatcher will be located at New Rockford. Twenty-five way stations will be equipped with relay type selector sets.

Laws of Current Induction.

The fact of current and magnetic induction is exceedingly significant in general electrical industries. Thus, if a circuit formed by connecting the two terminals of a galvanometer by a wire, without including a battery, be placed near to another circuit, formed by connecting the poles of a battery of galvanic cells by a length of wire including a suitable hand-key or switch, it will be found that whenever the second circuit, A, is closed by the key or switch, allowing a current to pass in a given direction, a momentary current will be induced in the first circuit, B, as shown by the galvanometer. A similar result will follow on the opening of the battery circuit, the difference being that the momentary induced current occurring at closure moves in a direction opposite to that in the battery circuit, while the momentary current at opening moves in the same direction.

The following rules govern the phenomena of current induction:

1. Increasing the strength of the current in A increases the strength of the current in B.

2. Decreasing the strength of the current in A, or opening the circuit, decreases the strength of the current in B, also causing it to flow in the same direction as the current in A.

3. If we move the current-carrying wire, A, nearer to B, we produce a strong current in the opposite direction; if we move it farther from B, we induce a weaker current in the same direction.

4. If the wire used in the circuit A is thick, and that used in B is thinner, the current induced in B will show a greater electromotive force than that in A. Conversely, if the wire used in A be thinner than that used in B, the induced current will show a lower electromotive force than that in A.

In precisely similar manner, if an ordinary steel permanent magnet be approached to the closed circuit B, the galvanometer will indicate the momentary current in one direction, and on the withdrawal of the magnet, the momentary current in the opposite direction; thus showing that the force existing in the magnet is the same in effect as that surrounding a current-carrying wire.

Telegraphers of Today.

An excellent opportunity is offered to telegraph people in general to become acquainted with over 600 prominent telegraph officials and others identified with the telegraph, the railroad, the submarine cable and press associations ot the past generation, through their portraits and sketches of their careers as published in "Telegraphers of Today."

This work was issued in 1894 and includes biographical sketches of all the individuals connected with the interests mentioned at that period, many of whom have passed away from their earthly labors. The younger generation, however, will find much of interest in looking upon their portraits and reading of their achievements in life. Many of them are still alive and in harness in the telegraph and other fields of activity.

Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York, who recently received a copy, expresses his appreciation of the work as follows: "Copy of 'Telegraphers of Today' received. I casually saw a copy of the book when first published, but never had I an idea that it was so beautiful, interesting and historically accurate. It should be of great interest to telegraphers with any sentiment in their makeup. It is magnificent, unique, and I truly pity those of the fraternity who fail to secure a copy before the edition is exhausted."

This book, which is 11½ x 14 inches in size, was originally published at $5 per copy, but in order to close out the remaining copies we offer them at $1 per copy by express, charges collect.

Send orders to TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Jacksonville, the Convention City.

Jacksonville, Fla., the convention city for the reunion of Old-Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, October 22, 23 and 24, is the largest and best known city in that State. It is situated on the St. Johns River, twenty-two miles from its mouth, and resembles an active northern city in respect to its commercial enterprise.

The city is beautifully laid out with fine broad streets and park system, which, together with the character of the government, municipal and other buildings, make it one of the most attractive and advanced cities of the South. It is well equipped with excellent hotels, churches, schools, theatres and places of amusement.

Some details regarding the city and its business will be of special interest at this time. Jacksonville has a population of 75,000 inhabitants including the suburbs. The 1910 census showed a population of 57,699 in the old city limits in which territory there was an increase in the past ten years of 103 per cent.

The climate is very equable, the average mean temperature in the spring being 71 degrees, in the summer 80 degrees, autumn 71 degrees, and winter 60 degrees, the annual mean temperature being 70 degrees. The 100 degree-mark is rarely reached and in the summer time the heat is tempered by cool breezes from the Atlantic ocean and the Gulf of Mexico. The annual rainfall is 52 inches. The evenings and nights are delightfully cool and enjoyable. Jacksonville is a healthy city, its death rate being 12.70 per 1,000, and the mortality of the state of Florida compares fully with that of any state in the Union.

There are ten banks in Jacksonville with a capital and surplus of $3,823,218 and deposits over $20,000,000. Sixty wholesale houses in the city do an annual business of $25,000,000 in Florida, Georgia, Alabama and the Carolinas. Among the industries of the city are: making lumber, naval stores, phosphate, vegetable and fruit packages, cigars, paint, iron work, shipbuilding, copper stills, carriages and wagons, ice, crackers, candies, chairs, clothing, brick, etc., one hundred and forty-seven establishments being engaged in this wide range of business activity.

The city is well provided with a modern and up-to-date street car system which comprises 42.2 miles of track. During the year 1910 the street cars carried 13,828,904 passengers. The city is also provided with excellent electric light and water supply, the water being obtained from flowing artesian wells. Gas is also produced for heating, cooking and lighting.

The telegraph and telephone facilities in the city are unexcelled, both the Western Union Telegraph Company and the Postal Telegraph-Cable Company having first-class offices and a splendid staff of operators. The telephone service of the Southern Bell Telephone Company is also very complete and the long distance facilities are of the best. Jacksonville also has a wireless telegraph station.

The harbor of Jacksonville is an excellent one. The channel has twenty-four feet of water at mean low tide from the city to the sea and a thirty-foot channel is now in course of construction. This is the deepest seaport along the South Atlantic coast and its importance will increase rapidly on the completion of the Panama Canal.

Steamship lines connect the city with Charleston, New York, Boston, Philadelphia, Savannah and Baltimore. Foreign steamship lines operate regular steamers to Bremen, Amsterdam and other European ports; there is also a line to Liverpool. The beautiful St. Johns river is much admired for its scenery and daily steamers run as far as Sanford, a distance of nearly two hundred miles from Jacksonville.

Jacksonville is a large railroad center and the Atlantic Coast Line; Seaboard Air Line; Southern Railway; Georgia, Southern and Florida and Florida East Coast Lines afford splendid service from all points nortn, south, east and west. About eighty passenger trains arrive and leave the Union Depot daily. The freight terminals are modern and stated to be superior to any in the South and the transportation companies have spent several million dollars within the past three years in new shops and freight warehouses.

The city has about sixty miles of brick- and rock-paved streets and about seventy-five miles of brick-, cement- and hard-surfaced roads in the country outside of the city. About one hundred acres are utilized as parks, abounding in beautiful tropical foliage, lakes and flower beds, and the residential suburbs are noted for their private parks and playgrounds.

The Y. M. C. A. has a fine building equipped with every modern convenience and cost $250,000. It contains, besides one hundred dormitory rooms, a swimming pool, gymnasium and a roof garden. The educational features of Jacksonville are liberal. There are fifteen schools in the city and fifty-three in Duval County. Each residential district has its own grammar school. There are also two large business colleges and schools of art and music. A public library, which was donated by Mr. Andrew Carnegie, cost $50,000 and contains 20,000 volumes.

The fraternal societies are well represented in the city and the principal ones have their own lodge rooms and meeting places.

Jacksonville has one morning and one afternoon paper both of which have a large circulation, and besides these there are several weekly and monthly publications. There is no lack of amusements in the city there being nine theatres, moving picture shows, ostrich farm and other attractions which afford amusement for the people. Pablo Beach, Atlantic Beach and Mayport are within three-quarters of an hour ride of the city. At these resorts there is fine fishing and surf bathing and good hotels. A cement- and brick-

Jacksonville Enterprise.

No better evidence of the enterprise of the Jacksonville business community can be given than the hearty manner in which many of the most prominent institutions in that city have availed of the opportunity to call attention to their business through the columns of TELEGRAPH AND TELEPHONE AGE. The old-timers and military telegraphers who will visit that city in connection with the reunion of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, October 22, 23 and 24, would do well to note the enterprise of this southern city and return good for good.

paved boulevard, eighteen miles in length, extends from the city to the beaches.

The Jacksonville Board of Trade is one of the most prominent activities in the city. It is housed in its own building at the corner of Main and Adams Street. This structure cost $175,000 and contains a fine auditorium, committee rooms, a library of directories of the principal cities of the country, telephones, etc. The membership is 1,000 and represents the principal lines of business in the city. The Board of Trade conducts a continual publicity campaign for the upbuilding of Jacksonville, Duval County and Florida, and everyone in Jacksonville is proud of their city.

Headquarters of Old Timer's Reunion at Jacksonville, Fla.

The Windsor Hotel, Jacksonville, Fla., has been selected as the headquarters for the reunion of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps to be held in that city, October 22, 23 and 24. The banquet on the evening of October 24 will be held at the same hotel. A short description of this hotel will be of interest to those who expect to attend the reunion.

The Windsor Hotel, which is being conducted on the European plan until November 1, and then on both European and American plan, has accommodations for 500 guests. Situated within a block or so of all the principal points of interest for both business and pleasure, and with a large park on the front covering the entire square, gives this hotel the ideal location in the city of Jacksonville. With an eastern and southern exposure the long cool verandas are among the most comfortable places in the city and make a most delightful resting place.

The hotel is equipped with all modern conveniences; is steam-heated and every room is fitted with long distance telephone, and with hot and cold running water. The European grill room is one of the handsomest in the State and here every delicacy the market affords is offered at reasonable prices. The hotel has its own lighting, heating, ice and refrigerating plant, and the water supply is obtained from its own artesian wells, which are over 1,000 feet deep, thus guaranteeing a supply of water that is absolutely pure.

The Windsor Hotel is well known and is a general favorite with tourists in the winter season on account of the fact that every effort is made to satisfy the most particular, and also, to combine as much as possible the home comforts with an up-to-date hostelry. Mr. Thos. M. Wilson is the proprietor of the hotel, and, he, with his corps of able assistants will see that everyone of the Old Timers and their families will be comfortably taken care of.

The Hotel Seminole, Jacksonville, Fla.

Old time telegraphers who expect to attend the Jacksonville reunion on October 22, 23 and 24 will naturally be solicitous about their stopping place in that city, but there need be no fear in regard to that matter. There are plenty of excellent hotels in Jacksonville and their rates are moderate. One of the best hostelries is the Seminole, and those old timers and their families who settle there will be welcomed by Mr. Fred E. Meyer, an old-timer himself, and one of the stockholders in the hotel. Mr. Meyer will be on hand during the reunion to greet his old friends.

The Seminole is a modern hotel in construction and furnishing and is fireproof. It is ten stories high and has a commanding view of the beautiful St. John river and surrounding country. An advantage this hotel possesses is its central location, all places of amusement and interest being within convenient distance. An interesting feature of the Seminole is the Indian Café which is decorated with tropical scenes and contains a rare collection of curios and Indian bead-work, and the dining room is stated to be one of the finest in the United States. The cuisine of the hotel is all that can be desired by the fastidious traveler, and, taken altogether, there is the charm of home about the place in addition to its being a first-class and up-to-date stopping place.

The hotel management will give the old-timers the free use of a parlor, desk and services of a stenographer.

Jacksonville Hotel Rates.

Mr. G. D. Ackerly, Jacksonville, Fla., chairman of the Hotel Committee in connection with the reunion of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps in that city on October 22, 23 and 24, has sent out circulars giving hotel rates for the members. The rates at the Windsor Hotel, which is conducted on the European plan, vary from $1 per day per person up to $3, according to the number of beds in and persons occupying a room, bath or without bath, etc. The Hotel Seminole (European plan) rates range from $1.50 per day up according to size and location of room, and $2 per day and up for rooms with private baths. The rates at the Hotel Aragon, conducted on the American plan, are from $2.50 to $4.00 per day; the Everett (European plan), $1.00 to $2.00; Hotel Jackson (European plan), $1.00 up; Hotel Seneca (American plan), $2.50 minimum; Hotel Windle (European plan), from $1.00 to $2.50 for one person and from $2.00 to $4.00 for two persons in a room. On the American plan this hotel charges $1.50 per day additional.

Telephone Pioneers.

A meeting of the general committee of arrangements for the second annual reunion of the Telephone Pioneers of America was held at the Railroad Club, New York, September 24, and a tentative programme was arranged with regard to the second annual meeting to be held at the Hotel Astor, New York, November 14 and 15. On the first day the morning will be given up to a general business meeting; in the afternoon there will be addresses by Messrs. U. N. Bethell, vice-president of the American Telephone and Telegraph Company and president of the New York Telephone Company, Thomas A. Watson and others. In the evening a reception will be given the Pioneers by the New York Telephone Society. The second day will be taken up with an automobile ride of considerable extent with lunch and festivities at a prominent club in the suburbs, returning in time for the banquet at 7.30 p. m. The committee is to meet again on October 15, when a full programme will be outlined and a copy sent to each member of the association.

In a notice to the members of the Telephone Pioneers of America, secretary Henry W. Pope says:

"It is particularly desirable that our membership should reach at least 1,000 in order to accomplish results which may be presented from time to time.

"In view of the reunion to be held in New York City, November 14 and 15, all of our members, in and about New York City particularly, are requested to do what they can to forward the names of such persons as were connected with the service prior to 1892 and enable them to become members and participate in the festivities."

The number of members up to July 31 was 802.

Memorial notices of Burton L. Freedy, who died at St. Paul, Minn., July 13, are being sent out to the members. Mr. Freedy was at one time assistant general manager of the Northwestern Exchange Company at Minneapolis, Minn. He entered the telephone service in 1881.

Certificates of membership are being issued as fast as the president can sign them. Members are urged to send their full names to secretary Henry W. Pope, New York, so that their names may be engrossed correctly. Certificates are issued only to members in good standing in the organization.

The certificate is an artistic piece of work. It is engraved on copper and printed in sepia tones, the lettering being in Old English. Dr. Alexander Graham Bell's portrait in miniature is shown at the top.

Radio-Telegraphy.

Major Edgar Russel, one of the United States representatives at the recent radio-telegraph conference in London, has returned, accompanied by his wife.

Signor Guglielmo Marconi was injured in an automobile collision near Borghetto, Italy, on September 25. He received a wound in the right eye and his right cheek and temple were badly bruised. He was accompanied by his wife and secretary at the time of the accident, both of whom were unhurt.

Wireless in the Vatican.—It is stated that the Marconi Wireless Telegraph Company is to instal a wireless station at the Vatican, in Rome.

Wireless in Alaska.—The Navy wireless station at Cordova, Alaska, is to be increased to twice its present power, which will enable it to work direct with San Francisco and other Pacific Coast stations.

Wireless in the South Seas.—A new company has been formed in Berlin to connect the German colonial possessions in Oceana by means of wireless telegraphy with the telegraph stations of the existing telegraph company.

Wireless Invention for Aeroplanes.—Two Roumanian military officers, captain-lieutenants Dan Zaharia and Gustav Rötlander, have invented a novel wireless receiving apparatus, more especially adapted for flying machines, which weighs only 270 grammes (a little more than half a pound). It is stated that the apparatus has given excellent results on aeroplanes.

Administration of Wireless Ship Act.—The Department of Commerce and Labor, Washington, D. C., has established administrative districts to carry out the requirements of the wireless ship act. The districts will be in charge of radio-inspectors at Boston, Mass., New York, Baltimore, Md., Savannah, Ga., New Orleans, La., San Francisco, Cal., Seattle, Wash., Cleveland, Ohio, and Chicago, Ill.

How a Small Telephone System Is Operated.

Telephone switchboards ranging in size from "ponys" that connect with only ten subscribers, up to "multiples," that will accommodate more than ten thousand lines each, are made by the Western Electric Company.

Most of us living in the cities and larger towns are familiar with only one kind of telephone—that known as the "central battery" type, on which the mere act of taking the receiver from the hook summons the operator at the exchange. But there is another type, which, while it was formerly used all over the country, is now confined principally to the smaller towns and rural centers. This is the "magneto" system, on which, in order to call "central," it is necessary to turn a crank before taking the receiver off the hook.

We are going to try and describe, as simply as possible, the operation of a telephone system employing this "magneto" type of instrument. In order to do this, we shall trace the course of a message from one subscriber, through the exchange, to another subscriber, showing just what happens from the time the crank is turned to call central to the time when the receiver is hung up and the connection "rung off."

CALLING CENTRAL.

Let us suppose that you live in a small country town; that your telephone number is 72, and that you want to call up some one whose number is 49. You go to the telephone, turn the crank, and take down the receiver.

Now look at the diagram, Fig. 1. At the left you will see your telephone, with the two wires that connect it with a socket or "jack" in the exchange switchboard, marked with your number, 72. Just above this jack you will see a small ball with the black side turned outward, facing the operator, which is its usual position. But when you turned the crank you worked a small dynamo inside the body of your telephone instrument (this dynamo is termed a "hand generator"). This created a current of electricity which passed over the wires to the exchange, and made the ball swing around until its red side was exposed (white in the diagram), thus calling central's attention to your signal. The illustration of the switchboard (Fig. 2), shows the jacks for each line (105 in this case), with the ball signal for each line just above the jack.

ANSWERING OF A CALL BY THE OPERATOR.

Ranged along the front of the switchboard below the jacks, on a horizontal board known as the keyshelf, are two rows of "plugs," which are fastened on the ends of flexible cords. The cords are held down below the keyshelf by pulley weights, like those used on window cords. A "plug" is an apparatus something like a short pencil stub, which can be inserted in a jack to make connections between the two wires of the jack and the two wires in the cord.

The back row of plugs are called "answering" plugs, the front row "calling" plugs. Each answering plug is connected, through its cord, with the calling plug in front of it, the two together forming a "pair of cords."

When central sees the red signal over your number she picks up any one of the answering plugs and inserts it into the jack just below the signal—your jack, No. 72. This turns the ball back, so that its black side is again exposed, and also allows the current from your telephone to pass into that particular pair of cords.

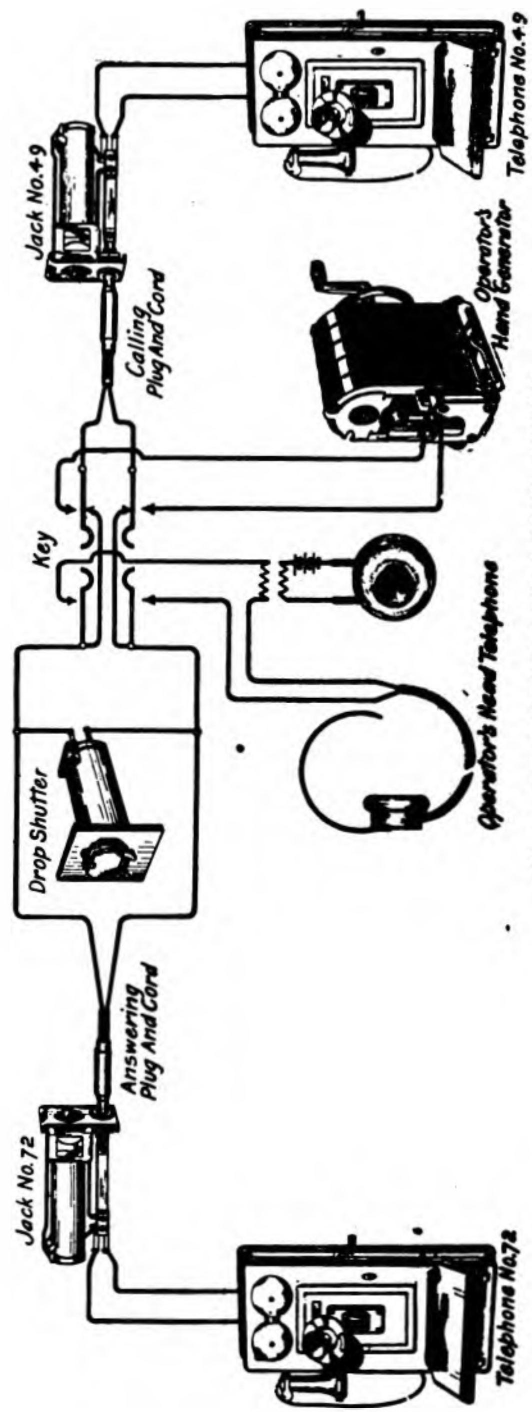

FIG. 1.—DIAGRAM OF A TELEPHONE CIRCUIT.

* From the *Western Electric News.*

On the keyshelf in front of the plugs, is a row of levers, or handles, known as "keys," one belonging to each pair of cords. Central next presses back the key lever corresponding to the pair of cords whose answering plug is in jack No. 72. This operation allows the current from your telephone to pass through the answering cord to the telephone she wears strapped to her head. She asks you, "Number, please?"

You say, "Give me four-nine."

If you will now again refer to the diagram you can trace the current from your telephone to your jack, through the answering plug and cord, and through the key to the operator's head-telephone.

RINGING THE DESIRED SUBSCRIBER.

Central, leaving the answering plug in jack No. 72, now picks up the corresponding calling plug

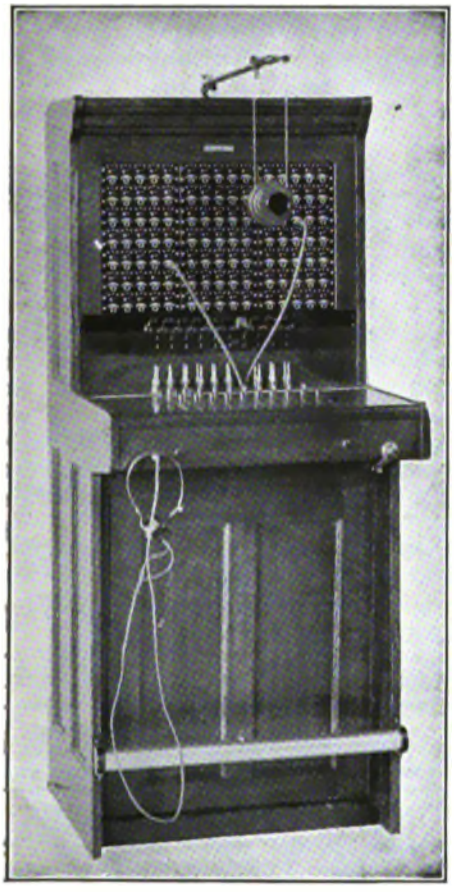

FIG. 2.—MAGNETO SWITCHBOARD.

and inserts it in jack No. 49, thus connecting you with the line of the person you asked for. She then pulls the key handle toward her for a moment, and at the same time, with her other hand, turns the crank of a hand generator in the switchboard (this may be seen at the right, under the front edge of the keyshelf, in the picture). This rings the bell of telephone No. 49.

If you will refer again to the diagram you will notice that when the key-handle is pulled forward the calling cord is disconnected from the answering cord, and connected with the operator's hand generator.

CONVERSATION BETWEEN SUBSCRIBERS.

As soon as central has "rung up" No. 49, she allows the key-handle to spring back to its normal vertical position, and you are in direct connection with telephone No. 49, as shown in the diagram. You are now ready to begin your conversation.

RINGING OFF.

When you have finished your conversation, you hang up the receiver and turn the crank to "ring off." This time the current from your hand generator, instead of moving the ball over No. 72 (this ball is "cut off" by the inserted plug), passes on through the answering plug and drops a small shutter that is set into the switchboard below the banks of jacks. There is one of these shutters for each pair of cords (the picture shows a pair of cords in use, with their corresponding shutter dropped for a "ring off" signal). This dropping of the shutter acts as a signal to the operator, who, first making sure that you are through talking, pulls the answering plug out of jack No. 72, the calling plug out of jack No. 49, and resets the drop shutter.

You and party No. 49 are now disconnected, and will remain so until either of you sends or receives another message.

Sons of Jove.—The next annual convention of the Sons of Jove will take place in Pittsburgh, Pa., October 14, 15 and 16. The order of the Sons of Jove is composed of electrical men and was organized some years ago for fraternal purposes and co-operation in upbuilding the electrical industries. Several municipal electricians joined the order at a "rejuvenation" held during the recent annual convention at Peoria, Ill., of the International Association of Municipal Electricians. It is the purpose to hold next year's convention in New York.

New Use for Underground Conduit.—A novel use for clay conduit, which is extensively used in telegraph and telephone underground work, is reported in the *Western Electric News.* A wealthy wool merchant of Philadelphia, Pa., who is also a "bon vivant," decided to build a wine cellar in his house. He has bought 600 twelve-inch lengths of vitrified clay conduit and will build the tile ducts into the walls, using them as receptacles for wine bottles. Each piece of conduit, being about a foot long and four inches in diameter, is just the right size to hold a quart bottle comfortably. This illustrates, very clearly, the fact that more than one kind of "juice" can be run through a conduit.

Annual Meeting of the T. M. B. A.—The date of the annual meeting of the Telegraphers' Mutual Benefit Association having been changed in order to comply with legal requirements, the next meeting will be held March 12, 1913. Hitherto the annual meetings have been held on the third Wednesday in November.

Delany Talking Machine.—Mr. P. B. Delany, of Nantucket, Mass., the well-known inventor of telegraph apparatus, has invented what he claims to be the "finest and most human-voiced talking machine in the world." We hope to be able to give some further details of the invention in a later issue.

New York Telegraphers' Aid Society.—President A. M. Lewis, of the New York Telegraphers' Aid Society, has appointed Mr. Robert J. Marrin chairman of the entertainment committee for the season of 1912. This year's entertainment will be held, as usual, at Terrace Garden, Fifty-eighth street near Third avenue, New York, Tuesday evening, November 19. The entertainment record established by this society will be maintained and a high class performance will be presented.

T. M. B. A. Assessment.—Assessment 542 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Harvey P. Dwight at Toronto, Ont., Francis C. Belden at Niagara Falls, N. Y., Frank D. Slaughter at Atlanta, Ga., Hyall V. Johnson at Vallejo, Cal., Benjamin F. Harris at Asheville, N. C., Charles F. Burlingame at Washington, D. C.

LETTERS FROM OUR AGENTS.

NEW YORK WESTERN UNION.

J. M. Garret, aged 56 years, a mechanical engineer in this office, died at his home in the Bronx, September 12.

John Doyle, aged 65 years, an operator in this office, died on September 19.

PHILADELPHIA WESTERN UNION.

Mr. F. G. Lamb, chief clerk to commercial superintendent J. W. Reed, has returned from a visit to Marengo, Ill.

Mr. R. C. Mason, special agent in handling telephone matters for this company, has returned from a visit to the New England states.

An independent Western Union office was established at the Havre de Grace, Md., race track during the races.

Mr. J. W. Reed, district commercial superintendent, has been visiting in the New England states, New Haven, Conn., principally, where he was formerly superintendent.

Mr. S. M. Custer, district commercial manager, has returned from a trip through the district.

Mr. A. P. Sell has been appointed supervisor in charge of the check boys and girls and the service department.

Mr. F. A. Hurley, operator in the traffic department, has been transferred to Washington, D. C., as repeater chief.

Mr. H. S. Swartz, chief engineer of the Barclay printers, has fitted up a first-class machine shop for the repair of Barclay and Morkrum apparatus. Mr. D. Good is traffic manager of the Barclay printers.

Mr. Mahlon G. Moyer, traffic chief, recently returned from a three months' tour of the Nile, Egypt, Persia, Jerusalem and European countries.

Information Wanted.

Can any United States Military operator remember Wm. Donovan, who was a volunteer soldier during the Civil War, and who was detailed to telegraph service in Washington and vicinity after July, 1861, until close of war, 1865, when he was sent to open a telegraph office in White Plains, N. Y. Any information will aid his widow in getting a pension.

Address Donovan, care of Telegraph and Telephone Age, New York.

Telegraph and Telephone Age

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

High and Low Wound Relays.

Some time ago a correspondent asked why three different standard windings for single-line Morse relays, *i. e.*, 35, 150, and 300 ohms, are required in the telegraph service and which winding gives best results; also under what particular condition or conditions each type is most suitable.

There are several very good reasons for constructing instruments having different windings, both from an electrical standpoint and a purely practical view of the situation. The merits of high and low wound relays have long been a mooted question among engineers, the pros and cons being divided according to whether they looked at it strictly from the electrical or the practical standpoint. There is much truth in the contention of each side, but it is safe to say that if operators were taught to keep the magnet and contact points adjusted properly and good retractile springs were always maintained, thereby obtaining the maximum efficiency of the instruments, a lower standard of windings would undoubtedly be adopted for general use.

Entirely too little importance is, as a rule, attached to the condition and adjustment of retractile springs, yet it should be apparent to all that in order to respond properly to minute variations of current flowing through wires during wet weather conditions they must necessarily be very sensitive and elastic, and this can only obtain when the spring consists of close convolutions in nearly their original unstretched form.

A good retractile spring, such as is usually furnished, will, under normal conditions, respond to alterations of two or three milliamperes of current in a local circuit, provided the armature is close to the magnet; yet an almost imperceptible increase in the tension, or widening of the air gap between the contact points will render the same instrument inoperative on any volume less than eight, ten, or more milliamperes. On longer circuits, more or less affected by induction, a greater tension and larger volume of current is of course required to supply a working margin with which to override the unsteadiness. As previously stated, however, neither so much current, nor so high a winding as are usually provided, are actually needed except for the purpose of aiding inexperienced and indifferent operators whose instruments would otherwise often fail to work properly.

Every wire chief is familiar with the constant call for more current on the part of young and inexperienced operators in small branch offices or on city line circuits, even where the volume at the time is ample and often excessive. Such offices are usually managed by young operators, and, of course, a few will always prove troublesome at first while they are gaining experience. In the meantime they must be taken care of temporarily by the only practical remedy—more current or a high-wound instrument.

This constitutes the principal argument advanced by the advocates of high-wound relays for general use. They say it is a "condition" and not a "theory" that must be met. However, it is a poor argument, and cannot hold good much longer, as the official schools of instruction now in vogue are rapidly instructing employes in every important branch of the service. Hence to prove inefficient hereafter, one stamps himself as "dull" or "indifferent."

Recurring to the original question as to the necessity for the three types specified, and the purpose of each a few words concerning the operation of relays generally may be in order.

In all single-line relays the strength of the magnet is in proportion to the current flowing around the iron core; that is to say, equal to the volume of current flowing through the main line conductor as would be indicated by the needle of a milliammeter, multiplied by the total number of turns of wire in the relay coils. Hence the comparative magnetic strengths of the three types of relays mentioned when connected in series in the same closed circuit would be approximately in proportion to their respective resistances, viz., 35, 150, and 300, provided each was wound with the same size wire, and other conditions being equal, which, however, is not always the case. The lower the resistance of the winding the more current a relay requires to attain a given magnetic strength; yet, owing to the retractile spring and armature of each type being practically identical in size and construction, the work to be accomplished is about the same for each magnet.

One might naturally wonder why the 300-ohm relay, which operates on the minimum amount of current, is not made standard for general use. The reason is that besides adding ohmic resistance to the line it also adds more impedance in the form of self-induction to the circuit than do lower resistance instruments. Impedance or counter-electromotive force acts as an additional resistance in the circuit, in some cases as great as that of the conductor itself.

When the impedance and total coil resistance in a circuit becomes greater than that of the ohmic resistance of the conductor itself, or in other words where the inductive resistance is greater than that of the non-inductive resistance, signals cannot be transmitted except at a reduced rate of speed, because the total counter-electromotive force developed by the numerous coils is so great that when a signal or character is being formed the initial rush of current is retarded in its effort to magnetize the relay core and again hindered in demagnetizing it when the current is broken. The result is that a rapidly made letter or character is clipped off in its initial formation as well as its finish, because a new signal is usually started before the previous one is completed.

This would happen regardless of whether 35-, 150-, or 300-ohm relays were used provided the ratio of inductive and non-inductive resistance was as stated.

The remedy for trouble of this kind is to reduce the impedance by using relays of a lower winding, hence the purpose of different types. For example, some comparatively short railroad and way wire circuits have so many 150-ohm relays cut in that the coils comprise the greater part of the total resistance. Now if we halve the resistance of a relay we reduce the self-induction four-fold and gain a quicker acting instrument. Hence for a circuit of this kind 35-ohm relays are now frequently substituted for the 150-ohm type, thereby securing a normal ratio. The low-wound relay of course requires more current for a given magnetization than that of the 150-ohm instrument, but it should be borne in mind that a greater volume will flow through the wire after the change is made because the total resistance of the circuit is less. Moreover, even though the 35-ohm instrument may not receive its normal current, what does arrive will all be effective and the signals will not be clipped off fore and aft.

The 150-ohm relay is adopted for general use because that winding has proved to be most suitable for nearly all normal situations and conditions.

The 300-ohm instrument is used for special work, usually on long circuits where the volume of current is below normal, and at repeating stations for insuring a strong action of the armature lever and contact points.

Telegraph and Telephone Patents.

ISSUED SEPTEMBER 17.

1,038,605. Composite System. To O. T. Lademan, Milwaukee, Wis.

1,038,617. Telephone Exchange System. To R. H. Manson, Elyria, Ohio.

1,038,832. Railway Telephone. To D. D. Biggers, May, Okla.

1,038,997. Telephone System. To H. G. Webster, Chicago, Ill.

ISSUED SEPTEMBER 24.

1,039,410. Telegraphic Instrument. To L. H. Jernigan, Sacramento, Cal.

1,039,443. Telephonic Transmitting Appliance. To J. K. Rhodes, Brooklyn, N. Y.

1,039,667. Emergency Signaling Device for Telephone Exchange Systems. To I. D. Fellows, Syracuse, N. Y.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange, October 9:

American Telephone and Telegraph Co....	143 3/4
Mackay Companies	86 7/8
Mackay Companies, preferred.............	68 1/2
Western Union Telegraph Co.............	81 1/2

Personal.

Mr. Thomas A. Edison was tendered a luncheon by the New York Edison Company preceding the opening of the electrical exposition and automobile show in New York on October 9.

Mr. W. D. Weaver, of Charlottesburg, Va., formerly editor-in-chief of the *Electrical World* and now consulting editor, sailed on October 7, for Nice, France, where he will spend a short vacation.

Mr. R. D. Prescott, who has charge of the telegraphs and telephones in the Canal Zone, Isthmus of Panama, was a recent visitor in New York. Mr. Prescott was born in St. Louis, Mo., March 27, 1882, and entered the telegraph service as operator on the Panama Railroad in March, 1898. He was afterwards cable operator at Panama and Buena Ventura, Colombia, for the Central and South American Telegraph Company. Later he became agent for the Guayaquil and Quito Railroad Company, at Guayaquil, Ecuador. Afterwards he returned to the United States and was employed as operator for the New York Central and Hudson River Railroad.

Preferential Telegraph and Telephone Service in Oklahoma.—The Oklahoma corporation commission's general order to telephone and telegraph companies for preferential service to state and federal officials went into effect September 20.

Western Union Annual Report.

The report of president Theo. N. Vail of the Western Union Telegraph Company for the year ended June 30, 1912, shows the following financial results:

INCOME ACCOUNT.

Gross telegraph and cable earnings			$40,857,768.91
Miscellaneous earnings			803,670.57
Total earnings			$41,661,439.48
Deduct:			
Operating expenses, including rent of leased lines, reconstruction, repairs, miscellaneous interest, etc.		$35,350,422.30	
Taxes		713,413.80	
			36,063,836.10
Balance			$5,597,603.38
Add:			
Income from loans and investments, including rentals from real estate			1,326,367.67
Net profits			$6,923,971.05
Deduct:			
Interest on bonds of the Western Union Telegraph Company		$1,670,416.79	
*Appropriation for reserves for repairs and reconstruction of land lines		1,250,000.00	
Dividends:			
Paid Oct. 16, '11	$747,906.00		
Jan. 15, '12	747,931.50		
Apr. 15, '12	747,978.00		
July 15, '12	748,008.00	2,991,823.50	
			5,912,240.29
Balance transferred to surplus acct.			$1,011,730.76

The following are abstracts from the report:

PROPERTY ACCOUNT.

Telegraph lines and equipment is less this year by $2,502,687, due to the sale, on March 1, 1912, of the Bay Roberts cable to the Anglo-American Telegraph Company for $3,297,362**, as referred to in the last annual report, and to an increase in plant value by reason of new construction and equipment added, amounting to $794,675.

The company's plant, exclusive of the ocean cables leased, has been extended during the past year by 1,709 miles of poles and 25,115 miles of copper wire and 4,857 miles of iron wire, a total addition of 29,972 miles of wire. On June 30 there were 25,392 Western Union offices.

DIVIDENDS.

In last year's report, continues Mr. Vail, it was stated: "In order that public confidence may be strengthened, not only in the ability of your company to continue any dividend disbursement which may be established in the future, but also confidence in its possibility to restore your company to a reasonable dividend-paying basis, it is proposed to carry to depreciation reserve all earnings over and above the present dividend, to charge such construction to that reserve as the directors may deem expedient, and to continue this procedure until such a time as the fund would, in the opinion of your directors, admit of an increase in your dividend rate."

As the examination of the plant proceeds and the urgent necessity for extensive repairs and rebuilding is more fully understood, the wisdom of this procedure is confirmed. The continuance of this plan for creating reserves will for some time to come preclude any increase in dividend rate, although stockholders should not lose sight of the fact that it is only by a steadfast adherence to this policy that the property will be strengthened and future increase in dividend assured.

GENERAL.

The gross telegraph and cable earnings show a gratifying increase this year over the previous year of $6,182,000. The increase in land-line message tolls was $4,357,373, or 15.57 per cent. There has also been a large increase in cable tolls, in part, from natural growth, but largely by the inclusion of the revenues of the Anglo-American Telegraph Company and the Direct United States Cable Company, from January 1, 1912.

While the company's gross revenue has largely increased, there is a decrease again this year in the net profits, which amounts to $181,386, or 2.5 per cent. Salaries and wages have increased over last year by $2,697,318, or 19.9 per cent, including the cable employes taken over from the Anglo-American and Direct Cable companies, but this is not out of proportion to the increase in gross revenues. The expenses of conducting the cable business generally do not as yet reflect the benefits which will obtain by the consolidation of the operations of the companies.

Last year the company received a stock dividend from one of its affiliated companies, and this year there was a substantial reduction in the amount of interest received from the American Telephone and Telegraph Company when the open account was closed. These transactions have caused a decrease in income credits of $344,000. The charges for repairs and reconstruction of land lines are greater by $558,788 than the previous year, due to the policy adopted of improving the plant and building up reserves.

LOANING MONEY TO EMPLOYES.

The plan of loaning money without interest to worthy employes in distress, which was inaugurated January 1, 1911, has had a beneficial effect in breaking up usurious practices, and recent legislation has, so far as New York State is concerned, put an end to this nefarious practice. The total of loans to employes outstanding on June 30 last was $19,313, and thus far the company has lost only $200 as uncollectible.

PENSIONS AND SICK BENEFIT.

On July 1, 1912, the company, after more than a year's careful study by a pension committee consisting of employes of over forty years' standing, inaugurated a pension plan affecting all of the direct Western Union employes. The board of directors has made suitable appropriation,

*This appropriation is in addition to the six months' appropriations from January 1 to June 30, 1912.

**The difference between the amount given in last year's report, $3,334,402.92, and the amount realized is made up of certain adjustments made at the time of transfer.

chargeable to working expenses, for the care of those who are eligible for the pension, and it is believed that the company can now reward in a measure those who have been long in its service, as well as relieve its staff of those whose age or infirmities justify their retirement from active service.

To the end that those actively engaged should receive some benefits in the event of illness or death, each employe has been asked to signify his or her preference with respect to the creation of a sick benefit or a life insurance fund. The replies to date would seem to indicate a preponderance in favor of the sick benefit, and it is the company's intention to inaugurate, at an early day, relief for those who have become ill in the service of the company.

NEW SERVICES—REDUCED RATES.

The Western Union Telegraph Company has not cut or reduced rates for the regular service of either the land lines or cables, nor has it established any unprofitable services. It is engaged in a study of the plant and operating facilities and business conditions, having in view the establishment of different classes of service of different values to the public as fast as it can be done at a reasonable profit and without disturbing any services of establised value and necessity. Formerly rates and services were considered from the standpoint of expedition only. While for important social and business correspondence expedition must be considered and sufficient facilities maintained for the average maximum demand, the business is negligible during a considerable part of the twenty-four hours and uneven during the working hours. If the business of the telegraph and cable is to be confined to immediate business only, then the charges for this business must bear all the cost of the idle facilities, which is large. Whatever can be earned by utilizing these idle facilities will enable broader and larger service to be given the public and soon bring the telegraph and cable into still closer beneficial relations to all and hasten the time when some readjustment of all rates can be made.

The statistics of the present business compared with that of a year ago show that there has been the normal increase in the regular business and that the new services have not been used as a substitute for the old, while the telegraph-letter service is at the rate of over 15,000,000 messages per annum.

This rapid development of new services, mostly communications of considerable length, created new traffic and plant conditions which have been successfully met. The general effect has been to equalize and steady the day load and greatly augment the night load.

COMPLEMENTARY OPERATION.

During the year under review the number of telegrams sent to our offices from telephone stations and delivered to telephone subscribers continues to show a steady increase. The one impediment to greater progress appears to arise from unauthorized persons receiving telegrams by telephone. It is suggested to those who have experienced difficulties in this direction that certain persons be delegated in each office or household to receive telegrams to the end that the telegraph company may ascertain before delivering a telegram whether an authorized person is available.

Plans have been completed and are being put into effect as fast as the details can be arranged for the opening of several thousand additional offices, making the telegraph service of the Western Union still more general and comprehensive.

CABLES.

There are six companies owning trans-Atlantic cables: The Commercial Company, six cables; the German Company, two cables; the French Company, two cables; the Anglo-American Company, five cables; the Direct Company, one cable, and the American Telegraph and Cable Company, two cables, the latter leased to the Western Union.

These cable companies, excepting the French Company, which operates independently of the others, form two principal groups with about equal cable facilities.

The Mackay group, consisting of the Commercial Cable Company and the German Cable Company, operated by the Mackay Company in close and exclusive physical connection with the Mackay land telegraph system.

The Western Union group consists of the Anglo-American, the Direct and the American Telegraph and Cable Company, or Western Union cables, operated heretofore by their respective companies, but under agreement in close and exclusive traffic but not physical connection with the Western Union land telegraph system.

To secure the best service, particularly to interior points, it is necessary that the cables shall be operated not only in close traffic connection with the land lines, but in actual physical connection under a common operating control.

This has always existed in the group operated by the Mackay Company and was the principal factor in the success of that system.

The fact that common control of operation or physical connection did not exist in the Western Union group made the service unsatisfactory. Negotiations were commenced nearly three years ago to bring about a more satisfactory operating arrangement. These negotiations resulted in an arrangement which, while it did not change the ownership or the traffic relations of the Anglo-American and Direct companies' cables, did bring them under a common operating control with the Western Union land lines, to the very material benefit of the cable service.

In addition to the betterment of the cable service, it has given the Western Union an opportunity to institute some new cable services at popular rates. It is an axiom that full loads make cheap operation. We have discussed elsewhere the effect of irregular loads in the telegraph business and the economic necessity for larger and more uniform average loads. The same reasoning applies to the cable traffic, and business has been created which cannot pay for immediate or instantaneous expedition, but can pay for cable transmission which can be uniformly distributed over otherwise idle facilities.

The new services are not in any sense of the word "rate cutting," and do not in any way interfere with the expedited or immediate business, but are intended to establish varied services at rates commensurate with the value of such services, in order that the varied demands of business and social communication may be served. It is intended to make the cable service of the greatest possible benefit to the public, consistent with a fair return. The company believes and has demonstrated that there is a growing field for an inexpensive deferred service. Those already introduced have shown a steady growth and have helped to modify the abrupt traffic curves which have heretofore characterized cable business.

Legal.

Taxation of Telegraph Rights in Georgia.—Judge W. T. Newman, of the United States Court at Atlanta, Ga., on October 1 rendered a decision holding that the value of the rights and privileges of the Western Union Telegraph Company conferred by the Federal government are exempt from taxation by the State of Georgia.

Poles Along the Louisville and Nashville Railroad.—In a decision handed down in the case of the Louisville and Nashville Railroad Company against the Western Union Telegraph Company, Judge George L. Bell in the Superior Court, Atlanta, Ga., held that the telegraph company may condemn a right of way for its poles along the line of the railroad, but that it cannot condemn the same right of way which its poles now occupy.

Sayville, L. I., Telefunken Wireless Station.

The Sayville, L. I., wireless station of the Atlantic Communication Company is equipped throughout with Telefunken apparatus and it is stated represents the latest development in wireless telegraphy. It is said to be the most powerful commercial wireless station at present in operation in the United States. Apart from a small set (600-meter wave) which is for local, shore and ship work, intended for ships up to sixty hours out of New York, there is a large set (2800-meter wave) for long-distance communication to reach ships four or five days out of New York. The proposed transatlantic transmission cannot, however, be undertaken until the completion of the station at Nauen, near Berlin, Germany, about the end of the year.

One of the most interesting things that have been introduced in the construction of the Telefunken towers is the method of building the base. The bottom of the Sayville tower, a steel structure, 500 feet in height, actually comes to what might be called a point. As a matter of fact this base consists of a ball-and-socket joint, so that the entire weight of the tower rests on a steel ball six or seven feet in diameter. This in turn rests on a heavy concrete block set in the ground. The object of the ball-and-socket joint is on the one hand to have great flexibility in taking up wind-stress and on the other hand results in reducing the amount of the material needed, and, therefore, the cost.

The call letters which will be used for the present, and until the Department of Commerce and Labor finally settles the call signal, will be "SLI." The rates are the same as those of the Marconi Company for Seagate and South Wellfleet.

For the prompt and efficient handling of all messages the Atlantic Communication Company

FIGS. 1 AND 2, SAYVILLE, L. I., WIRELESS STATION.

has leased a direct private wire from the plant at Sayville to the central office of the Western Union Telegraph Company, at 195 Broadway, New York, and has arranged that all telegrams marked "via Sayville" be sent to its head office so that messages can be collected and distributed with the greatest precision all over the United States.

Fig. 1 of the accompanying illustrations shows the main switchboard at the Sayville plant and Fig. 2 shows two of the six concrete anchorages in the background, also the incoming aerial wires, including those of the counterpoise.

Dr. Karl G. Frank, 90 West Street, New York, American representative of the Siemens and Halske Company of Berlin, Germany, is secretary and treasurer of the Atlantic Communication company.

Chaining Criminals to Telegraph Poles.—The authorities of Wellsburg, W. Va., are not far removed from medieval practices in regard to punishment of criminals. Three men were secured to telegraph poles in the public streets of that place by ball and chain because they refused to work out a sentence. Besides being a humiliating spectacle and vicious in its effect, the telegraph company should see that its property is not used for such disgusting exhibitions.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Ellin Mackay, the nine-year old daughter of president Clarence H. Mackay, was operated on in Paris, October 9, for an acute attack of appendicitis. On this account Mr. Mackay postponed his departure for New York.

Mr. F. W. Conger, superintendent of the sixth district, Western Division, at Chicago, Ill., has resigned to enter other business at Kansas City, Mo. Mr. Conger's district, comprising the offices in Indiana, will be attached to the districts presided over by superintendents J. F. Looney and A. L. Lafferty.

All the superintendents of the eastern division together with sixty-three of the managers of the principal offices will assemble in New York on October 21, 22 and 23, as guests of President C. H. Mackay. A conference will be held each day at the Hotel Navarre, Thirty-Eighth street and Seventh avenue, which will be the headquarters of the gathering. A paper will be read and discussed each day. On Monday evening, October 21, the entire party will visit the Hippodrome. Tuesday evening will be left free and on Wednesday evening the visitors will be entertained at the Fall dinner of the Magnetic Club. Mr. E. B. Pillsbury, general superintendent of the eastern division, will preside at the conferences.

Mr. C. A. Johnson, manager of the Meadville, Pa., office of this company, who is in Italy under leave of absence on business connected with the telegraph in that country, in a letter states: "Italy is a very interesting country. I like the people and have been treated exceedingly well by the different officials of the Italian telegraphs."

Mr. L. H. Dinkeldein, wire chief of the New Orleans, La., office of this company, has been promoted to be night chief operator of the same office.

This company is erecting four additional copper wires between New York and Chicago, two via Meadville, Pa., and two by the way of Albany and Buffalo.

Magnetic Club Dinner, October 23.—The regular autumn meeting of the Magnetic Club will be held at the St. Denis Hotel, Broadway and Eleventh Street, New York, at 6:30 p. m., October 23. The greater portion of the evening will be devoted to entertainment by professionals. All dinner acceptances should be in the hands of Mr. Joseph J. Cardona, treasurer, 253 Bradway, New York, not later than Saturday, October 19.

Mr. D. A. Macneill, telephone inspector of the Canadian Pacific Railway Company's Telegraphs, with headquarters at Schreiber Station, Ont., writes: "TELEGRAPH AND TELEPHONE AGE is a welcome visitor, and I have much pleasure in enclosing a remittance for another year's subscription, together with seven renewals and new subscriptions."

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. A. G. Saylor, general superintendent, New York, will be absent from his office for about ten days while on a business trip in the western part of his division.

Mr. John C. Willever, United States manager Cable System, New York, has been elected a director of this company, vice the late John Jacob Astor.

Mr. E. B. Saylor, of the general manager's office, New York, has been transferred to the office of the traffic engineer.

Mr. F. S. Lewis, manager of the Jersey City, N. J., office, has been promoted to be district cable manager, New York. Mr. Lewis is succeeded at Jersey City by Mr. E. Williams, formerly chief operator in that office.

The Commercial Managers Association of New York will hold its fall meeting and dinner some time during the latter part of October.

Mr. C. B. Kelley, manager at Springfield, Mass., has been appointed district commercial manager for Maine and a portion of New Hampshire, with headquarters at Portland, Me.

Mr. C. T. Hendrickson has been appointed manager of the Findlay, Ohio, office of this company, vice M. I. E. Ward, resigned.

Mr. G. R. Simpson has been appointed manager at Newton, Iowa, vice Miss Jessie Phelps, transferred to Ottawa, Ill.

The following appointments of managers of New York branch offices have been made: G. W. Fascher, at the cable office, 60 New street; A. Goetz, of the new office in the City Investing Building, Broadway; Miss K. C. Hyland, of the new office in the Fifth Avenue Building; J. H. Fleming at 91 Wall street, vice L. E. Westrope resigned.

A cable district has been established at 171 Franklin street, New York, and Mr. Thomas Handling has been appointed cable agent.

Mr. C. E. Knox, of the Toledo, Ohio, office, has been appointed to the newly opened office of this company at La Porte, Ind. Previous to October 1 the telegraph service of Laporte was handled at the Lake Shore and Michigan Southern depot.

Mr. B. I. Gable, of the Western Union Telegraph Company, Pittsburgh, Pa., accompanied by his wife, recently spent several days in New York, while on his vacation.

The advancement of chief operator L. G. Rosebery to be manager of this company's office at St. Joseph, Mo., has resulted in the promotion of Mr. C. M. Good to be chief operator, and H. V. Gray to be night chief, the position previously occupied by Mr. Good.

Mr. L. G. Rosebery, whose appointment as chief operator at St. Joseph, Mo., was announced in our issue dated October 1, was born in Buffalo, W. Va., March 1, 1876, and entered the telegraph service of the St. Joseph & Grand Island Railway at Wathena, Kan., June 1, 1897, going to the Western Union Company in September, 1902.

He has been in the service of this company ever since, as operator, night chief and day chief at St. Joseph.

S. B. Haig, Division Traffic Superintendent, New York.

Mr. S. B. Haig, whose appointment as division traffic superintendent at New York was announced in our issue for October 1, is a native of New York City, where he was born in 1869. His first telegraph service was in Cobourg, Ont., in 1884. Returning to New York he entered the service of the Postal Telegraph-Cable Company and filled, successively, the positions of night city chief, day city chief, general traffic chief, and assistant manager of the branch office at 20 Broad Street. He was later appointed superintendent of traffic which position he resigned on November 1, 1910, to accept one in the traffic department of the Western Union Telegraph Company, New York. Mr. Haig's ability has received merited recognition at the hands of the company in his recent advancement and his wide experience in traffic affairs eminently fits him for his new duties.

S. B. HAIG,
District Traffic Superintendent, New York.

The Cable.

Mr. G. G. Ward, vice-president and general manager of the Commercial Cable Company, New York, accompanied by Mrs. Ward, arrived on the steamer "Adriatic" on October 11, after an absence of several months in Europe.

Mr. William Bellamy, superintendent of the Anglo-American Cable Company, Heart's Content, N. F., arrived in New York on the steamer "Adriatic" on his return from London.

Mr. J. C. Hagen, superintendent of the Direct West-India Cable Company, Jamaica, B. W. I., is in Nova Scotia enjoying a three months' holiday away from the tropics.

Capt. W. G. Squares de Carteret, of the Western Union cable steamer "Minia," was a recent New York visitor on company business.

Dr. Arthur E. Kennelly, professor of electrical engineering at Harvard University, Cambridge, Mass., and a former cable telegrapher, on October 10 delivered a lecture before the electrical department of the Brooklyn Institute of Arts and Sciences on the subject, "The Elements of Hyperbolic Functions and Their Application to Electrical Engineering." Dr. Kennelly will deliver four other lectures on the same subject at the same place on November 14, December 12, and January 9, and February 13, 1913.

Mr. Michael Fitzgerald, of East Brewster, Cape Cod, Mass., a well-known old-time cable operator, is the author of a book just published giving the story of Cape Cod during the war of 1812. The author gives a very realistic picture of the life of that period. Mr. Fitzgerald, who has lived on the "Cape" for many years, spent much time in searching the ancient records for the material for his narrative and he has succeeded in producing a very instructive and entertaining volume. The local press praises Mr. Fitzgerald's book, stating that "so accurately and so faithfully has the author adhered to the actual facts that the book is really authoritative history."

The Commercial Cable steamer "Mackay-Bennett" is engaged in relaying the cables from Coney Island to the new cable station at Far Rockaway, L. I.

The Isles of Shoals Cable.—The United States Government is negotiating with Mr. Thomas C. Leckey, of Portsmouth, N. H., who laid the telegraph-telephone cable between that place and the Isles of Shoals, to make arrangements to connect the Portsmouth navy yard by telephone and telegraph direct with the Isles of Shoals. Mr. Leckey successfully laid the cable in the face of opposition of experts who maintained that the telephone could not be used over it.

Obituary.

W. D. Batterton, manager of the Jackson, Tenn., office of the Western Union Telegraph Company committed suicide September 30 by drinking carbolic acid.

Peter Griffin, a New York operator, was asphyxiated by gas October 10. His mother was also killed in the same manner. According to reports the crime was committed by the mother who feared that her son intended to marry and leave her alone.

Henry C. Hepburn, aged 86 years, the oldest telegrapher in the United States at the time of his death, and who is the subject of a personal sketch printed on page 670 of this issue, died at his home in West Islip, L. I., October 8. Deceased was a native of Rochester, N. Y. He was in good health at the time the article referred to was prepared.

Jules Lumbard, aged 88 years, a forty-niner of the telegraph, and a celebrated singer of patriotic songs during the civil war, died in Chicago, October 10. He was with Abraham Lincoln throughout the 1860 campaign, and sang the requiem at President Lincoln's funeral. An article about Mr. Lumbard was published in our issue dated February 16, 1912.

The Telephone.

Mr. Thos. D. Lockwood, general patent attorney of the American Telephone and Telegraph Company, Boston, Mass., was a recent New York business visitor.

Mr. E. E. Bawsel, formerly division commercial superintendent of the American Telephone and Telegraph Company at Atlanta, Ga., has been appointed division commercial superintendent of the Southern Bell Telephone and Telegraph Company, with headquarters at the same place.

Telephone Purchase in Arkansas.—The Southwestern Telephone and Telegraph Company has purchased the entire holdings of the Hynson Brothers' Telephone Company in Northeast Arkansas and Southeast Missouri.

Improvements at Columbus, Ga.—The Southern Bell Telephone Company announces that it will make improvements in the telephone facilities at Columbus, Ga., at a cost of $100,000. A new exchange will be erected and equipment installed.

Meeting of Telephone Managers and Chief Operators.—Several managers and chief operators of the Cumberland Telephone and Telegraph Company in the Memphis, Tenn., district, met in that city October 1 for a general discussion of matters pertaining to the service.

New England Company's Annual Report.—The report of the New England Telephone and Telegraph Company for the year ended June 30 shows gross earnings $14,239,387, a gain of $1,154,166 over the previous year; net earnings $4,218,892, a gain of $391,472, and a surplus of $401,507, a decrease of $37,967 as compared with 1912.

Telephone Exhibit at Boston Electric Show.—The Boston Electric Show was opened on September 28 and will continue until October 26. In the telephone section are shown the devices which typify the history and development of the telephone from the first instrument invented by Bell down to the perfected switchboards of today. The exhibit is made by the New England Telephone and Telegraph Company.

Central Battery Telephone in Spain.—The second central or common battery switchboard is shortly to be installed in the northern part of the Iberian peninsula at Pamplona, Spain. The first central battery installation in Spain was made about four years ago in the sea coast city of San Sebastian, separated from Pamplona by the Cantabrian mountain range. The equipment was manufactured and installed by the Bell Telephone Manufacturing Company of Antwerp—the Belgian concessionaire of the Western Electric Company of the United States. The equipment to be installed at Pamplona is also to be furnished by the Bell Telephone Manufacturing Company of Antwerp and consists of a number of sections of what is known as the No. 10 central battery switchboard. This is a lamp signal relay board employing a cut-off jack in place of the cut-off relay used in the No. 1 type.

Automatic Telephones in England.—An automatic telephone equipment to replace the existing manual switchboard will be installed in Leeds, England, by the Post Office Department. The installation will operate 6,800 lines in the main exchange and about 3,000 lines at present being served in branch exchanges. The new telephone building in course of erection is designed for 15,000 automatic lines. It will be completed in about six months. The Automatic Telephone Manufacturing Company of Liverpool is furnishing the equipment.

Second Convention of Telephone Pioneers.

In addition to the speakers at the next convention of the Telephone Pioneers of America to be held in New York, November 14 and 15, named in our issue for October 1, Messrs. Emil Berliner and S. G. McMeen will make addresses at the meeting.

Badges of handsome design for the attending members are being prepared, but only those who attend the convention will be entitled to one without cost. Those who do not attend the meeting, but who desire a badge, will be required to pay a small amount for it.

Death of Col. W. H. Eckert.

Col. William H. Eckert, aged 73 years, died at the home of his nephew, Clendenin Eckert, in Stamford, Conn., on October 4. He was a brother of the late General Thomas T. Eckert, president of the Western Union Telegraph Company, and was well-known in telegraph, telephone and railroad circles. Deceased was a native of Ohio and started his business career as a telegraph operator at Wooster, Ohio, in 1854. In 1856 he went to Indianapolis, Ind., and later to Cincinnati, Ohio. Leaving the telegraph service he entered the employ of the Cincinnati, Hamilton & Dayton Railroad, as superintendent of telegraph afterwards becoming a conductor, running out of Cincinnati.

Col. Eckert returned to the telegraph service in 1872 and for several years was manager of the Cincinnati office of the Atlantic and Pacific Telegraph Company. At the advent of the telephone he became, in 1878, general manager of the Bell Telephone system in Cincinnati, remaining there until 1882, when he moved to New York to become general manager of the Metropolitan Telephone and Telegraph Company, which position he filled until 1890.

Col. Eckert, it is said, installed the first multiple switchboard erected. This was at Covington, Ky., in 1882. In 1898 he organized the Knickerbocker Telephone and Telegraph Company in New York and was its president until it was absorbed by the Bell interests in 1901. Since that time and until his death he was associated with the Gray National Telautograph Company in New York.

Col. Eckert was the last one of his generation.

Radio-Telegraphy.

New Wireless System for Submarines.—A new invention of wireless telegraphy is announced in Paris whereby the system can be employed to advantage by submarines.

Wireless Law in Effect.—The law compelling all steamers leaving United States ports to carry two wireless operators and an auxiliary plant, independent of the ship's main power plant, went into effect October 1.

Sayville, L. I., Wireless Station Opened.—The Sayville, L. I., wireless station of the Atlantic Communication Company was opened for public service recently. Only ship messages will be handled at this station at present. The Telefunken system is used.

Russian Wireless Conference.—The Russian postal authorities, it is stated, have called a conference for the purpose of formulating regulations for government supervision of wireless stations and the use of radio-telegraphy on foreign ships in Russian waters.

Wireless Plant for a Newspaper.—The Los Angeles *Examiner* is installing a wireless station in its office to facilitate the paper's ship news service. The station at East San Pedro is being overhauled and modernized. Mr. H. L. Bleakney, assistant Pacific Coast manager for the Marconi Wireless Telegraph Company, is supervising the work.

Wireless in Brazil.—The Brazilian Government has decided to erect wireless telegraph stations in the Rio Grande do Sul, Santa Catharina, Sao Thome, Cruzeiro do Sul, Senna Madureira, Rio Branco, Sao Luiz de Caceres, and Porto Murtinho. Steps are being taken to organize a general scheme of radio telegraphy both on the coast and in the interior.

Wireless in Norway.—A new wireless station was recently opened at Rundemanden, Norway. It is the third large government station. A number of smaller stations are doing good work. The land wireless stations built by the government at Loften successfully send and receive about 6,000 telegrams per month. The government has five coast stations in operation besides the three large stations.

Amateur Wireless to be Subdued.—Within the next few months all the wireless telegraph plants in Southern California not engaged in government, commercial or scientific work, will be ordered dismantled or so weakened that their range will be limited to comparatively small distance. This order is declared by government authorities to be imperative because of the persistent "fogging" of the atmosphere by the amateurs.

Sustained Long Distance Wireless Service at Sea.—The steamer "Cordova," of the Hamburg-American Line, while en route to Central America recently was for thirteen days in constant communication with the German wireless station at Norddeich. The maximum distances covered was 2,400 miles. The North German Lloyd steamer "Neckar," for Philadelphia, remained for six and one-half days in unbroken communication with Norddeich, the greatest distance at which messages were exchanged being 1,820 miles.

Demonstration of High-speed Wireless.—The Marconi Wireless Telegraph Company gave a demonstration of high-speed automatic wireless transmission at its works at Chelmsford, England, on September 30, to representatives of government departments. It was demonstrated that the signals could be received at a high rate of speed on a recording cylinder, which was afterward caused to repeat the messages at a rate of speed sufficiently low to enable the operators to read them. By another method, which was shown, messages as received were printed on tape.

Trans-Pacific Wireless.—The Marconi Wireless Telegraph Company is erecting at San Francisco, Cal., and Honolulu, Hawaii, stations of the same type as those which it is proposed to construct for the British Imperial scheme. The station at Honolulu has been so designed as to enable wireless communication to be established at a little later date with similar stations to be erected by the Marconi Company at Yokohama and in the Philippine Islands. In reference to reports of long distance wireless communications across the Pacific, which the Federal Wireless Telegraph Company claims to have established by means of the Poulsen system, it is stated that the Marconi Company has commenced proceedings for infringement of patent against the Federal Wireless Telegraph Company.

Federal Telegraph Company Expansion.—The Federal Telegraph Company has inaugurated a regular wireless service between San Francisco and Honolulu, Hawaii. Mr. J. G. McCloskey, formerly of New York, and a well known press operator, is manager at Honolulu. The company will construct stations on each of the islands comprising the Hawaiian group. No cables will long stand the chafing against the coral reefs, so wireless will be relied upon hereafter to connect the various islands. It is said that the Federal Company, which uses the Poulsen system, will extend its service east from San Francisco to Chicago, thence along the Great Lakes to New York. The Federal system has been in regular operation between Los Angeles, San Diego, and San Francisco, Cal., Tacoma, Wash., and many other places. Engineers are now selecting sites for stations in Guam, Philippines, Hong Kong, and Manila, where they will meet the service from Scandinavia. It is intended to establish an all-around-the-world Poulsen wireless s ystem. The company has its own factory in Palo Alto, Cal., and is producing machinery as fast as possible to meet the requirements of the new stations now in course of construction.

El Paso, Tex., Messengers.

The accompanying illustration shows the messenger force of the Western Union Telegraph Company at El Paso, Tex. This force is unique in American telegraph experience in that it is composed entirely of Mexican boys, twenty-five in number.

Manager S. P. Jones is shown at the left of the line and next to him is Mr. Roy Palmer, delivery clerk. These are the only two Americans in the group.

All the boys had on new uniforms when the picture was taken.

WESTERN UNION MESSENGER FORCE AT EL PASO, TEX.

Municipal Electricians.

Mr. Thomas J. Cusack, a well-known old-time telegrapher of New York, has been appointed operator in charge of fire alarm telegraph service in Richmond Borough, New York City.

Mr. A. C. Loftin of the Western Union Telegraph Company at Trenton, Mo., in remitting to cover his subscription for another year says: "I find many single articles in each issue of TELEGRAPH AND TELEPHONE AGE worth the subscription price of the paper. It is a valuable magazine and is welcomed twice each month by me. I cannot speak too highly regarding its value. To be without the AGE is dropping from civilization."

Mr. E. Clyde Cooksey, Postal Telegraph-Cable Company, Roanoke, Va., in renewing his subscription writes: "In my opinion your magazine is indispensable to the man who is desirous of keeping abreast with the twentieth century progressiveness of electricity."

The Reid Memorial.

Liberal contributions toward the fund for a memorial to the late James D. Reid are being received from all parts of the country, according to reports from Col. A. B. Chandler, treasurer of the fund. The letters accompanying the subscriptions all testify to the high personal esteem of the writers for Mr. Reid.

Mr. Charles A. Tinker, formerly general superintendent of the Western Union Telegraph Company, New York, says: "I believe it to be a labor of love for his fellow-workers in the telegraph industry, with which he was so early identified in the era of its birth and marvelous developments, to unite in the erection of a substantial and lasting tribute to his memory."

Miss Elizabeth Cogley, of Lewistown, Pa., states that she was appointed to the charge of the Lewistown, Pa., office April 13, 1855, by James D. Reid then superintendent of the Atlantic and Ohio Telegraph Company.

Mr. J. B. Hammatt, of Peoria, Ill., writes: "I think every operator should respond quickly to show his appreciation for what this grand old veteran did for the service that now provides him employment."

Letters of a similar character have been received from B. P. Stephens, Brooklyn, N. Y.; G. W. Wyeth, New York; T. R. Fox, Poughkeepsie, N. Y.; W. F. Carter, Macon, Ga.; G. B. Scott, Tom's River, N. J., and J. L. Edwards, Collingswood, N. J.

Contributions toward the fund should be sent to Col. A. B. Chandler, treasurer Reid Memorial Fund, 253 Broadway, New York.

Telegraph and Telephone Age

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CHANGES OF ADDRESS.—In ordering a change of address the old as well as the new address must be given.

REMITTANCES to Telegraph and Telephone Age should be made invariably by draft on New York, postal or express money-order, and never by cash loosely enclosed in an envelope. By the latter method money is liable to be lost, and if so remitted is at the risk of the sender.

New York, October 16, 1912.

The Jacksonville Reunion of Old Timers.

The spirit of fraternity among old-time commercial and military telegraphers manifests itself with particular emphasis once a year when they are wont to meet together at some previously appointed place and relate their experiences of the olden days, and have a good time generally.

This year Jacksonville, Fla., October 22, 23 and 24, will be the scene of their gathering, and, judging from the preparations that have been made by the people of that city, from the mayor down, the old-timers will receive a welcome that will long remain a pleasant memory to them. It is not always that the mayor of a city takes an interest in gatherings of this kind further than to make the address of welcome at the opening exercises, and then disappear, but in this instance the mayor of Jacksonville happens to be the president of the old-timers' organization and, naturally, he will be more in evidence.

It is not necessary to relate here the charms of Florida and its climate; they have been extolled *ad infinitum.* It will, however, be a very agreeable change for those of the members who reside in the northern latitudes, to spend a few days in the sunny South and we hope that all will thoroughly enjoy their visit and meet again a year hence.

A pleasant feature in connection with the reunion is the sea voyage from New York to Savannah which will be participated in by many of the members from New York and other cities. This part of the journey to and from Jacksonville will consume six days in all, three going and three returning, and will be made under the most favorable circumstances. The steamer leaves New York in the afternoon of October 19, and the seafaring members will reach their destination in ample time for the reunion.

Efficiency.

The word efficiency is much used these days, and also much abused in a thoughtless effort to make it apply to something that it does not mean. Briefly, in its broadest sense, efficiency means to get the best results from a given expenditure of effort in minimum time; or, in other words, to do things right at the proper time. One may ask how to determine the right course when apparently two or more ways present themselves to the mind. It is at this point that one's efficiency, or ability to do things right at the right time, is put to the test. No hard and fast rule can be laid down to govern one in every case; native or acquired ability to judge things and situations are essential. Comparatively few are endowed with the power of keen discernment and discrimination, but these desirable qualities can be acquired by practice, and opportunities for such practice are constantly arising in our daily lives.

In order to be efficient one must think, and take a mental perspective view of each situation as it presents itself, before taking action upon it. Care should be taken, however, not to consume too much time in thinking on one subject. There are many other things to think about, therefore efficiency must be practiced in thinking as well as in other directions. It is important to make clear in the mind what is to be done, and then do it to the best of one's ability. If the first attempt falls short the second will be better, and the third will bring us nearer the goal.

All knowledge is the result of successes and failures in human experience—largely failures—but failures lead to success, and the overcoming of obstacles is in the line of efficiency.

A practical example of one kind of efficiency will be useful in illustrating the point we wish to make. Take two sending operators: one sends at a steady, even gait and rarely stumbles or halts in his work; the other, in a hurry to make speed, sends rapidly for a few moments then hesitates, stumbles and splutters, makes blunders which necessitate his going back to repeat, and then resumes his erratic course, only to be repeated and further repeated. It is needless to state which of the two men will accomplish the more work in the course of a day.

There are some important lessons to be derived from this simple statement of facts. The steady, even sender is relatively highly efficient because he sends a great deal more business in a given time than does operator No. 2, and he does it correctly and with the least expenditure of energy and nervous force. Besides that, because of his easy, unfaltering gait the operator receiving from him has confidence in him and knows that he will not fail, so the two work in harmony and accomplish the best results. Whereas, the other man who stumbles and makes mistakes, soon gets the receiver into a nervous state, not knowing what to expect next, and, naturally, is likely to be unprepared for what does happen. Under such conditions discord between them must inevitably result, and business suffers in consequence—the men have not done the best work that they are capable of doing simply because of inefficiency at one point.

Another lesson is that in order to make a circuit efficient the team operating it should be well matched as to ability and harmony of action. It is self-evident that an inferior operator on a first class circuit would soon demoralize the system and reduce its efficiency.

Efficiency is very desirable in any line of action and its practice brings a satisfaction that cannot be attained in any other way, because of the knowledge that one has done his best.

Wireless Regulations Issued at Washington.

On October 6 acting secretary Cable of the Department of Commerce and Labor, Washington, D. C ., promulgated the regulations for the enforcement of the radio-communication act on December 13. The act establishes a complete Federal control system over radio-communication and requires licensing of all wireless operators working across State lines or in communication with ships at sea. The department will administer the act through inspectors at New York, Baltimore, New Orleans, and San Francisco, and additional inspectors will be appointed within a few weeks for Boston, Chicago, Savannah, Seattle, and Cleveland. The United States has been divided into nine districts, with headquarters in those cities.

The circular embodying the regulations announces the eligibility of women as well as men, and says that applications for licenses for ship stations must be sent to the department's radio inspector at the port of departure. Licensing of great lakes vessels will not begin before spring. Licenses for coast stations will be issued by the nearest inspector or by the Commissioner of Navigation at Washington. Examinations of would-be operators will be held at the navy yards, naval stations, the Naval Academy, certain army posts, and elsewhere.

Amateur stations are restricted in wave lengths to not exceed 200 meters (about 750 feet) except on special application to the department.

The act does not apply either afloat or ashore to apparatus which merely receives radiograms and, accordingly, cannot in any way affect the sending of wireless messages. Stations on shipboard are divided into three classes, applying to passenger steamers, cargo steamers, with crews of fifty and more, and vessels voluntarily equipped with radio apparatus.

Land stations are divided into about six classes, that is, coast or shore stations, general public service stations, limited commercial stations, experiment stations, technical and training school stations, general amateur stations, special amateur stations and special class stations.

The Late A. F. Moore, Wire Manufacturer, of Philadelphia.

In our issue for October 1 note was made of the death of Alfred F. Moore, the well-known manufacturer of electrical wires and cables, of Philadelphia, which occurred in that city, September 18. He was in the fifty-ninth year of his age at the time of his death. The business of which he was the active directing head, was established by his grandfather nearly a century ago. Mr. Moore began his business career in 1870, when he entered the employ of the firm of Joseph Moore & Son, composed of his father and brother. Later he was admitted to partnership, the name being changed to Joseph Moore & Sons. In 1878, some time after the decease of the other partners, the name of the concern was changed to, and still remains, Alfred F. Moore.

No change will be made in the firm name, or the general conduct of the business, which will be under the management of Mr. Antoine Bournonville, who has been actively associated in the management of the business for thirty-five years. Mr. Moore had gathered around him an able force of assistants and the personnel of the sales force, manufacturing departments and agencies will remain unaltered.

F. F. Riefel Appointed Superintendent of Telegraph Lake Shore Railway.

Mr. Frederick F. Riefel, assistant division superintendent of the Franklin Division of the Lake Shore & Michigan Southern Railway, has been appointed superintendent of telegraph of the Lake Shore & Michigan Southern Railway Company, the Lake Erie & Western Railroad Company, the Dunkirk, Allegheny Valley & Pittsburgh Railroad Company, the Toledo & Ohio Central Railway Company and the Zanesville & Western Railway Company at Cleveland, Ohio, vice Mr. E. C. Keenan, appointed general superintendent of telegraph New York Central Lines West. Mr. Riefel will also represent the Western Union Telegraph Company. His headquarters will be at Cleveland.

Wireless Along the Panama Canal.—Under Section 6 of the Panama Canal Act, recently signed by President Taft, the President is authorized to have such wireless telegraph stations erected and operated at such suitable places along the canal and the adjacent coast as he may deem necessary for the operation and protection of the canal. If necessary, the President is authorized to conduct negotiations for the erection of wireless stations upon the territory of the Republic of Panama. Private and commercial messages will be handled, but government communications will always receive precedence in transmission. The President is also authorized to make such arrangements with private wireless companies as seem in his judgment desirable for the purpose of insuring immunity of the government wireless system from interference by commercial companies.

Course of Instruction in the Elements of Technical Telegraphy—XXV.

(Copyrighted.)

(Continued from page 627, October 1.)

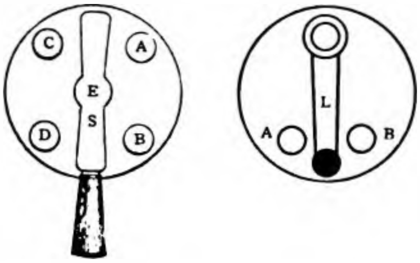
[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order. The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

Switches.

The alteration of connections is greatly facilitated by the use of suitable switches.

Fig. 16 shows a two-way switch. A, B, C, D are brass buttons. S is a brass bar provided with an insulated handle and pivoted at E.

If one circuit be completed by placing S across A D this circuit may be cut out altogether and



FIGS. 16 AND 17.—TWO-WAY AND THREE-POINT SWITCHES.

another completed through B C by turning S across these two buttons.

Fig. 17 shows a three-point, or ground switch. The lever L is in connection with earth, and may slide upon A or B which are connected to the proper wires, or a main circuit may be completed through L A, and button B connected with earth, so that a part of the main circuit may be grounded by placing L over B.

The three-point switch may be used for a variety of purposes. As a rule that part of the circuit which requires to be placed in connection with either path is attached to the switch lever, and the two paths, either of which may be cut out by reversing the switch, are connected with the buttons.

For instance, if it were desired to switch a battery from one wire to another by means of a three-point switch, the lead from the required pole of the battery would be joined to the switch lever, and the two wires to the buttons, as in Fig. 18. The opposite pole of the battery would of course be to ground.

The maintenance of communication over a line of telegraph wires is greatly facilitated by the

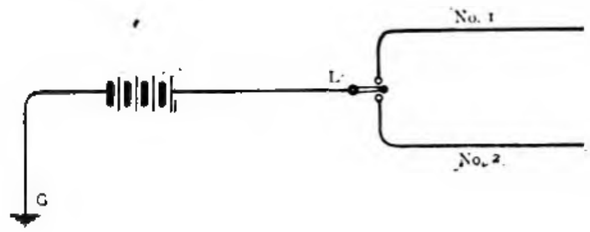


FIG. 18.—BATTERY SWITCH.

accuracy and rapidity with which changes can be effected at, and tests made with, the intermediate test offices along the line. These offices are consequently provided with switchboards of suitable capacity into which the line wires are led, with the view of affording the necessary conveniences for expediting the various operations of testing.

(To be Continued.)

Installing Wireless Apparatus.

In setting up wireless telegraph apparatus all wiring within the building must conform to the rules and requirements of the National Board of Fire Underwriters governing the class of work installed, and the following additional specifications:

1. Aerial conductors to be permanently and effectively grounded at all times, when station is not in operation, by a conductor not smaller than No. 4 B. & S. gauge copper wire run in a direct line to a water pipe, at a point on the street side of all connections to said water pipe within the premises; or to some other equally satisfactory earth connection.

2. Aerial conductors when so grounded must be effectually cut off from all apparatus within the building.

3. Or the aerial to be permanently connected at all times to earth in the manner specified, through a short gap or lightning arrester; said arrester to have a gap of not over .015 of an inch between brass or copper plates not less than 2½ inches the other way with a thickness of not less than ⅛ of an inch mounted upon non-combustible non-absorptive insulating material of such dimensions as to give ample strength. Other approved arresters of equally low resistance and equally substantial construction may be used.

4. In cases where the aerial is grounded as specified in No. 1, the switch employed to join the aerial to the ground connection shall not be smaller than a standard 100-ampere jack-knife switch.

5. Notice of wiring done for these installations should be sent to the Board, the same as for all other electrical work.

Regulations of the London Wireless Conference.

Up to the present time, only meagre accounts have been given out as to the results of the wireless telegraph convention which was held in London last June and July, on account of the secrecy enjoined. The *Electrical World*, however, in a recent issue, published a full transcript of the convention and the final protocol, together with abstracts of the regulations, as follows:

CONVENTION.

"The undersigned, plenipotentiaries of the governments of the countries enumerated, having assembled in conference in London, have with common accord, and with the limitations of ratification, determined upon the following agreement:

"Article I. The contracting parties promise to apply the resolutions of the present convention in all radio-telegraphic stations (coast stations and marine stations) which are established or managed by the contracting parties and open for the service of public intercourse between the land and the ships at sea.

"They also promise to impose the observation of these resolutions upon all private enterprises authorized either to establish or to manage radio-telegraphic coast stations open to the service of public intercourse between the land and vessels at sea, or to establish or manage radio-telegraphic stations, whether open to the service of public intercourse or not, on board vessels carrying their flag.

"Article II. Every radio-telegraphic station established on land or on board a permanently anchored vessel and used for communication with ships at sea is called a coast station. Every radio-telegraphic station established on board a vessel other than a permanently anchored ship is called a ship station.

"Article III. The coast and ship stations are obliged to exchange radio-telegrams without regard to the radio-telegraphic systems used by these stations. Each ship station is obliged to exchange radio-telegrams with every other ship station without regard to the radio-telegraphic system used by these stations.

"However, in order not to hinder scientific progress, the resolutions of this article shall not interefere with the future use of a system of radiotelegraphy incapable of communicating with other systems, provided that this inability be due to the specific nature of the system, and not the result of arrangements adopted solely for the purpose of hindering inter-communication.

"Article IV. Notwithstanding the provisions of Article III, a station may be destined for a restricted public service determined by the purpose of the correspondence, or by other circumstances independent of the system used.

"Article V. Each of the contracting parties promises to join the coast stations to the telegraphic system (network) by special wires, or, at least, to take other measures insuring a rapid exchange between the coast stations and the telegraphic system.

"Article VI. The contracting parties will give each other the names of the coast stations and the ship stations under the scope of Article I, as well as all indications necessary to facilitate and to accelerate the radio-telegraphic exchange which will be specified in the regulations.

"Article VII. Each of the contracting parties reserves the power to prescribe or to admit, except in the stations under the scope of Article I, independent of the installation concerning which information is made public according to Article VI, other purview, which shall be established and managed for the purpose of special radio-telegraphic transmission, whose details need not be made public.

"Article VIII. The management of the radio-telegraphic stations is to be organized so as to give as little disturbance as possible to other stations of the same kind.

"Article IX. The radio-telegraphic stations are obliged to give absolute priority to appeals of distress wherever they may come from, to reply in the same manner to these appeals, and to give them the precedence.

"Article X. The price of a radio-telegram includes, according to the case:

"1. (a) The 'coast price' which belongs to the coast station . (b) The 'ship price' which belongs to the ship station.

"2. The price for the transmission by telegraph, calculated according to the regular custom.

"3. The prices of transmission from coast stations or intermediate marine stations and the prices appertaining to special services asked by the sender.

"The rate of the coast price is subject to the approbation of the government to which the coast station belongs; that of the marine price to the approbation of the government to which the ship belongs.

"Article XI. The resolutions of the present convention are supplemented by a regulation which has the same power and is in force simultaneously with the convention. The prescriptions of the present convention and of the regulation relative thereto may at any time be changed by common consent of the contracting parties. Conferences of plenipotentiaries having power to change the convention and the Regulations will take place periodically; each conference will choose the place and the time for the next reunion.

"Article XII. The conferences are composed of delegates from the contracting countries. In the debates each country has only one vote. If a government represents its colonies, possessions or protectorates at the convention, the interior conferences may decide whether the whole or a part of the colonies, possessions or protectorates shall be considered as forming one country for the application of the preceding sentence. In every event the number of votes at the disposal of any government, including its colonies, possessions and protectorates, shall not exceed six. The following are considered as forming a single country for the application of the present article. [List omitted.]

"Article XIII. The International Bureau of the telegraphic union is charged to gather together and to publish all information relating to radio-telegraphy, to inform the convention of the demands for modifications, to promulgate the charges adopted, and in general to take care of the administrative works attendant upon the interests of international radio-telegraphy. The expenses of this institution shall be met by all the contracting countries.

"Article XIV. Each of the contracting parties reserves the right to fix the conditions under which it will admit radio-telegrams passing through or destined for a station, either coast or ship, which is not submitted to the consideration of the present convention. If a radio-telegram is admitted, the regular prices are applicable to it. The right to pass is given to all radio-telegrams coming from a ship station and received by a coast station of a contracting country or accepted in transit by the government of a contracting country. The right to pass is equally given to all radio-telegrams destined for a ship, if the government of contracting country has accepted them in transit from a non-contracting country, subject to the right of a coast station to refuse the transmission to a marine station of a non-contracting country.

"Article XV. The regulations of Articles VIII and IX of this convention are equally applicable to radio-telegraphic installations other than those included in Article I.

"Article XVI. The governments which have not taken part in this convention have a right to be admitted at their request. This request is made known diplomatically to that one of the contracting governments in which the last conference took place, and by it to all the others. This admission gives full rights of all the clauses of the present convention and to all the advantages herein stipulated. The admission of the government of a country having colonies, possessions or protectorates does not include the admission of the colonies, etc., unless a declaration to this effect has been made by the government. The whole of the colonies or one separate one may be admitted under the conditions of the present article and of Article XXII.

"Article XVII. The resolutions of Articles I, II, III, IV, V, VI, VII, VIII, XI, XII and XVII of the international telegraphic convention of St. Petersburg of July 10 to 22, 1875, are applicable to international radio-telegraphy.

"Article XVIII. In case of a disagreement between two or more contracting governments relative to the interpretation or execution either of the present convention or of the Regulations referred to in Article XI, the question may, by common accord, be submitted to arbitration. In this case each of the interested governments chooses another disinterested one. The decision of the arbiters is determined by the majority of the votes. In case of a tie the arbitrators shall choose another disinterested government. In case there is a dispute as to the choice, each government shall propose a disinterested contracting government, and lots shall be drawn between the disinterested governments. The drawing of lots shall take place on the territory of the government on which the International Bureau is working as provided in Article XII.

"Article XIX. The contracting parties promise to take or to propose to their respective legislatures the necessary measures to assure the execution of the present convention.

"Article XX. The contracting parties will inform each other as to the laws already passed or which are about to be passed in their countries relating to the object of the present convention.

"Article XXI. The contracting parties retain their absolute liberty relative to radio-telegraphic installations not included in Article I, and especially naval and military installations, as well as stations insuring communication between fixed points. All these installations and stations are subject only to the obligations mentioned in Articles VIII and IX of the present convention. Always, when these installations and stations exchange public maritime intelligence, they shall conform, so far as the execution of this service goes, to the rules of the Regulations, so far as the method of transmission and the responsibility are concerned. If, however, coast stations guarantee communications between fixed points at the same time that they communicate public correspondence to ships at sea, they are not subject for this service to the Regulations of the convention except so far as Articles VIII and IX are concerned. However, fixed stations which communicate between land and land may not refuse to exchange radio-telegrams with another fixed station because of the system used by the latter; always each country is absolutely free so far as the organization of the service between fixed points is concerned, and the determination of the correspondence done by the stations belongs to this service.

"Article XXII. The present convention shall be put into execution on July 1, 1913, and shall remain in force for an indefinite length of time and until the expiration of a year from the day of its denunciation. The denunciation has effect only in respect to the government in whose name it is made; for all the other contracting parties the convention remains in force.

"Article XXIII. The present convention shall be ratified and the ratifications shall be deposited in London as soon as possible. In case one or more of the contracting parties does not ratify the convention, it will be none the less binding on the parties who shall have ratified it. In testimony whereof the respective plenipotentiaries have signed the convention by an exemplary which shall remain among the archives of the British government and a copy of which shall be kept in Paris.

"London, July 5, 1912." [Signatures omitted.]

FINAL PROTOCOL.

"At the moment of proceeding with the signing of the convention agreed upon by the international radio-telegraphic conference of London, the undersigned plenipotentiaries agreed upon what follows:

"I. The exact nature of the acquiescence announced in the interest of Bosnia-Herzegovina not being as yet decided upon, it is recognized that if a voice is attributed to Bosnia-Herzegovina, a decision comes up as to whether this voice belongs to it because of Article XII of the convention, or if this voice is in accord with the third paragraph of this article.

"II. It has made the following declaration: The delegation from the United States declares that its government finds it necessary to abstain from all action concerning the prices, because the transmission of radio-telegrams, as well as of telegrams, in the United States, is managed, either entirely or in part, by commercial or special companies.

"III. It has also made the following declaration: The government of Canada reserves the right to fix separately for each one of its coast stations a total ship price for radio-telegrams originating in North America and destined for a ship, the coast price mounting from three-fifths of the price on board to two-fifths of this total price.

"In witness whereof the respective plenipotentiaries have drawn up the present final protocol, which shall have the same force and the same weight as if these resolutions had been inserted in the text of the convention to which it refers, and they have signed it in an exemplary which shall be deposited among the archives of the British government and a copy of which shall be delivered to each party.

"London, July 5, 1912." [Signatures omitted.]

SERVICE REGULATIONS.

I. ORGANIZATION OF RADIO-TELEGRAPHIC STATIONS.

No restriction is placed upon the choice of apparatus to be used by coast or ship stations, and these installations should correspond as far as possible with scientific and technical progress. Two wave-lengths, one of 650 meters and the other of 300 meters, are allowed for general public correspondence, and every coast station open to this service should be so equipped as to operate with these two wave-lengths, one of which is designated as the normal wave-length of the station. During the time it is open, each coast station should be ready to receive calls made at least at its normal wave-length. For the repetition of original messages and documents by ship stations to their respective governments, use is made, however, of a wave-length of 1,800 meters. Each government may authorize the use in coast stations of other wave-lengths for the purpose of insuring long-distance service other than that of the general public correspondence, but established in accordance with the rules of the convention and with the reservation that the wave-lengths shall not exceed 600 meters or that they shall be greater than 1,600 meters.

Stations used exclusively for sending signals for the purpose of determining the position of ships shall not use wave-lengths of more than 150 meters. All ship stations should be equipped for the use of wave-lengths of 600 meters and of 300 meters. The former is the length of normal waves, and cannot be exceeded except in the case of a sender on shipboard, who has always the right to designate by which coast station he wishes his radio-telegram to be sent, and in such case the ship station waits until that particular coast station is the nearest one. Other wave-lengths, less than 600 meters, may be used in special cases, with the approval of the administration which has jurisdiction over the coast and ship stations involved. During the entire time which any coast or ship station is open it should be able to receive signals or calls at its normal wave-length. Boats of small tonnage which cannot conveniently employ wave-lengths of 600 meters for transmission may be authorized to use wave-lengths of 300 meters, but they should be able to receive signals at a wave-length of 600 meters. Communications between two ship stations or between a ship station and a coast station should be exchanged in every case by means of the same wave-lengths, but when communication is difficult the two stations may, in a particular instance and by common accord, pass from the wave-length by means of which they ordinarily correspond to the other regulated wave-length. As soon as the communication is completed they shall resume again their normal wave-length.

The International Bureau publishes and periodically revises an official chart, naming the coast stations, their normal range, the principal navigation lines and the time normally taken by ships to traverse the routes between the different ports. The bureau establishes and publishes the nomenclature of radio-telegraphic stations according to Article I of the convention, as well as periodic supplements containing additions and modification. This list gives general information about each station, including the name, nationality, geographical position or name and nationality of ship, the call letters, normal capacity, radio-telegraphic system employed, length of waves (with normal wave-length underlined), character of service rendered, uses of service, and the coast or ship rate. The exchange of superfluous words and signals is forbidden to stations coming under Article I of the convention. Practice exercises are not permitted except when they do not interfere with the service of other stations, and should be made with a wave-length differing from those used for public correspondence and with the minimum of power. All stations are expected to exchange messages with the minimum necessary power.

(To be Continued.)

The Multiple Telephone Switchboard.*

Large switchboards are nowadays practically all of the common battery type, and the following description of how subscribers' lines are connected together for conversation in a large city office, where the thousands of subscribers are divided among many operators, applies to that kind of switchboard. The distinctive operating feature of this type of board is that signals from the subscribers are given by miniature electric lamps, which automatically light and go out when the receiver hooks on the subscribers' instruments are moved up and down.

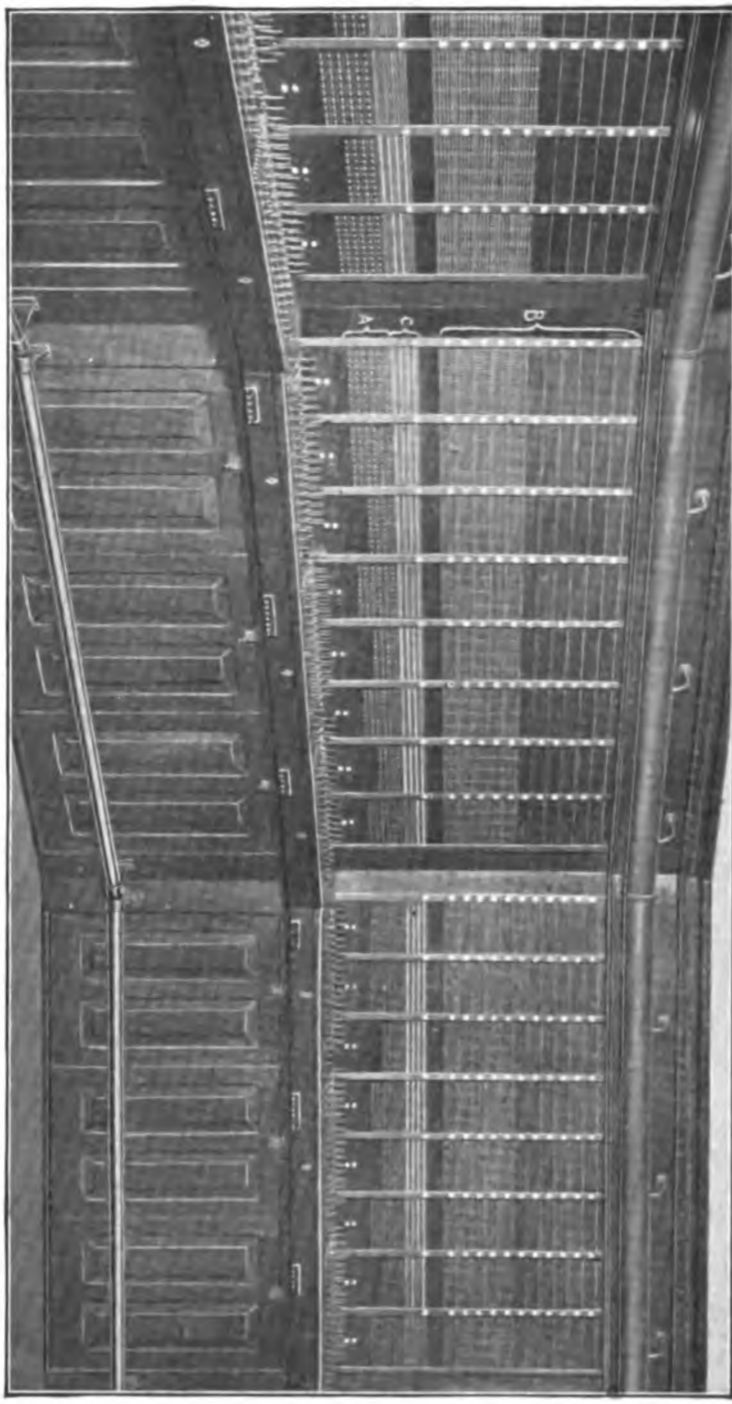
The operators sit in a row along a continuous switchboard, and in front of each operator are jacks for about two hundred lines. These are called answering jacks, and under each one is a small lamp called a line lamp, which lights when that subscriber lifts his receiver from the hook to ask for a number.

In the keyboard in front of each operator are pairs of cords, each with its ringing and listening key lever, similar to those in the small board. (See article on "How a Small Telephone System is Operated" in our October 1 issue.) There are also two small lamps called supervisory lamps placed between each pair of cords and their key. The back lamp is associated with the back or answering cord and plug, and the front lamp with the front or calling cord and plug.

Now, suppose your telephone number is No. 999, and that you take up your receiver to ask for No. 4321. At once the line lamp under answering jack No. 999 lights, and the nearest operator places the answering plug of any one of her pairs of cords in the jack presses back the key lever and asks "Number"? You say "4321."

Now, answering jack No. 4321 may be at the other end of the board, out of your operator's reach. So as to enable her to connect to line No. 4321 without asking another operator's assistance, there are provided the multiple jacks which give the switchboard its name of multiple switchboard.

The upper part of the face of the switchboard for its whole length is a solid mass of jacks, numbered in groups of say 10,000 (if there are 10,000 lines connected to the switchboard). Each group fills the space in front of three operators, and if we look in a certain place in every group we shall find one jack in each group numbered 4321. All the multiple jacks of the same number are connected together, and to the answering jack and subscriber's line of the same number, by means of cable in the back of the switchboard.



MULTIPLE TELEPHONE SWITCHBOARD.

Your operator is, therefore, able to find a multiple jack numbered 4321 either directly in front of her or within reach on one side or the other. She places the calling plug of the same pair of

*Western Electric News

cords in that jack and pulls the key lever towards her, to ring subscriber No. 4321's bell.

Before plugging into the multiple jack, however, she must first make sure that line No. 4321 is not already in use, as some other operator may have a plug in one of its other multiple jacks or its answering jack. To tell this, she make a "busy" test by tapping the point of the calling plug several times against the edge of the multiple jack. If the line is disengaged she will hear nothing, but if there is a plug in any one of the other jacks of that line she will hear a sharp click each time she taps the jack.

We will now describe the action of the supervisory lamps. When the operator plugs into multiple jack No. 4321, the front lamp of the pair of cords lights. When it goes out the operator knows that subscriber No. 4321 has answered and she need not ring again. The back lamp has not yet lighted.

When the conversation is finished and you both hang up your receivers both the supervisory lamps light, telling the operator to pull down the cords, as the call is finished.

If either you or subscriber No. 4321 desires to get the attention of the operator while you are still connected, a slow up and down movement of the receiver hook will light and extinguish one lamp or the other as long as you keep it up, and that notifies the operator to press back the key lever and ask what you want.

The illustration shows part of a switchboard where it is rounding a corner of the operating room. In the space marked "A" are the answering jacks and line lamps; the multiple jacks are in the upper part, marked "B"; and in the space marked "C" are jacks used for connecting to other central offices.

It will be seen that in each straight section there are keyboards for three operators and a complete equipment of multiple jacks for 4,000 lines, with space above for more multiple jacks up to the total capacity of 8,800 lines, which is the limit of this particular switchboard.

The multiple jacks are in groups of 100, with a number plate at the left of each group, and the jacks in each group are individually numbered from 0 to 99.

Henry C. Hepburn, the Oldest Living Telegrapher.

Mr. Henry C. Hepburn, a prominent citizen of Babylon, L. I., N. Y., and a former telegrapher, celebrated his eighty-sixth birthday on September 22. Mr. Hepburn entered the telegraph service in 1843 or 1844 and left it in 1852. He became interested in financial affairs and was a member of the New York Stock Exchange for thirty years. He retired from business at the age of eighty years.

When the telegraph came into being, Amos Kendall, one time postmaster general of the United States, became associated with Prof. Morse in the projection of telegraph lines. He was a friend of Henry O'Reilly, then postmaster at Rochester, N. Y. When there was but one telegraph line in the world—the stretch of wire built with government funds between Washington and Baltimore, over which the first telegraphic message, "What hath God wrought?" had been sent, O'Reilly secured the right to build telegraph systems west of Philadelphia. Mr. Hepburn became O'Reilly's confidential man and superintended the construction of many of the lines which have linked O'Reilly's name so closely with the early development of the telegraph. The line over the Alleghenies to Pittsburgh was the first line built in what was then "the West." Mr. Hepburn was contractor for a section of this line and opened the first office in the "West" in Pittsburgh. One of the incidents Mr. Hepburn tells was that when he was first in charge of the new office in Harrisburg the news of the coup d'etat of Napoleon III. was brought to Harrisburg over the new telegraph wires. Many people gathered at the office to hear the news and, with quite as much interest, to marvel over the quickness with which the news could be brought to them.

In those days reading messages by sound was unknown. The dots and dashes were printed on tape and read visually. Soon, however, someone discovered that the dots and dashes could be read by sound and the printing tape was discarded, and is now a memory of the past. Among Mr. Hepburn's activities in the early days of the telegraph was his connection with the line between Buffalo and Detroit, of which he was superintendent. He opened the first office in Cleveland, Ohio.

In James D. Reid's book, "The Telegraph of America," it is recorded that Mr. Hepburn assisted in the building of the O'Reilly line between Lancaster and Harrisburg, Pa., in being employed in cutting up rags to be dipped in melted beeswax and used for insulation.

Mr. Hepburn, it is stated, is the oldest living telegrapher in the United States. He has been an enthusiastic sportsman all his life and still takes keen interest in fishing and hunting. It was only a few weeks ago that he entered the License Bureau in the City Hall in Manhattan, and asked for a hunting license. The clerk who made out the license went along nicely until he asked the age of the applicant.

"Eighty-five years," said Mr. Hepburn, without a smile.

The clerk looked at the applicant with puzzled eyes and, with a gasp of astonishment, went on filling out the license.

Reinforced Cement and Concrete Poles for Overhead Electric Lines.*

BY ALFRED STILL.

There is much to be said in favor of the wood pole when the right kind of timber, properly seasoned and treated, is used; but, apart from the general unsightliness of wood poles in urban districts, their life is uncertain and always comparatively short. In Switzerland the experiment has been tried of covering the ordinary wood pole with concrete mortar about one inch thick. The strength, and especially the life, are greatly increased thereby, as the decay which so frequently occurs at ground level will be largely, if not entirely, prevented; but it is doubtful whether the system will in the long run prove satisfactory or economical. The ideal material to use for reinforcing concrete is undoubtedly steel or iron. Longitudinal rods or bars of iron can be placed exactly where required to strengthen those parts of the pole section that will be in tension and the concrete, filling up the spaces between the reinforcing rods, takes the place of all bracing and stiffening members of the ordinary steel structure in an almost perfect manner. It is probably at this time generally admitted that iron embedded in cement will last almost indefinitely without suffering any deterioration. The life of a concrete pole is, in fact, almost unlimited, a consideration which should not be overlooked when estimating the relative costs of different kinds of supporting strutcures. It requires no painting and practically no attention once it is erected. If any small cracks should at any time develop, they can readily be filled with cement.

An unlimited life is not necessarily an unmixed blessing; in the case of a badly or inharmoniously designed pole it might be considered a disadvantage. On the other hand, the concrete pole, with its inexpensive requirements in the matter of molds, can easily be so designed as to harmonize with its surroundings, and undoubtedly much might be done with concrete poles in our larger cities to mitigate the unsightly and inartistic effect of overhead lines until such time as it may be found possible or expedient to put all such wires underground. By making the interior of the poles hollow connections can readily be made between overhead wires and conductors in underground conduits, without any unsightly attachment to the outside of the pole.

While referring to the advantages of the cement pole it may be added that every pole is virtually a lightning rod, an advantage which it shares with the steel pole or tower. On lines where both timber and concrete poles have been used and where many wood poles have been shattered by lightning the concrete poles have rarely been struck.

The weight of concrete poles is necessarily considerable, and unless they are made on or near the site where they will be erected the cost of transportation would generally be prohibitive. Some data given by Mr. George Gibbs in a paper read before the American Society of Civil Engineers may be of interest. The concrete poles he refers to are erected on the Meadows division of the Pennsylvania Railroad, the average spacing being 120 feet. The total (over-all) lengths varied between thirty-five feet and sixty-five feet. The specification called for poles to withstand a transverse loading of 6,000 lb. applied 6.5 feet below the top. The cross-section of the poles is a square with chamfered corners, the taper being one in 120. The weight of a thirty-five-foot pole without fixtures was 5,300 lb., while that of the sixty-five-foot pole was 17,300 lb. These weights are in excess of what would ordinarily be required because, the foundations being poor, the portion of the pole buried in the ground is abnormally long.

It is probable that the concrete poles of cross-country transmission lines are usually made somewhat heavier than the strength requirements necessitate because, being molded on the site, not always with the best and most convenient appliances, they are made solid throughout or through a large part of their length, whereas a hollow construction would have been adopted had suitable collapsible cores been available.

Poles up to thirty-five feet in length are usually molded in a horizontal position, the forms being removed after three or four days. After a period of seasoning lasting from two to three weeks they are erected in the same manner as wood poles.

Poles longer than thirty-five feet are best molded in a vertical position; in fact, it is possible that this method may be found advantageous even in the case of shorter poles. The forms are set up immediately over the hole previously prepared for the pole base. They are set truly vertical and temporarily guyed, the reinforcing inside the form being held together and in position by whatever means of tying or bracing may be adopted. Sometimes iron wire is used, but more uniform results are obtained by using specially designed iron distance pieces with the required spacing between them. The concrete is raised to the top of the mold by any suitable and economic means (preferably direct from the concrete mixer by an arrangement equivalent to the ordinary grain elevator) and is dropped in. By this means the hole in the ground is entirely filled with concrete. No tamping is required, a firm hold being obtained, since the ground immediately surrounding the concrete base has not been disturbed.

The best quality of crushed stone and sand should be used, the usual proportions being: cement, one part; sand, two parts; crushed stone, three or four parts, not too large to pass through a ¾-inch screen. When gravel is used the mixture may be one part of Portland cement to five parts of gravel, provided that the latter is graded, including sand, and with the largest pieces of a size to pass through a ¾-inch screen.

The cost of concrete poles does not compare unfavorably with that of other types of poles. The manufacturing cost of a thirty-five-foot pole

*Electrical World.

may be as low as $8.50, but $9.50 would be a safer figure to allow for estimating purposes. A forty-foot pole might cost from $15 to $20, while for a fifty-foot pole containing about fifty cubic feet of concrete from $25 to $30 should be allowed; but the cost will depend much on local conditions and the method of manufacture. An increased initial expenditure on convenient and economic forms and suitable manufacturing plant will usually lead to reduction of total cost.

When designing a concrete pole to withstand a definite maximum horizontal load applied near the top, the pole is treated as a beam fixed at one end and loaded at the other. The calculations are very simple if certain assumptions are made, these being as follows:

(1) Every plane section remains a plane section after bending.

(2) The tension is taken by the reinforcing rods.

(3) The concrete adheres perfectly to the steel rods.

(4) The modulus of elasticity of concrete is constant within the usual limits of stress.

The ultimate crushing stress of the concrete may be taken at about 2,200 lb. per square inch. The reinforcing bars should be covered with concrete to a depth of not less than one inch. The effect of keeping the reinforcing bars under tension while the concrete is poured in the mold and until it has hardened sufficiently to support the strain itself has been tried and found to improve the performance of the poles, but it is doubtful whether the extra apparatus and labor required are justifiable on economic grounds. When subjected to excessive load a concrete pole will generally yield by the crushing of the material in the base near ground level; but, unless it is pulled out of its foundations, it will not fall to the ground.

The comparative rigidity of concrete poles cannot be said to be a point in their favor, as the flexibility and elasticity of wood poles and some forms of steel structures are features of undoubted advantage under certain conditions. On the other hand, the degree of deflection of concrete poles before breaking is remarkable. The elastic limit is variable, and no exact figure can be given for the elastic modulus of cement concrete; but for a 1:2:4 mixture 3,000,000 may be taken as a good average figure for approximate calculations. For cinder concrete this coefficient may be as low as 900,000.

Some tests made on thirty-foot concrete poles gave deflections of from three inches to 4 inches at a point near the top of pole, when submitted to a test load equal to about double the maximum working load. Another series of tests made recently in England on some forty-four foot poles of hollow section, seventeen inches square at the base and eight inches square at the top (inside dimensions thirteen inches and four inches respectively), with loads applied 38.5 feet above ground level, gave a deflection of sixty-six inches under a horizontal load of 10,500 lb., and the permanent set on removal of load was twenty-one inches. The pole did not fail completely until the deflection was seventy-eight inches.

As examples of concrete-pole lines, the transmission line of the Northern Illinois Light and Traction Company, of Marseilles, Ill., and the forty-two mile, 33,000-volt line of the Empreza Luz e Força da Ribeirão Preto, Brazil, may be mentioned. The Northern Illinois company transmits three-phase energy at from 30,000 volts to 33,000 volts. Most of the poles used by it are about thirty feet high, spaced from 125 feet to 132 feet apart. The section is square, with six-inch sides at the top of the pole and nine inches at the base. The reinforcing consists of six ½-inch-square steel bars through the entire length of the pole. Many of the concrete poles on this line have now been in position over four years, and they have given entire satisfaction.

In the matter of supporting distributing lines in cities it may be stated that upward of 1,000 concrete poles have been erected for this purpose in Oklahoma City during the last four years. These poles are mostly thirty-five feet high, of hexagonal section, seven inches wide at top and sixteen inches at the base. They are hollow, with walls about 2¾ inches thick, and they weigh 2,000 pounds each.

Meeting of Institute of Radio Engineers.

At the meeting of the Institute of Radio Engineers, held at Columbia University, New York, October 2, Dr. Alfred N. Goldsmith presented a paper on Present Educational Necessities in Radio Communication. His paper indicated that Germany is and has been far in advance of all other nations in scientific radio education and consequent development. Heretofore, apparently no scientific radio courses have been established in this country except a part-year course in connection with the electrical engineering course at the Ohio State University. The College of the City of New York has now established such a course, of which Prof. Goldsmith is the head, and Mr. Gano Dunn, a former telegrapher and past president of the American Institute of Electrical Engineers, has provided for a complete Poulsen telephone-telegraph equipment for use in this course. With this and a number of standard radio measuring instruments, variable and fixed capacities and inductances, and the usual physical laboratory apparatus the college is well equipped to give extensive instruction.

The purpose of the course is to develop scientific radio engineers. No instruction will be given in operating.

The next Radio Institute meeting will be held November 6 at 8 p. m.

A Bull That Was Not a Bull.—"No more hard cow for sale," is a recent deciphering of Morse characters in a message to a coal dealer.

New Telephone Receiver.

BY ANDREW PLECHER, LAS ANIMAS, COL.

I have always contended that so-called wireless transmission is a misnomer and originated from the idea that transmission takes place through the air or through ethereal space. I am not speaking here of transmission by induction at comparatively short distances in which the dielectric plays the prominent part, but of transmission for which a ground is necessary and in which electric conduction does the work.

Taking, therefore, the mysterious part away from wireless and looking at the same as a matter of fact, it is strictly equal to one-wire transmission, where the surface of the earth forms the one conductor, stretching at the same time in all directions, and over this conductor the electric charges emitted by a transmitter spread out. Without doubt, signals to Mars could only be transmitted by induction, by charging the entire earth and discharging the same to such an extent that a sensible charge would be induced on the far-distant planet.

Referring to the article and drawings published in your September 16 issue, there is shown a granular microphone in the battery circuit of the new receiver. Now, I wish to demonstrate that the new receiver acts at the same time as a so-called wireless, or one wire, or complete circuit receiver.

The granules of the microphone may consist of nickel and silver filings, the same as in an ordinary coherer, or the nickel and silver filings may be mixed with small crystals of galena, and then you have at the same time a receiver which will answer all purposes of wire or wireless transmission in the most perfect manner, a receiver, which is not only extremely sensitive, but easier to handle than any receiver in existence. This instrument may be used on trains, aboard ships, and in flying machines. The battery may be carried in the pocket and the instrument strapped to the ear; and, in case the core is a permanent magnet and consequently only one winding is necessary, the battery is also dispensed with, and nevertheless the receiver remains still effective in the highest degree, since the granules act as a coherer and the vibrating diaphragm as a most efficient decohering device. It is evident that this mixture of granules may be modified according to particular requirements.

It should be mentioned, that the new receiver is already patented, that is, a patent has been applied for in the United States, Canada, Mexico, Philippine Islands, Porto Rico, Great Britain, France, Germany, Belgium, Switzerland, Denmark, Sweden, Norway, Austria-Hungary, Italy, Spain, Portugal, Australia, New Zealand, Argentine, Chile and Japan, and all other countries of the globe may be added after the publication of the United States patent.

San Francisco-Honolulu Wireless.

The wireless service of the Federal Telegraph Company between San Francisco, Cal., and Honolulu, Hawaii, is receiving considerable attention at the present time. It has already been noted in this journal that the Poulsen system, which is employed by the Federal Company, is a high-speed system.

Messages are transmitted at a rate of 300 words per minute, secretly, by sending two waves, one of which carries the message and both of which are automatically changed in length about every thirty seconds by a prearranged system whereby the receiving tuner changes its wave-length to correspond at the same time.

The received signals cause the deflection of a fine gold wire in front of a hole which deflection permits light to fall on an inexpensive, light-sensitive tape. One tape is said to last about four hours and the developing and fixing bath about eight hours. The transmitter is very rapid and sensitive and is said to be mounted on gimbals and springs. The distance separating the two stations is 2,350 statute miles, and the system is operated in quadruple, that is, two messages can be sent and two received at the same time. It is stated that it is practically insensitive to outside influences, and is reliably operative at all times.

The two masts at the South San Francisco station are of wooden truss construction, six feet square and 440 feet high. Between them is stretched an antenna consisting of seven miles of wire. The Poulsen system does not employ the usual spark transmission. The oscillations are produced by burning an arc in a hydrogen atmosphere and by the use of a powerful transverse magnetic field oscillations of proper frequencies are obtained. The generator produces from 200,000 to 1,000,000 waves per second, the transformer used in the process being water-cooled.

The new Poulsen station at San Francisco employs thirty kilowatts against twelve used in the former station, and the service between San Francisco and Honolulu is stated to be unsurpassed in steadiness and reliability.

Platinum.—Native platinum is an alloy of platinum, iridium, rhodium, palladium, and often osmium, with varying amounts of iron, copper, and gold. It is usually found as small nuggets, scales, and rounded or irregular grains; its color is steel-gray. The specific gravity of the crude platinum varies from 14 to 19. The percentage of the metal varies also within wide limits, usually from 70 to 85 per cent. Owing to its high melting point and great resistance to acids, platinum is extensively used for laboratory utensils. It is also used extensively in the arts and manufactures.

Portable Wireless Telegraph Stations.

The importance of portable wireless apparatus for military purposes was quickly grasped at an early date in the development of wireless telegraphy, and the first experiments in this direction were made in 1902, the apparatus being put to extensive use by the Russian Army during the Russo-Japanese war.

These early wireless stations were only adapted for wheel transport, and were thus of limited application. Attention was, therefore, next turned to the development of wireless stations that could be carried on pack horses. The various stations that have been evolved are described in a book recently issued by the English Marconi Wireless Telegraph Company, which deals with the cart station, the cavalry station, the landing station, the knapsack station and the airship station.

In the knapsack station everything possible has been done to secure portability and ease of manipulation. No elaborate system of tuning is provided, or is necessary, owing to the short wave-length employed, which is so widely different from that in ordinary use as to be practically immune from interference.

The station is intended primarily to be employed by scouts, and to replace to a large extent visual signalling and mounted orderlies. The distance over which it will work ranges approximately from five to seven miles, and over this distance communication can be safely relied upon under practically all conditions. The units composing the station have been so devised as to be of a shape which can be conveniently carried in an ordinary haversack or valise, and the station can be divided into either four loads of approximately twenty pounds each or eight loads of approximately eleven pounds each, according to circumstances. It can conveniently be carried by two mounted men, and can be erected by one man, if necessary, in about ten minutes, or by two men in about five minutes.

The instrument cases are so arranged that when once the adjustments have been made they may be closed, and the station worked with the instruments perfectly protected from the weather. At the same time everything is very accessible for adjustment when necessary. A single mast of extremely light though rigid construction is used with the umbrella form of aerial, the aerial itself acting as stays for the mast, and auxiliary stays are provided for use under exceptional circumstances. A complete knapsack equipment for carrying the apparatus and accessories is supplied with the station. The source of energy may be either a primary or secondary battery, according to choice. In the latter case the accumulators should be systematically charged as required; and for this purpose the company supplies a special field charging set which has sufficient output to serve ten or twenty such stations, and which would, of course, be equally useful for charging any accumulators that might be required for any other purposes, such as ignition accumulators for motor cars, etc.

The accumulator consists of three 2-volt cells carried in a light, strong and portable aluminum case, in which two sockets are provided for making the necessary connections. The case is fitted with a substantial leather handle, and weighs thirteen pounds complete.

One of the latest types of portable apparatus to be designed is the Marconi aeroplane set, which has been constructed with a view of making it as far as possible adaptable to any type of aeroplane. The set, which is the outcome of considerable experiment, has been made up into several separately contained units, with the idea of having as wide a margin as possible for the distribution of weight. The apparatus is very strongly constructed, and has stood very severe treatment without in any way suffering from it. The source of supply can be either primary or secondary batteries. The only high-tension wire in the machine is run in a very well insulated tube in the fusilage of the machine, which makes the pilot and the passengers absolutely immune from any chance of shock while the apparatus is working. The trailing wire is fitted with a safety plug, which is adjusted to stand only as much strain as it would be subjected to when the machine is flying, and which frees itself immediately in the event of the wire having extra strain put upon it, such as would occur if it came in contact with trees or anything during a flight.

It has been found convenient for the bulk of the apparatus to be fitted underneath the pilot and passengers' seats, and it has, therefore, been designed with a view of it being placed upside down, or in any other position most suitable to the type of machine on which it is to work. The receiving station is very compact, and is fitted with a portable mast which can be erected in a few minutes. The wave-length of the set is comparatively short, and consequently the receiving apparatus is not in any way troubled by interference from other stations, and very little adjustment is required in tuning. Beyond its uses from a military point of view, a machine thus equipped enables the pilot to keep in constant communication with the aerodrome or headquarters during a flight, which in cross-country and long-distance flights would be of great importance.

Copper Wire Tables.—The Bureau of Standards, Washington, D. C., has issued a circular, with tables, on copper wire, which was prepared by the Bureau at the request of the standards committee of the American Institute of Electrical Engineers. In the historical section the circular contains much information on copper, wire gauges, aluminum, etc., and many valuable tables are given of the various properties of copper wire. It is an elaborate report on the subject and will be a great value in wire calculations where great accuracy is required.

Are You Having Wire Troubles?

Are you spending money for maintenance and renewals?
<u>How long</u> does your wire give <u>efficient service?</u>

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The Railroad.

Edwin C. Keenan, General Superintendent Telegraph, New York Central Lines West of Buffalo.

Mr. Edwin C. Keenan, who has just been appointed general superintendent of telegraph of the New York Central Lines West of Buffalo, jointly representing the railroads and the Western Union Telegraph Company, with headquarters at Chicago, was born at Toledo, Ohio, April 20,

E. C. KEENAN,
General Superintendent of Telegraph, New York Central Lines West of Buffalo, Chicago.

1868, and entered the telegraph service August 3, 1885, as a railway telegrapher. He filled positions at various small stations and in the dispatcher's office at Detroit, Mich., and Toledo, Ohio.

In 1892 he accepted a clerkship in the engineering department of the Lake Shore and Michigan Southern Railway at Toledo, Ohio, and in 1900 was transferred to the general offices of the engineering department at Cleveland, Ohio. In 1901 he was appointed chief clerk in the engineering department of the Lake Erie and Western Railroad at Indianapolis, Ind., and in 1905 he returned to Cleveland to take the position of chief clerk in the engineering department of the Lake Shore Railway.

Early in 1910 he was advanced to the position of superintendent of telegraph of that road, which office he held at the time of his recent appointment.

Mr. Keenan is the son of the late Joseph Keenan, who was a joint Lake Shore and Western Union line foreman at Cleveland and Toledo for fifty years. Mr. Keenan's father, who died in 1910, was one of the best construction and maintenance telegraph line men in the country.

Mr. Keenan comes to his new duties well equipped with experience in the telegraph and engineering departments of this railway system. He is a man of high character and has the happy faculty of making friends. He is an active member of the Association of Railway Telegraph Superintendents, and takes lively interest in the proceedings at its annual conventions.

John A. Kick, Railway Telephone Engineer, Chicago.

Mr. John A. Kick, recently appointed railway sales engineer, Western Electric Company, Chicago, Ill., has a record of being one of the most active and progressive young electrical engineers in the railway telegraph and telephone service, and is well known to our readers through his contributions on these subjects. He was born at Loudonville, Ohio, January 20, 1877, and entered the telegraph service in his home town in August, 1891. In 1892 he became an operator on the Pittsburg, Fort Wayne & Chicago Railroad remaining in that service until 1898 when, at the outbreak of the Spanish-American War, he enlisted in the Pennsylvania Volunteer Light Artillery and served in Porto Rico. At the close of the war he returned and enlisted in the United States Signal Corps serving two years in the Philippines.

Returning to the United States in 1901 he became wire chief for the Standard Oil Company in the Marietta, Ohio, district, leaving this service in February, 1905, to go with the American Telephone and Telegraph Company at Chicago, where he filled various positions including those of wire chief and assistant chief operator. Between February, 1906, and November, 1909, he was wire chief and telephone engineer for the Chicago, Burlington and Quincy Railroad.

During 1909-1910, Mr. Kick was engaged in special development work in typewriter-telegraph

J. A. KICK,
Railway Telephone Engineer, Chicago.

inventions, and in March, 1910, he was appointed engineer of the telegraph department of the New York Central lines west, which position he held at the time of his recent appointment.

Mr. Kick's technical knowledge was obtained through a correspondence school course in electrical enginering, supplemented by two years of laboratory work in the night classes at Armour Institute of Technology, Chicago. He is co-inventor of the Cummings-Kick typewriter telegraph system and the inventor of a high-speed selective system for train dispatching.

Telephone Pioneers of America.

T. C. MARTIN.

Mr. Thomas Commerford Martin, the subject of this sketch, is one of the earliest of the telephone pioneers, having become associated with the telephone service in the fall of 1877. He entered the telephone department at the Edison laboratory at Menlo Park and New York City and afterwards, in 1878, became secretary to the joint Bell Telephone and Edison Phonograph Companies at 203 Broadway, and later at Reade Street, New York. For some months in 1878 Mr. Martin had charge of a pioneer telephone line running from his own office at 203 Broadway to the Hilborne Roosevelt organ factory in the upper part of the city, and made frequent reports on its working to Messrs. Gardiner Hubbard, W. L. Candee, Thomas A. Edison and E. H. Johnson. This line, it is thought, was the nucleus of the present New York telephone system.

THOMAS COMMERFORD MARTIN (1877),
Secretary National Electric Light Association, New York.

Mr. Martin was invited to go to Boston as assistant secretary of the Bell Telephone Company when it moved to that city about 1879-80, but he declined. He was associate editor of the *Electrical World* when it was founded in 1883 and for several years editor of the *Electrical Engineer,* and afterwards of the *Electrical World*, when the two papers were combined in 1899. He is now secretary of the National Electric Light Association with headquarters in New York and has been highly successful in building up that organization to its present large membership and influence.

He is the senior past president of the American Institute of Electrical Engineers.

Mr. Martin is an Englishman by birth, being born in London, on July 22, 1856. He is a man of wide experience and reputation and has a host of friends throughout the country. It may be truly said that he has been one of the most potent and active agencies in the upbuilding of the electrical business of this country. Mr. Martin has been decorated by the French government.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "Electrical Instruments and Testing," by Norman H. Schneider, with chapters on testing wires and cables and locating faults, by Jesse Hargrave, a well-known and capable electrical engineer, is now being covered in this department. These subjects will no doubt prove of great interest to students, as they are timely and important, and each student should have a copy of the book at hand in order to follow intelligently the study of the subjects under consideration.]

What is the method employed in locating a cross by the voltmeter test?

What is the disadvantage of the test illustrated in Figs. 117 and 118?

What kind of a voltmeter is necessary in this test?

What are the factors that affect the accuracy of this test?

How are insulation tests made by the milliammeter method?

Is the milliameter an accurate and reliable instrument for making insulation tests?

Study the method of making tests as illustrated in Fig. 119.

In making insulation tests why is the wire under test open?

How is the mileage insulation resistance reckoned?

Describe the insulation test by the voltmeter method.

When an abnormal leakage is disclosed, how is it localized?

What is meant by localization?

What is the purpose of conductivity tests?

How often should conductivity tests be made?

How are wires connected to be tested for conductivity?

How is the exact resistance of each wire determined?

When the resistance of a wire is abnormally high, how is the abnormal resistance located?

Study the chapter on the location of grounds and crosses in telegraph and telephone cables by the Varley method.

How are openings in cable conductors located by the bridge method?

What is the Leeds & Northrup fault-finder?

What faults can be dealt with with this instrument?

Study the various tests given.

(To be Continued.)

Composite Systems.

(*Concluded from page 621, October 1.*)

Transmitting Trouble. If the transmission is poor, that is, if there is trouble in receiving messages at a distant station while messages are clearly received at the home station, the speaker should talk clearly, with his lips close to the mouthpiece of the transmitter. If the transmission is still unsatisfactory, the trouble may be an open in a condenser at an intermediate telegraph station in the primary or secondary of the talking circuit in the sending station; or in the secondary (receiving) circuit of the receiving station.

If in the condenser at an intermediate telegraph station, the trouble is undoubtedly an open, which, although interfering with the transmission of the voice beyond the break, will not interfere with its reaching a station on the same side of the break as the sending station. If in the primary or the secondary of the talking circuit in the sending station, the receiving station will have no trouble in hearing messages transmitted to it from other stations on the line. On the other hand, if the trouble is in the secondary (receiving) circuit of the receiving station, the sending station will have no trouble in transmitting to other stations.

To test for trouble in the talking circuit of the sending station, place the receiver to the ear, and if the secondary circuit is not open and there be no defective apparatus in it, the usual low sounds characteristic of aërial lines will be heard. These sounds vary in intensity according to the length of the line and its exposure to other electric circuits, but they are seldom of sufficient intensity to interfere with telephonic transmission. If the secondary circuit is thus found to be all right, the primary circuit is then tested by listening in the receiver while speaking into the transmitter or tapping it gently. These sounds will be distinctly heard in the receiver if the primary circuit is in good working order, or a click will be heard in the receiver when the switch hook is operated. If such sounds are not heard, the apparatus and wiring in the secondary circuit should be examined, and the battery inspected for an open circuit.

A battery test with an ammeter is here recommended. This test is made by connecting the ammeter in the primary circuit, and after the receiver has been off the switch hook for one minute, noting the current in the ammeter. If the battery is working perfectly, it should give a current of more than 0.14 ampere after it has been thus connected for one minute. This corresponds to a voltage of approximately 2.8 across the terminals of the talking battery while the latter is under load, that is, furnishing current to the primary circuit.

If the condensers on the line are not defective, and there be no trouble in the talking circuit, it is in all probability in the receiving circuit at the distant station.

Receiving Trouble. If unable to hear distinctly, and there is no difficulty in transmitting messages, either in the local or the distant station, it indicates trouble in the secondary circuit of the telephone set. This circuit consists of the secondary of the induction coil, the condenser, receiver in multiple with the retardation coil, the switch hook and ground. A thorough inspection should be made of all parts of this circuit for poor connections, and if none be found, an examination should be made of the apparatus in the secondary circuit for defects and poor adjustments.

Adjustment of the Retardation Coil. The retardation coil in the regular telephone set has an iron core which can be moved in or out and secured in any position to vary the impedance and regulate the amount of current shunted around the receiver. If disturbing noises become troublesome in the receiver, the iron core should be moved out of the retardation coil to reduce the impedance of the coil and permit more current to pass around the receiver. On the other hand, to maintain the volume of the sounds received, the amount of current diverted from the receiver should be as small as consistent with the necessary freedom from the disturbing noises. The core should therefore be withdrawn from the coil no further than is necessary to obtain the desired result.

In the portable telephone set the iron core is permanently adjusted in the retardation coil there used, because the disturbing noises vary at different points along the telegraph line, and owing to the temporary use of the set, do not warrant readjusting the core every time the set is put in service at a different point.

Receiver Defects. In case the trouble cannot be remedied by means of the retardation coil, it may be found in the receiver itself. Trouble in receivers may be caused by dust or dirt settling upon the pole faces of the magnet and damping the vibrations of the diaphragm. To clear this trouble, the receiver cap should be unscrewed and the pole faces of the magnet wiped perfectly clean. All regular tests for receivers also apply.

Telephones on the Temiskaming and Northern Ontario Railway.

The Temiskaming and Northern Ontario Railway, operating in the Province of Ontario, has placed an order with the Western Electric Company for the necessary equipment for telephone train dispatching. The main line from North Bay to Cochrane, and the Porcupine branch extending from Timmins to Iroquois Falls Junction will be equipped—a total distance of approximately 290 miles. The train dispatcher will be located at North Bay. Twenty-seven way stations in all will be equipped with selector sets.

The Use of the Telephone at Baseball Contests.

The value of the telephone to the baseball enthusiast, is evidenced by the increasing number of telephones found in the press box, whereby accounts of games, inning by inning, are telephoned to the newspaper offices and displayed at once on the bulletin boards. Back of the stands, the devotee of the game may find pay station telephone booths, which he may utilize for communication with his office or home.

The latest aid to the telephone facilities is the addition of the loud-speaking telephone. This instrument, which combines the sound intensifying properties of the megaphone with the articulating properties of the telephone receiver, is capable of producing spoken words which may easily be heard at a considerable distance. Ordinarily, the commercial telephone receiver cannot make itself heard if held away from the ear.

In the new Western Electric loud-speaking telephone all these difficulties have been overcome, and twelve of these instruments have been installed at the Washington Park grounds of the Brooklyn (National League) Baseball Club, in various parts of the grandstand, fastened to the posts. All the telephones announce, simultaneously, every man as he comes to bat and other interesting incidents of the game. They also serve to call spectators to the public telephone to receive messages. The transmitting end of the system is in the press box, from which all announcements originate.

TELEPHONES AT A BASE BALL CONTEST.

Round-About Translation.—Resourcefulness in emergencies is well exemplified in the following incident: A French woman entered a Postal Telegraph office in New York and tried to explain in very poor English that she desired to send a night lettergram, which she had written in French. The manager explained to her that the message must be written in plain English. Being unable to write English she was about to leave when the manager asked her if she could speak Italian. She replied that she could not but that she had a friend who could. The friend was sent for and while he could talk Italian and French he could not talk English. On the force was an operator who could converse in Italian. The Italian friend of the woman took the telegram written in French and translated it to the operator who understood Italian and he in turn translated it into English. It took twenty-four minutes to get the telegram into English and the manager of the office thinks the tolls, fifty cents, were well earned.

General Alarm for Telephone Systems.

In manufacturing plants, public buildings and schools or other institutions which have private telephone systems, there is frequent need for a device which will ring a number of bells or buzzers simultaneously. The "general alarm or code signaling sets" have been perfected for this purpose by the Western Electric Company.

The functions of the sets, which will probably find their greatest application in connection with private branch exchanges and interior telephone systems in business houses, factories, hospitals and schools, will be to call to the nearest telephone any one of a number of men by an arbitrary selective code, to sound an alarm in case of fire or other emergency, and to sound bells for recess or recitation periods. The sets may also be used independently of telephone systems.

ALARM FOR TELEPHONE SYSTEMS.

A simple turn of a key handle will sound a call simultaneously on all the bells and repeat the call four times, each key sending out a different code signal. The sets can be connected into the telephone or interior telephone system together with an auxiliary resistance and condenser box. They are furnished in any capacity up to ten different signals.

Mr. Charles E. Stump, manager of the Dock Street office of the Postal Telegraph-Cable Company, Philadelphia, Pa., writes: "Enclosed find check for another year's subscription to TELEGRAPH AND TELEPHONE AGE. Can't well get along without it so don't stop your valuable publication."

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, 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" is 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 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.

Wireless Operator's Pocketbook of Information.

The Wireless Operator's Pocketbook of Information and Diagrams, is the title of a 174-page book recently published. The author is Leon W. Bishop, a well-known authority on wireless matters, and he has given to the student and general reader a book that is well worth careful reading and study. It is a practical pocketbook for the wireless operator, showing all up-to-date apparatus, in theory and practice. Its purpose is to satisfy the desires of the wireless operator and of those experimenters who have already some knowledge of wireless phenomena, for a practical book more suited to their needs than the many elementary ones which deal mostly with the construction of simple apparatus, or the elaborate technical and mathematical treatises which presuppose a technical education to understand them.

Briefly, it thoroughly describes all transmitting and receiving instruments; aerials, giving the types and relative sizes for the best work in transmitting and receiving; the latest methods of tuning both transmitting and receiving apparatus; and it has a full chapter of diagrams, showing the most improved circuits for all sizes and sets, both in transmitting and receiving.

Among other features it gives a table showing how to compute roughly the sending and receiving distances for all types of instruments with all types of aerials and ends with the latest Call-Book containing the calls of the principal land and water-stations in America both government and commercial. A prominent authority on wireless telegraphy states that this is the best book on the subject he has ever seen, and he has purchased them all. The book is very liberally illustrated and the price is $1.00. This and other books on electrical subjects can be supplied by J. B. Taltavall, Publisher, 253 Broadway, New York.

A B C of the Telephone.

There are several excellent books on the telephone and its practice, but all men do not know the rudiments of the telephone. It is well, therefore, in order to gain an understanding of this instrument, as in everything else, to begin the study at the beginning. The telephone is no harder to know than any other electrical device and it becomes extremely fascinating on better acquaintance.

A B C of the Telephone is a good book for the student to start with. It explains the subject in non-technical language and the main facts connected with the telephone industry are stated in a clear and simple style. Although it is elementary in character it covers the whole subject of telephony so comprehensively and completely that after a careful study of the book the student will have a good working knowledge of the instrument and its many uses. The book is rendered particularly valuable by reason of the great many illustrations, each one of which tells a story. It has 350 pages and nearly 300 illustrations. The author of the work is Mr. James E. Homans and he is a master of the subject.

The price of this book is $1.00 per copy and copies can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Mr. John R. Dixon of Chicago has just severed his connection with the telegraph service to engage in other business at La Grange, Ind. Mr. Dixon spent fifty years of his life as a telegrapher and two years as a telephone operator. He was a military telegrapher during the Civil War and is well known in telegraph and railroad circles. In entering upon other business at his age he remarked that: "This world is moving along so rapidly I can scarcely keep up and follow the business. Hence the change." His friends wish him every success.

New Book.

Wireless Telegraphy and Telephony, By C. I. Hoppough, Valparaiso, Ind. This work has just come from the press and is the most up-to-date and complete treatise on these subjects. It contains about 200 pages of descriptive and illustrative matter pertaining to wireless and more than 150 illustrations. There are sixteen chapters describing in detail the development of wireless telegraphy and telephony from its inception to its present state of efficiency. The book embraces the following subjects: Matter, Motion and the Ether; Electricity and Magnetism; Quantitative Electricity; Dynamo Electric Machinery; Electro-Magnetic Induction; Capacity and the Oscillatory Discharge of Condensers; Electro-Magnetic Waves; Early Experiments in Wireless Telegraphy; Detectors; Receiving Circuit and Tuning Apparatus; Transmitters; Spark Gaps; Aerials; Wireless Equipment and Telegraph Stations; Wireless Telephony; Wireless Operating.

Mr. Hoppough, the author, has been in the wireless field for six years, having held some of the most important positions with the United Wireless Telegraph Company. This work is not only an invaluable treatise for the amateur, but a most valuable book of reference for the wireless telegrapher.

The price of the book is $1.50 per copy and copies may be obtained of Telegraph and Telephone Age, 253 Broadway, New York.

Old Time Telegraphers' Reunion Programme.

Following is the programme of the reunion of the Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps which is to be held at the Windsor Hotel, Jacksonville, Fla., October 22, 23 and 24:

Tuesday, October 22—11 a. m.—Business meeting of the Old Time Telegraphers' and Historical Association called to order by retiring president. Address of welcome and response. Installation of the new president, transaction of business, etc.

12 m.—Business meeting of the United States Military Telegraph Corps.

2:30 p. m.—Visit to Florida ostrich farm.

8:30 p. m.—Entertainment by the Jacksonville Board of Trade.

Wednesday, October 23.—Morning.—Automobile trip around the city.

Afternoon and evening, trip on St. John's River.

Thursday, October 24.—Morning.—Trip to St. Augustine.

Afternoon, go as you please.

Evening, banquet at Windsor Hotel.

Hon. W. S. Jordan, mayor of Jacksonville, and an old-time telegrapher, is the president of the Old Timers' Association, and Mr. F. J. Scherrer, 30 Church Street, New York, is secretary.

Following is the membership of the various committees:

Reception Committee Old Time Telegraphers' and Historical Association: George H. Usher, chairman, G. D. Ackerly, L. J. Amsden, John S. Arnold, John W. Atkins, W. J. Burt, P. J. Casey, Geo. A. Cellar, N. E. Church, W. P. Cline, W. F. Coachman, T. P. Cummings, Geo. W. Davis, W. F. C. Fellers, Wm. T. Gentry, A. B. Hernandez, A. E. Heston, Chas. M. Holmes, F. G. Jones, James W. Kemp, J. Levin, Geo. W. Lloyd, Wm. J. Lloyd, C. W. Maxwell, L. J. Maxwell, W. H. McKeldin, Geo. E. Mundee, M. J. O'Leary, J. E. Peacock, W. A. Porteous, H. G. Reich, Geo. W. Ribble, Harvey D. Reynolds, Benj. Sams, V. G. Shearer, Geo. R. Shultz, E. S. Spencer, J. M. Stephens, J. B. Taltavall, L. R. Taylor, W. F. Williams, Wm. B. Wilson, H. C. Worthen.

Reception Committee, United States Military Telegraph Corps: M. F. Robinson, chairman, Sanford, Fla., J. T. Abernerthy, Jesse W. Crouse, William J. Dealy, Edwin Peel, J. J. Fowler, Chas. D. Hammond, George Henderson, Charles W. Jaques, George E. Jones, Marion H. Kerner, Frank B. Knight, A. C. Lindauer, John Matthews, Dr. J. E. O'Brien, Charles W. Pearson, Victor Rosewater, W. S. Taylor, E. Von Eye, R. T. Weitbrec, John Wintrup, L. W. Wortsman.

Ladies Committee: Mrs. A. E. Heston, chairman, Mrs. G. D. Ackerly, Mrs. L. J. Amsden, Mrs. John S. Arnold, Mrs. W. P. Cline, Mrs. W. F. Coachman, Mrs. Geo. W. Davis, Mrs. W. F. C. Fellers, Miss Lalla Jordan, Mrs. W. S. Jordan, Mrs. J. Levin, Mrs. C. W. Maxwell, Mrs. L. J. Maxwell, Mrs. W. H. McKeldin, Mrs. Geo. E. Mundee, Miss Mundee, Mrs. M. J. O'Leary, Mrs. J. E. Peacock, Mrs. Benj. Sams, Mrs. F. J. Scherrer, Mrs. V. G. Shearer, Mrs. E. S. Spencer, Mrs. J. B. Taltavall, Mrs. W. A. Wiggs, Mrs. W. F. Williams, Mrs. Wm. B. Wilson.

Committee on Hotels: G. D. Ackerly, chairman, Jacksonville, Fla., W. F. C. Fellers, J. E. Peacock, E. S. Spencer.

Committee on Badges: John S. Arnold, chairman, Jacksonville, Fla., G. W. Davis, Chas. M. Holmes, Benj. Sams.

Committee on Banquet: L. J. Maxwell, chairman, Jacksonville, Fla., C. W. Maxwell, Geo. W. Ribble, Geo. R. Shultz.

Committee on Finance: W. F. Coachman, chairman, Jacksonville, Fla., Wm. T. Gentry, Geo. E. Mundee, Paul R. Wiggs, H. C. Worthen.

Where Former Reunions Have Been Held.

Following is a list of the places and dates of the reunions of the old timers and military telegraphers since the organization of the two societies, together with the names of the presidents elected at the meetings:

First meeting of old timers, Cincinnati, Ohio, September 8, 1880, O. H. Booth, of Mansfield, Ohio, elected president.

There was no reunion in 1881 on account of the death of President Garfield.

Second meeting, Niagara Falls, N. Y., September 20, 1882. The military telegraphers held a meeting at the same time and place and effected an organization. Mr. W. R. Plum, of Chicago, was elected president of the twin organizations.

Third meeting, Chicago, September 19 and 20, 1883. President, G. M. Dugan, Jackson, Tenn.

Fourth meeting, St. Louis, Mo., September, 1884. President, C. W. Hammond, St. Louis.

Fifth meeting, New York, August 20, 1885. President, James D. Reid.

Sixth meeting, Cleveland, Ohio, August 19, 1886. President, C. C. Hine, New York.

Seventh meeting, Philadelphia, August 17, 1887. President, Prof. David Brooks.

Eighth meeting, Chicago, August 15, 1888. President, Charles E. Taylor, Frankfort, Ky.

Ninth meeting, Louisville, Ky., September 11, 1889. President, Day K. Smith, Kansas City, Mo.

Tenth meeting, Kansas City, Mo., September 16, 1890. President, George C. Maynard, Washington, D. C.

Eleventh meeting, Washington, D. C., August 19 and 20, 1891. President, E. Rosewater, Omaha, Neb.

Twelfth meeting, Omaha, Neb., 1892. President, A. H. Bliss, Chicago.

Thirteenth meeting, Chicago, 1893. President, Charles Selden, Baltimore, Md.

Fourteenth meeting, Baltimore, Md., 1894. President, E. C. Cockey, New York.

Fifteenth meeting, New York, 1895. President, S. A. Duncan, Pittsburgh, Pa.

Sixteenth meeting, Pittsburgh, Pa., 1896. President, James Compton, Nashville, Tenn.

Seventeenth meeting, Nashville, Tenn., 1897. President, J. J. Dickey, Omaha, Neb.

Eighteenth meeting, Omaha, Neb., 1898. President, H. J. Pettengill, Boston, Mass.

Nineteenth meeting, Boston, Mass., 1899. President, H. C. Hope, St. Paul, Minn.

Twentieth meeting, St. Paul and Minneapolis, Minn., 1900. President, L. B. McFarlane, Montreal, Que.

Twenty-first meeting, Montreal, Que., 1901. President, G. H. Corse, Salt Lake City, Utah.

Twenty-second meeting, Salt Lake City, Utah, 1902. President, U. J. Fry, Milwaukee, Wis.

Twenty-third meeting, Milwaukee, Wis., 1903. President, C. C. Adams, Atlanta, Ga.

Twenty-fourth meeting, Atlanta, Ga., 1904. President, John C. Barclay, New York.

Twenty-fifth meeting, New York, 1905. President, W. H. Young, Washington, D. C.

Twenty-sixth meeting, Washington, D. C., 1906. President, H. D. Reynolds, Buffalo, N. Y.

No meeting was held in 1907.

Twenty-seventh meeting, Niagara Falls, N. Y., 1908. President, G. A. Cellar, Pittsburgh, Pa.

Twenty-eighth meeting, Pittsburgh, Pa., 1909. President, W. J. Lloyd, Chicago.

Twenty-ninth meeting, Chicago, Ill., September 8-10, 1910. President W. B. Wilson, Holmesburg, Philadelphia, Pa.

Thirtieth meeting, Atlantic City, N. J., September 5-7, 1911. President, Hon. W. S. Jordan, Jacksonville, Fla.

General Notes.

Mr. J. S. Ernest, our enterprising Jacksonville, Fla., representative, has done as much as any other agency in arousing interest in Jacksonville in connection with the old timers' reunion in that city, October 22-24. He has been successful in getting business men interested in the gathering, and the result will be that the old timers and their families will be received with open arms by the citizens and business community.

Secretaries F. J. Scherrer, of the Old Time Telegraphers and Historical Association and David Homer Bates of the Society of the United States Military Telegraph Corps, have been the two busiest men lately in connection with the reunion. Few realize the great amount of detail work that falls upon these two officials on the occasion of an annual gathering, and the members should be proud of the fact that they have such capable men to look after the affairs of their associations.

Mr. J. E. Peacock, former manager of the Jacksonville, Fla., Western Union office, is now a successful real estate broker and agent in Jacksonville. Besides this Mr. Peacock has just been elected treasurer of Duval County, of which Jacksonville is the county seat. He was elected to that office by a substantial majority against an old incumbent and one of the strongest men, politically, in Jacksonville. During Mr. Peacock's managership for the Western Union he made many friends. He will be glad to meet his old friends among the old timers during the reunion.

The City of Jacksonville.

Mr. H. C. Worthen, general superintendent Western Union Telegraph Company, Atlanta, Ga., in a recent interview with our Jacksonville representative, Mr. J. S. Ernest, said:

"Jacksonville, Fla., which was selected as the place of meeting for the Old Timer Telegraphers' and Historical Association and Society of the United States Military Telegraphic Corps is, in my opinion, the most suitable place that could have been selected. Its citizens boast that it is the coming city of the South, and indeed they have reason to feel a pride in the progress that has been made. On May 30, 1901, Jacksonville was totally destroyed by fire. Now the city is four times larger, and has a population of 85,000, which, during the winter and tourist season, is swelled to a number estimated at 125,000. Owing to the fact that the city has been entirely rebuilt, it presents a new and clean appearance, which is not the case in older cities.

"The skyscraper boom is now on in Jacksonville, and handsome pretentious buildings are being erected on every hand. With a natural growth of tropical scenery, the residential portion of Jacksonville, particularly Riverside and Springfield, are especially beautiful, while the suburb's attractive homes are springing up in large numbers. The people of Jacksonville have just succeeded in getting Governor Albert W. Gilchris to call a special meeting of the legislature for the purpose of bonding the city to the extent of $1,500,000, so that the city may own its municipal docks. It has already been bonded to the extent of $300,000 to improve the channel of the St. John's river to the Atlantic Ocean, twenty miles away.

"The State of Florida itself is a close rival of California, not only in the production of citrus fruit and richness of soil, but in its perpetual sunny climate as well. The only railway, which has ever attempted to cross the waves of the ocean extends from Miami to Key West, and was one of the greatest engineering feats of modern times. The drainage of the Everglades has turned the attention of the world on Florida. It is said upon the completion of the Panama Canal that Florida will make an effort to build a canal across the State leading into the Gulf of Mexico to handle the enormous business which it will obtain from the Latin republics. Already an inland canal extends from Jacksonville, by way of old St. Augustine, to Miami.

"The number of home-seekers who have made this State their homes during the past five years is beyond legitimate enumeration. The number of visitors are yearly increasing, due solely to the healthful climate, beautiful scenery and splendid hotels. All of these people must go through Jacksonville, where the products of all Florida are received and forwarded northward and westward for larger markets.

"In view of these things and augmented by the general hospitality of the people, I believe that the meeting of the Old Timers in such a place will be greatly enjoyed."

Forty-Niners of the Telegraph.

Following is a list of living Forty-Niners of the telegraph:

Berry, Stephen......1846
Bethune, N. W.......1847
Brigham, George F...1848
Brigham, Henry H...1849
Bright, Louis A......1849
Brownson, W. G.....1849

Carleton, George W..1849
Carnegie, Andrew....1848
Clark, Dr. J. J.......1846
Clark, William H.,..1849
Cleveland, Uriah.....1847
Compton, James......1848

Daugherty, A. D.....1848
David, T. B. A.......1849
Dunham, J...........1847

Easson, R. F.........1849

Flagg, John A.......1849
Frey, George H., Sr..1849

Gentry, Dr. W. D....1848
Greene, Jos. S........1846

Haviland, James D...1847
Homans, Benjamin...1848
Hoyt, Samuel........1848
Hucker, Nathaniel....1847

Hunt, Thomas........1849

Lasscell, W. B.......1849
Louis, L. A..........1848

Matthews, Charles P.1849
Melbourne, W. A....1848
Merrihew, James.....1849
Morris, S. B.........1847

Porter, E. P..........1846

Reed, Henry A.......1849
Reid, Douglas........1848
Ryan, Reuben H.....1848

Sutherland, John A..1849

Titcomb, H. B.......1848
Townsend, John A...1849
Tree, J. B............1847
Tubbs, F. H........1848
Tyler, Artemus E....1848

Van Duzer, A. M.....1849

Ward, Henry H......1848
Ware, James 1847
Weller, Alfred 1847
Williams, George T..1849
Worl, James N.......1848

The following Forty-Niners died during the year: A. G. Davis, H. P. Dwight, J. F. Guthridge, H. C. Hepburn, G. M. Huntington, Julius G. Lumbard.

Confederate Military Telegraphers.

Among the living telegraphers who took part in the Confederate military telegraph service may be mentioned Mr. Milton H. Smith, now president of the Louisville and Nashville Railroad Company; Col. George M. Dugan, for many years superintendent of telegraph of the Illinois Central Railroad, and now living in retirement at Tip Top, Ky.; Mr. Emmett Howard, who was for many years manager of the Western Union Telegraph office at Memphis, Tenn., and is now in the insurance business in that city, and Mr. E. H. Hogshead, now identified with the Postal Telegraph-Cable Company at Meridian, Miss.

Mr. G. M. Baker, formerly manager of the Western Union, Dallas, Tex., office was detailed by Col. G. M. Dugan from the army to the telegraph service, in 1862. He is a brother of the late L. C. Baker, who was superintendent of the Western Union Telegraph Company at St. Louis, Mo. Both of the Baker brothers were stepsons of the late John Van Horne, vice-president of the Western Union Company.

Charles St. John, of Canton, Miss.

John A. Galbreath, of New Orleans, La., formerly night wire chief of the New Orleans Western Union office, telegraph editor of the *Daily States*, cashier in the New Orleans postoffice, secretary of the New Orleans Chess and Checkers Club.

Wm. E. Flippen, of Vicksburg, Miss., was for about thirty-eight years Western Union manager at Vicksburg, but retired several years ago.

Charles W. Montgomery, of Natchez, Miss., for many years manager at that place for the Western Union, is now in other business.

Benj. Chisholm, of Port Gibson, Miss., manager of the Southwestern Telegraph Company's office at Port Gibson, before, during and for many years after the war. Left the service some years ago and was still living at last accounts.

Col. Lee S. Daniel, a former operator in the Confederate service, was 75 years of age October 19, and is still in harness in the Galveston office of the Western Union Telegraph Company.

Mr. Philip H. Fall is employed in the Western Union office at Houston, Tex.

There are no doubt many others still alive who were identified with the telegraph service in the South during the war, and we would like to prepare a more complete list of them. We invite our readers, therefore, to send us the names of those they may know who come within this class.

Real Estate in and about Jacksonville.

Florida real estate is steadily increasing in value and is evidently a secure investment.

Commerce and business in that State are advancing at a healthy rate, and this expansion naturally enhances the value of real property. The Jacksonville Development Company, of Jacksonville, Fla., is one of the most prominent real estate concerns in the South, and if any of the old-timers in attendance at the reunion in that city, October 22, 23 and 24, are sufficiently interested to look into the real estate situation in that section this company will be glad to take the matter up with them. The company offers liberal inducements to telegraphers to become agents for Jacksonville property, and an interview with the company's managers might result in an arrangement satisfactory to both parties.

Montgomery's Moving Pictures.

One of the amusement attractions of Jacksonville is Montgomery's moving picture theatre. Mr. Montgomery is preparing to give the old-timers and their families a royal welcome, and he will produce some of the finest films obtainable, on the occasion of the reunion. He is an "idealist," and this is reflected in the high character of his shows. He will make the old-timers' visit to Jacksonville the subject of a special demonstration.

A Governor for Fifteen Minutes Took the Bull by the Horns.

BY J. W. HAYES, PORTLAND, ORE.

It was ten minutes past the midnight hour; the last train for the night had pulled out, and J. Frank Howell, the night operator at Tin Cup, Ariz., began preparations for a little rest.

It was in the month of August, and the full harvest moon beamed down through the clear atmosphere resplendent and as bright almost as the midday sun. Glancing out towards the south trail Howell could see a horseman coming at full speed towards the lonely station. A few minutes later an active, fine looking man hurried in.

"I have a very important telegram to send to the Governor. I must get an answer in half an hour or an innocent man perishes. Come, do all you can and as quickly as you can."

The speaker was Lee Henniger, the sheriff of Dos Cabezas. He had ridden forty miles since nine o'clock over the sandy desert to Tin Cup hoping to obtain a reprieve for Bob Beecher, who was under sentence to die at daybreak for murder.

A few hours previous a dying Mexican had confessed to the murder of which Beecher was to suffer. Frank Howell spent five minutes in vain trying to raise "Px." He knew that the night operator there was taking press reports and could not hear him. Being, however, full of resources he called up the St. Louis office and sent the following message: "Chief operator, San Francisco: Have Phoenix answer on local quickly, a man's life is in jeopardy." Signed, "Howell, Tin Cup."

It was with great joy that he heard an answering tick, tick from "Px" a few minutes later, and the following telegram was put on the wire: "Governor Smithers, Phoenix: Information just elicited that proves that Beecher condemned to be executed at daybreak this morning is innocent. Please wire reprieve, not a minute can be lost." Signed, "Lee Henniger, sheriff."

The operator at "Px," Paul G. Tompkins, realized the importance of the message and standing San Francisco off for a few minutes hastened to deliver the telegram.

Arriving at the Governor's house, instead of finding the mansion dark and everybody asleep he was surprised to observe a big crowd of ladies and gentlemen seated on the veranda, while strains of popular music from the ball room filled the air. Tompkins quickly asked for the Governor on important business and he noticed that there seemed to be some hesitancy in sending for him. Presently a lady, the Governor's wife, came to the door.

"Won't your business do in the morning?" was asked. Tompkins replied in the negative and the lady withdrew, a gentleman appearing to represent her. "The Governor has retired," said this gentleman, "and cannot be disturbed until morning."

Tompkins inquired for the private secretary and also for the Secretary of the Territory and ascertained that both these functionaries were out of town.

"Can't you possibly awaken the Governor?" queried Tompkins.

"No. To tell you the truth about it, the Governor unfortunately drank a little too much wine and Warwick whiskey and he is dead to the world; a gatling gun would not arouse him, and he is absolutely off the face of the earth until nine o'clock in the morning" was the information given young Tompkins.

"Then this glorious territory is at present without a Governor, private secretary, or Secretary of the Territory," ejaculated Tompkins. As he wended his way back to the office, he had made up his mind what to do and proceeded to carry out his determination.

He called up Tin Cup and sent the following telegram: "To Lee Henniger, sheriff Dos Cabezas: The reprieve is granted to Robert Beecher for ten days. Regular papers go forward in the morning mail." Signed, "H. Y. Smithers, Governor, per Paul G. Tompkins, acting Governor pro tem."

Ten o'clock the next morning Paul Tompkins appeared at the capitol, telegram in hand, which he handed the Governor, who looked a wee bit groggy.

"Good Heavens!" said the Governor. "This telegram should have been delivered ten hours ago, why was it not?" and the Governor grew very much excited.

"For the reason, Governor, that you were 'under the weather' and couldn't be wakened, and there was nobody in the city to attend to your business," replied the placid Tompkins.

"Then the poor fellow is hanged by this time, and I am guilty of the execution of an innocent man," and the Governor broke down completely.

"That would have been true had it not been that I took the liberty of usurping your place for fifteen minutes," and Tompkins showed the telegram he sent in reply.

Governor Smithers was overjoyed with Tompkins' actions and thanked him again and again, and a few weeks later he further showed his appreciation by appointing Paul G. Tompkins to a lucrative position in the Territory.

Sheriff Henniger arrived in Dos Cabezas in the nick of time. The rope was already around Beecher's neck when one of the deputies who was standing near, spyglass in hand, recognized his chief coming down the trail swinging aloft a paper which was proved to be the first and only official act of Paul G. Tompkins, acting Governor pro tem.

Mr. B. N. Rooney, manager of the Western Union Telegraph Company, Bloomington, Ill., writes: "Thank you for renewing my subscription. The AGE furnishes an instance where business and pleasure may be combined."

INDUSTRIAL.

Insuring the Country's Telephone Service.

It has been remarked that a large fire at the Hawthorne, Ill., works of the Western Electric Company would be a very serious matter for the various telephone companies supplying service to the public. The company has, however, taken every precaution to avoid such a disaster, and maintains a regularly organized fire department at the works, six men by day and fourteen by night. The day force is a regularly paid force, and is supplemented by a large volunteer force made up from the ranks of the employes. The provisions against a fire are very elaborate, and every fighting appliance of value is available at a moment's notice, every department of the works being protected by proper apparatus.

Telephone Dispatching on the Chicago & Eastern Illinois.—The Chicago & Eastern Illinois Railroad is installing telephone train dispatching and message equipment on two of its divisions, from Evansville to Danville and from Danville to Yards Center, Chicago. The first named circuit is for train service only, while on the Danville to Chicago circuit the dispatching wires are paralleled by a message circuit. The entire equipment is furnished by the General Railway Equipment Company and includes some of the latest developments in auxiliary apparatus for railroad telephone service. The equipment includes 125 local battery Gill selector outfits with the necessary dispatchers' terminal sets and Gill automatic calling keys, wire chiefs' test panels, and full station apparatus. The installation also includes the recently designed No. 1000 transmitter arm, which is not only conveniently arranged as a desk or wall fixture, but possesses advantages in case of replacing the receiver and connecting cords, which may be done by the operator, without calling upon the repairman. A motor-generator set, consisting of a 500-watt, 320-volt motor and 350-volt generator is being installed for charging the storage batteries of which 300 cells of Universal type were furnished for the operation of all the selector circuits.

LETTERS FROM OUR AGENTS.

OMAHA WESTERN UNION.

Among recent visitors at this office were Messrs. J. C. Nelson, assistant to the general manager, New York; W. J. Lloyd, general superintendent, B. L. Brooks, division traffic superintendent and W. C. Titley, division plant superintendent, Denver, Col.

Mr. I. D. Hough, manager of the Ware & Leland grain office, Omaha, has been appointed supervisor of equipment of the Gulf Division, with headquarters at Dallas, Tex.

Mr. Thomas B. Kennedy of this office has been appointed to a position in the Pension Bureau Office, Washington, D. C.

Mr. C. M. Trimble, chief clerk to superintendent J. P. Barnhart, has resigned to make Portland, Ore., his home. Mr. G. L. Durand is now chief clerk.

Late night-chief R. M. Macdonald has resigned on account of poor health, and has accepted a position in the Denver, Col., office.

NEW YORK WESTERN UNION.

Mr. W. H. Hoyt, for many years wire chief in this office, was retired on pension on October 1. The chief operators presented him with a handsome gold-headed silk umbrella.

Mr. Harry A. Roberts, formerly of this department, and later of the American District Telegraph Company, of this city, and now engaged in real estate operations at Edmonton, Alberta, Canada, was a recent visitor at this office.

BALTIMORE WESTERN UNION.

Mr. C. A. Carrick, formerly supervisor of delivery of this office, has been appointed general traffic supervisor, vice E. S. Anderson, deceased.

Mr. A. K. V. Hull, acting general traffic supervisor, since the death of E. S. Anderson, last June, retired on October 1. Mr. Hull is a well and favorably-known old time and military telegrapher.

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 328,000, which, apart from current assets, amounts to nearly 6½% 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 employe 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 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. 21. NEW YORK, NOVEMBER 1, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

The Loopswitch, Its Growth and Part in the Development of Telegraphic Traffic.

BY WILLIS H. JONES.

When a stranger first sees what appears to him to be a tangle of from 500 to 1,000 green cords inserted in the various springjacks of a large loop switchboard, he naturally wonders how it is possible to keep track of them, and why such an arrangement was ever invented. But these persons seldom realize the fact that the great number of connections made by means of these cords, etc., represents a growth of business for the telegraph company that would have been difficult to care for without these appliances.

In the early days of telegraph service all broker and other branch office loops were permanently connected to the multiplex apparatus desks, and when one of the circuits became interrupted the branch office's delay was measured by the time occupied in testing and clearing the wire. Such delays were naturally greater than Exchange brokers could afford; hence, for this reason, the number of leased circuits was comparatively small.

In order to develop this valuable class of business a means of making the loops of all multiplex sets immediatey exchangeable was deemed necessary, and the loopswitch was the outcome of various plans suggested.

Today the local desk connections of all multiplex apparatus are extended to the loopswitch, which is usually located in the central part of the operating room for convenience, while the different branch office loops are placed in the loop switchboard. As each loop terminates in a cord and wedge and the extensions to the various sets are connected to as many springjacks, it is obvious that any loop may be connected with any set by merely inserting the loop wedge in the multiplex springjack designated. With these facilities immediately available there is no necessity for an important broker office being compelled to await the restoration of a wire temporarily interrupted as long as there are other circuits intact to the same point. All that is required is the removal of some loop from a less important circuit and the subtsitution of the broker's loop therefor.

After this method had been in vogue a reasonable length of time and brokers began to realize the fact that the service was sufficiently reliable to be depended upon the number of such leased circuits increased rapidly.

Another immediate result of the improved service afforded by means of loopswitch facilities was the opening of offices in the editorial rooms of the various daily newspapers, and the construction of loops thereto. The New York *Sun* and the New York *World* were first to take advantage of the facilities offered for direct communication between their offices and their correspondents at distant points, and each of these newspapers leased one loop as an experiment. The result was so satisfactory, and the number of "beats" these papers obtained over their rivals were so frequent, that all the other papers were compelled to lease wires or print stale news.

This class of business has increased to such an extent that in New York City alone each newspaper possesses from 10 to 30 loops, all of which are often actively engaged during certain hours of the day and night.

While the loopswitch with its equipment may on first thought appear to be an expensive device it is really not only a source of great economy to the operating department but to the newspaper managers as well. The economy to the latter lies in saving the salary of a manifolder employed to put "hard" copy in proper shape for distribution as would be necessary were the copy delivered from the main telegraph offices on hard paper. Today the operators in newspaper offices copy much of the incoming matter on specially prepared manifold forms, thus effecting a saving in both time and money.

As to the economic value of the loopswitch, the gain to the company lies principally in its being able to provide, with a minimum equipment, for emergencies that would otherwise require duplicate apparatus in different parts of the operating department to meet temporary demands, which would be idle much of the time. For example, each section of the main line switchboard would require the maximum number of repeaters and intermediate batteries that might be called for in emergencies, thus requiring an amount of apparatus far in excess of the ordinary needs of the office. By locating the cord connections of all the apparatus in the loopswitch the number may be greatly reduced, thus saving equipment as well as desk space. Furthermore when repeaters are placed in a department by themselves the wire chief is relieved of a great deal of responsibility since the repeater chief is required to immediately follow up the connections and see that the circuits are started.

Another great advantage derived by centralizing the connections of apparatus in the loopswitch is that it provides quick facilities for transferring the handling of traffic from one part of the room to another without necessitating any change or disturbance of the working circuit itself. In case it were preferred to handle, say eastern traffic, in the western division, all the change that would be necessary would be to request the loop chief to place a desk or office loop located in the western section on the eastern circuit and move the operators. The latter would then work the original circuit to which they were assigned.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange, October 26:

American Telephone and Telegraph Co.	143
Mackay Companies	85
Mackay Companies, preferred	68½
Western Union Telegraph Co.	80

Telegraph and Telephone Patents.

ISSUED OCTOBER 1.

1,039,773. Telephone Switchboard. To E. S. McLarn, East Orange, N. J.

ISSUED OCTOBER 8.

1,040,629 and 1,040,630. Telephone System. E. R. Corwin, Chicago, Ill.

1,040,631. Busy Test for Telephone Systems. To E. R. Corwin, Chicago, Ill.

1,040,632 and 1,040,633. Telephone System. To E. R. Corwin, Chicago, Ill.

1,040,634. Telephone Exchange System to E. R. Corwin, Chicago, Ill.

1,040,635 and 1,040,636. Telephony. To C. A. Bals, Chicago, Ill.

1,040,637. Telephone Transmitter. To R. Royal, Chicago, Ill.

1,040,796. Telephone-Receiver Holder. To S. C. Sladden, New York, N. Y.

ISSUED OCTOBER 15.

1,041,354. Selective Signaling. To H. O. Rugh and C. S. Rhoads, Jr., Sandwich, Ill.

1,041,393. Audible Signal. To H. C. Williams and S. R. Payne, Utica and Syracuse, N. Y.

1,041,545. Secondary Mouthpiece for Telephone Transmitters. To S. S. Williamson, Philadelphia, Pa.

Personal.

Commander W. H. G. Bullard is to be placed in charge of the wireless department of the United States Navy.

Mr. James B. L. Orme has become associated with the firm of Rosenbaum & Stockbridge, the well-known patent attorneys of New York.

Mr. Andrew Carnegie arrived in New York from Scotland on the steamer "Baltic," on October 19. He was accompanied by Mrs. Carnegie and daughter.

Mr. Albert Klein, formerly manager of the Postal Telegraph-Cable Company at Birmingham, Ala., and who for several months past has been farming for the benefit of his health has returned to Birmingham greatly improved.

Mr. C. F. Annett, of Jerome, Idaho, a well-known old-timer and formerly assistant superintendent of telegraph of the Illinois Central Railroad, Chicago, has opened a Western Union telegraph office in his store and manages the business himself.

Mr. George J. Goalding, the well-known old-time and military telegrapher, for the past twenty-five years manager of the Erie, Pa., office of the Postal Telegraph-Cable Company, and who retired from active service recently, is now located at Los Angeles, Cal.

Professor W. Y. Titcomb, of Anniston, Ala., was an intimate friend of Professor S. F. B. Morse during the time of the development of the telegraph and the sending of the first message. Professor Titcomb is still in vigorous health although he is an octogenarian.

Mr. Francis W. Jones, formerly and for many years electrical engineer of the Postal Telegraph-Cable Company, New York, who spends the summer months at Spring Valley, N. Y., and the winters at West Palm Beach, Fla., has, accompanied by Mrs. Jones, gone to Florida for the winter.

Mr. B. H. Mann, of St Louis, Mo., a former telegrapher on the Old Colony Railroad of Massachusetts, now part of the New York, New Haven and Hartford Railroad, was elected president of the Railway Signal Association at its recent annual meeting in Quebec.

Prof. M. I. Pupin, head of the electro mechanics department at Columbia University, New York, has subscribed $10,000 toward a fund to aid Servia in the prosecution of the war. Prof. Pupin is well known to telegraph and telephone people as being the inventor of the well-known Pupin coil so widely used in long distance telephony.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay, president of this company, returned from Europe on the steamer "France," October 25.

Mr. M. M. Davis, electrical engineer and chief engineer of telephones, New York, has returned from a business trip through the South.

Mr. G. H. Mills, manager of the Providence, R. I., office, who attended the conference of Postal superintendents and managers in New York, October 21, 22 and 23, took occasion to call on his many friends while in the city.

Mr. P. M. Batchelder, Boston, Mass., has been appointed manager of the Burlington, Vt., office, vice Mr. F. H. Dernell, who is on sick leave.

Mr. C. H. Burr, of the Pittsfield, Mass., office, has been appointed manager at New Britain, Conn., vice Mr. G. F. Groff, resigned.

Mr. J. A. Rhode, manager of the Iowa City, Ia., office, is in temporary charge of the Davenport, Iowa, office, vice Mr. C. F. Wichelman, who is on a leave of absence.

F. M. Broad, manager of the Terre Haute, Ind., office, died October 13.

Arthur S. Louis, aged thirty-one years, manager of the Watertown, N. Y., office of this company, died in New York on October 16.

The Postal Telegraph-Cable Company at Los Angeles, Cal., is advertising in the local papers for girl telegraph messengers with bicycles.

Conference of Postal Superintendents and Managers.

All the superintendents, together with the managers of the principal offices of the eastern division of the Postal Telegraph-Cable Company, held a conference at the Hotel Navarre, New York, on October 21, 22 and 23, and were the guests of president C. H. Mackay. The sessions were held from two o'clock until four-thirty p. m. each day, and were presided over by Mr. E. B. Pillsbury, general superintendent, New York.

On Monday, October 21, the proceedings were opened by an address of welcome by superintendent C. F. Leonard, New York. Mr. A. W. Rinehart, manager at Pittsburgh, Pa., read a paper entitled "What a Manager Can Do as an Individual to Improve Our Service," and this was followed by a general discussion of the subject. In the evening the entire party visited the Hippodrome.

On Tuesday, October 22, an address was made by Mr. J. D. Kenyon of the Sheldon School, on "The Science of Business Getting." Mr. J. W. Weed, manager at Syracuse, N. Y., read a paper on "How to Obtain Best Results When Using the Telephone as an Auxiliary for Collection and Delivery, and discussion of the general subject followed.

On Wednesday, October 23, Messrs. F. B. Travis, manager of the Boston office, and J. J. Whalen, day manager of the New York office, presented papers on "Cost of Operation," and Mr. E. P. Tully, manager at New York, read a paper on "The Messenger Problem and How it Has Been Solved in New York." All of these papers were fully discussed.

In the evening the entire party attended the dinner of the Magnetic Club at the St. Denis Hotel.

The following were present at the conference: E. B. Pillsbury, general superintendent, New York; district superintendents E. Kimmey and C. F. Leonard, New York; C. A. Richardson, Boston, Mass.; C. E. Bagley, Philadelphia, Pa.; H. D. Reynolds, Buffalo, N. Y., and H. Scrivens, Pittsburgh, Pa.; J. P. O'Donohue, division electrical engineer, New York; J. de J. Almonte, of the general manager's office, New York, and the following managers; J. C. Ackerman, Jersey City, N. J.; W. W. Anderson, Wilmington, Del.; M. L. Barnes, Troy, N. Y.; L. A. Boone, Newport, R. I., G. S. Bowser, Lynn, Mass.; E. H. Breinig, Allentown, Pa.; T. F. Burke, Poughkeepsie, N. Y.; M. J. Carey, Schenectady, N. Y.; J. Carroll, Meadville, Pa.; J. L. Clark, Bangor, Me.; M. L. Coe, Geneva, N. Y.; L. A. Coleman, York, Pa.; J. F. Coogan, Newark, N. J.; A. J. Cook, Johnstown, Pa.; F. N. Cooke, Worcester, Mass.; E. P. Cooper, Trenton, N. J.; J. C. Crowley, New Bedford, Mass.; C. E. Diehl, Harrisburg, Pa.; T. P. Dowd, Pittsfield, Mass.; S. G. Fitch, Scranton, Pa.; S. H. Flint, Bridgeport, Conn.; G. M. Foote, Washington, D. C.; T. D. Walsh, Cambridge, Mass.; N. C. Hall, New Haven, Conn.; C. Hellmuth, Hoboken, N. J.; W. B. Hinds, Norwich, Conn.; Martin Jurist, New York; H. C. Knowles, Pawtucket, R. I.; G. F. Lawler, Utica, N. Y.; R. J. Little, Rochester, N. Y.; H. C. McCanna, Lancaster, Pa.; J. S. McIntire, Elmira, N. Y.; J. A. McNichol, Philadelphia, Pa.; P. J. Macken, Springfield, Mass.; W. J. Martan, Niagara Falls, N. Y.; R. P. Martin, Hartford, Conn.; J. L. Mathews, Altoona, Pa.; G. H. Mills, Providence, R. I.; S. J. Murphy, Erie, Pa.; C. G. Newman, Olean, N. Y.; C. H. Newman, Buffalo, N. Y.; E. Y. Ouderkirk, Wheeling, W. Va.; G. K. Parr, Ithaca, N. Y.; W. T. Phillips, Reading, Pa.; S. J. Pickering, Easton, Pa.; A. T. Post, Newburgh, N. Y.; W. M. Pruyn, Albany, N. Y.; C. C. Ramsay, Portland, Me.; W. H. Reagan, Fall River, Mass.; W. I. Rehr, Oil City, Pa.; A. W. Rinehart, Pittsburgh, Pa.; V. G. Ringwalt, Camden, N. J.; R. A. Sheppard, Rutland, Vt.; W. S. Snow, Brockton, Mass.; C. E. Sornberger, Williamsport, Pa.; F. B. Travis, Boston, Mass.; C. Troeller, Jr., Atlantic City, N. J.; E. P. Tully, New York; J. A. Vogt, Baltimore, Md.; J. W. Weed, Syracuse, N. Y.; J. J. Whalen, New York; J. B. Whittaker, Cumberland, Ind.; C. H. Woodin, Jamestown, N. Y.; F. G. Wyman, Binghamton, N. Y.; B. F. Ziegler, Wilkes-Barre, Pa.

B. S. Durkee, Manager Postal Telegraph-Cable Company, Portland, Ore.

Mr. Benton S. Durkee, whose appointment as manager of the Portland, Ore., office was announced in our issue for September 16, was born in Olathe, Kan., February 2, 1872, and entered the telegraph service as messenger for the Western Union Telegraph Company, in Portland, Ore., in August, 1884. In 1887 he went to San Francisco as operator for the Western Union and shortly afterwards entered the employ of the Postal Telegraph-Cable Company, returning to Portland in 1890. He was appointed chief operator in 1902, which position he held at the time of his elevation to the managership. Mr. Durkee

B. S. DURKEE.
Manager, Postal Telegraph-Cable Company, Portland, Ore.

is the gentleman who came to New York to participate in the speed contests, with a large number of telegraphers of this and other companies in March, 1893. He won the first prize for receiving on the typewriter, which was comparatively new in telegraphing in those days. The prize was a handsome gold medal set with diamonds, given by the late John W. Mackay.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. C. F. Ames, district commercial superintendent at Boston, Mass., announces the following appointments in his district: Mr. H. B. Simons, manager at Cambridge, Mass., to be manager at Worcester, Mass., vice C. H. Simpson, transferred to Springfield, Mass. Mr. E. J. Burke, manager at Burlington, Vt., to be manager at Cambridge, Mass. Mr. R. H. Nason, manager at Narragansett Pier, R. I., to be manager at Burlington, Vt. Miss E. M. Sanborn to be manager at Belfast, Me., vice Miss R. T. Newell, who has been given an extended leave of absence on account of ill health.

Mr. J. S. Calvert, superintendent, Richmond, Va., announces the following appointments of managers in his district: Miss Leathe C. Walker at Union, S. C., vice Mrs. N. B. Pamplin, resigned; J. R. Day at Rock Hill, S. C., vice J. C. Kinard; Miss H. G. Rumph at Goldsboro, N. C., vice Z. B. Spence, resigned; C. P. Dickson at Henderson, N. C., vice A. H. Cheek, who leaves the service to engage in other business.

Mr. Matthew Quinlan has been appointed acting division auditor of the Eastern Division, vice J. W. Rahde, transferred to the Systems and Methods Bureau at New York.

Mr. J. W. Lewis, manager of the Astor House office, New York, has been employed in that office for fifty-eight years, and has never worked anywhere else. In an article in the *Evening Mail* Mr. Lewis' remarkable career is told in an interesting manner.

Mr. Clay Van Keuren, manager of the Kalamazoo, Mich., office, has been appointed district traffic inspector with headquarters at Cleveland, Ohio. Mr. Van Keuren was born at Flint, Mich., May 3, 1885, and became an operator at an early age. He was for a number of years chief clerk and later traffic chief at Toledo, Ohio.

George E. Palmer, district equipment supervisor, with headquarters at Los Angeles, Cal., has been promoted to the newly created position of division traffic supervisor of the Pacific Division, with headquarters at San Francisco, Cal. Mr. Palmer, accompanied by Mrs. Palmer, visited New York recently.

Mr. Fred M. Randolph, wire chief, Chicago, Ill., recently visited relatives in Brooklyn, N. Y., taking occasion at the same time to call on his many friends in New York.

Mr. Robert McCarthy, assistant night chief operator of the Cincinnati, Ohio, office was married in Detroit, Mich., on October 12 to Miss Nellie McCray.

Mr. Americus K. V. Hull, for the past twenty-nine years traffic chief in the Baltimore office of this company, was retired on October 1.

Mr. W. E. Peirce, of the San Francisco office, was in New York last week visiting friends. He will remain in the East some time before returning to the Pacific Coast.

A new office has been opened in the Loft District, at 387 Fourth Avenue, New York, and Mr. O. L. Whiteneck, formerly manager at 1398 Broadway has been transferred to the new office as manager. Other recent transfers of managers in New York are: C. L. Seelman from 407 Broadway to 1398 Broadway; Ralph Raphael, from 60 Wall Street, to 407 Broadway; Harvey Smith from 30 Church Street, to 60 Wall Street; Fred Bollman from 90 West Street, to 30 Church Street. Miss Ray Pollock has been appointed manager at 90 West Street.

Longest Span of Wire.—What is stated to be the longest span of telegraph wires in the world is that across the river Mekong in Cochin China. Poles 160 feet high have been placed on each side of the river at a point where the width is 2,560 feet. The wires in the span are of bronze.

Zone Systems for Philippine Telegraphs.—The Philippine postal authorities have inaugurated the zone system on the interisland telegraph lines. It provides, instead of the past flat rate of three cents gold a word, rates proportioned according to distances, the islands being divided into several zones.

The Cable.

Mr. Donald McLaine, supervisor at Bay Roberts, N. F., Western Union Cable System, was a recent New York visitor.

Cable Rates.—The Commercial Cable Company has issued a leaflet giving additions and corrections to the 1912 book of cable rates.

German Cable to African Colonies.—The German South American Telegraph Company is laying the new cable between Monrovia, Liberia, and Togoland and the Cameroons, to provide independent communication between these Colonies and Germany.

New Cables Between Alexandria and Gibraltar.—The Telegraph Construction and Maintenance Company has recently completed the laying of a cable between Alexandria and Gibraltar, providing direct communication between Alexandria and the head office of the Eastern Telegraph Company.

The Telephone.

Mr. Phillip L. Spalding, vice president and general manager of the Bell Telephone Company of Pennsylvania, has been elected president of the New England Telephone and Telegraph Company, Boston, Mass., vice Mr. Jasper N. Keller, resigned.

Mr. Benjamin S. Read, general manager of the Bell Telephone Company of Missouri, St. Louis, Mo., has been appointed general manager of the Missouri and Kansas Telephone Company, vice Mr. F. L. Gilman resigned, and will henceforth fill the duties of both positions. Mr. Read's headquarters will continue in St. Louis.

Mr. W. J. Hiss has been appointed general manager of the Bell Telephone Company of Missouri with headquarters at St. Louis, Mo. Mr. Hiss was formerly general manager of the Western division of the New York Telephone Company at Buffalo, N. Y. Mr. C. A. Spaulding of the Buffalo office has been advanced to the position of general manager of the western division of the New York Company.

Mr. J. G. Patterson, of the plant engineering department, New England Telephone and Telegraph Company, Boston, made an address on "Toll Line Studies" before the Boston Plant Chapter of the Telephone and Telegraph Society of New England, October 15.

Improvements in New Orleans.—The Cumberland Telephone and Telegraph Company contemplates making extensive improvements and extensions in the New Orleans division, including the erection of an exchange building.

Progress of Telephony in New York.—Mr. J. A. Stewart, general manager of the New York Telephone Company, New York, read a paper on the progress made by the New York Telephone Company since 1902, before the New York Telephone Society, October 15.

Telephony in Manchuria.—The number of telephone subscribers in Dairen, Manchuria, increased to 1,200 in 1911. As soon as the subscription list reaches 3,000 the present supervisory magneto multiple switchboard will be replaced with the common battery multiple system. Cables are being laid underground and a modern system will be installed at a cost of about $50,000.

Telephones in Austria.—According to the Government report at the beginning of the fiscal year 1912-13 there were in Austria 1,035 local telephone plants, 1,037 main centrals, 299 secondary centrals, 2,015 public stations, and 265 automatic public stations. There were 96,934 individual subscribers and 32,947 club line subscribers, and 645 interurban lines, aggregating about 20,000 miles.

Quick Restoration of Telephone Service.—Fire in the Indianapolis (Ind.,) Telephone Company's main office recently destroyed most of the cross connections on the main distributing frame, about 650 switchboard cables and all the trunk cables between five other exchanges, and cut off the business section. In thirty minutes the Western Electric Company delivered 15,000 feet of switchboard cable and installed accessories and within forty-eight hours there had been delivered 20,000 feet of switchboard cable, 100,000 feet of flameproof jumper wire and large quantities of miscellaneous material. Six men of the Hawthorne installation force were brought to Indianapolis to re-establish the service.

The Use of Automobiles in Telephone Line Inspection.—Mr. Maynard Bailey, district commercial superintendent of the Pacific Telephone and Telegraph Company, Fresno, Cal., uses an automobile of his own in connection with his inspection duties. He is a thorough believer in the efficiency of the automobile in telephone work and his experience has been that he can get in much closer touch with the territory and at considerable less expense than by using railroad trains. This is especially true in California and other western states where the distances are great and the train service meager. In rural territory where towns are without street car service and trains are used for travel from town to town it becomes necessary to hire a horse and carriage in order to inspect the lines, but by travelling by automobile the inspector gets into closer touch with the inhabitants and practically learns things in a chance manner that are of value in his work. There is no doubt that the telephone companies will eventually use automobiles in their inspection work more extensively than they do at the present time.

Mr. E. C. Keenan, general superintendent of telegraph, New York Central Lines West, Chicago, in renewing his subscription for another year, writes: "I watch for TELEGRAPH AND TELEPHONE AGE twice a month and wish to say that you certainly are keeping up with the times and helping us all in our work."

Radio-Telegraphy.

Mr. John Bottomley, vice-president of the Marconi Wireless Telegraph Company of America, New York, is the subject of an interesting personal sketch in the October number of the *Marconigraph*. An excellent full page portrait of Mr. Bottomley accompanies the article. Mr. Bottomley takes an active interest in public affairs and institutions, and is president of the New York Electrical Society.

The Marconi Wireless Telegraph Company of America has applied to the California Railroad Commission to establish a night letter service between Avales, Catalina Island, and San Pedro, Cal., on the mainland.

Wireless at Electrical Show.—Among the features at the Electrical Exposition held in New York last month was the operating exhibit of wireless telegraphy. Radiograms were exchanged with the naval electrical school at the Brooklyn Navy Yard.

Wireless from Scandinavia to America.—It is stated that Waldemar Poulsen, the Danish inventor of the Poulsen wireless system, intends to establish wireless communication between Scandinavia and America, via an intermediate station in South Greenland.

Phillips Memorial.—The citizens of Godalming, England, the home of the late J. G. Phillips, the wireless operator who lost his life on the "Titanic," have decided to erect a memorial to the deceased. The memorial will consist of a rectangular cloister with a garden in the centre, and a tablet will be placed upon one of the walls.

New English Wireless Company.—The Universal Radio Syndicate, Ltd., has been formed to acquire the rights of the Poulsen-Pedersen system of wireless telegraphy, and to establish communication between England and Canada, receiving a subsidy of $75,000 per annum from the Canadian Government.

Telefunken Ocean Letter.—The Telefunken Wireless Telegraph Company of Germany has inaugurated the ocean letter. This service enables a passenger on a German vessel to send a letter of thirty words or more by wireless by way of the nearest homeward-bound German vessel and mailed when the vessel first reaches port. The service was first tried on the Hamburg-American Line to South America and is now being extended to the entire German merchant marine. According to present arrangements the vessels of no other nation participate in it.

Sparkless Wireless.—A French engineer, M. Bethenod, has patented a system which enables several neighboring telegraph stations to communicate without interfering with each other, ten times more quickly than with submarine cables, and at a tenth of the cost. The invention substitutes sparkless for spark telegraphy, and it is declared that communication can be made by it at a speed of up to 200 words a minute. Moreover, it makes wireless telephony immediately practicable.

Marconi Chelmsford Wireless Mast.—The steel mast at the Marconi Wireless Telegraph Company's new works at Chelmsford, England, is 450 feet high, and weighs 70 tons. It is composed of steel flanges formed in four sections, bolted together after being hoisted into position. The inside diameter of the mast is three feet five inches and the outside diameter of the flanges is four feet six inches. Another 450-foot mast is to be erected at the works.

American "Marconigraph."—"The Marconigraph" is the title of a new monthly magazine issued by the Marconi Publishing Company, New York. It is closely patterned after the magazine with a like title published by the Marconi Wireless Telegraph Company of London. The first number of the American issue contains a great deal of matter of general wireless interest, the leading article being an illustrated description of of the Marconi wireless telegraph school recently opened in New York. The leading editorial article says: "The Marconigraph enters the field as an authority both for the investor and experimenter." The frontispiece consists of a portrait of Signor Guglielmo Marconi. Mr. J. Andrew White is the editor and Mr. John P. Curtiss, manager.

Mr. Marconi's Injured Eye Removed.

In our issue for October 1 note was made of an automobile collision in Italy, on September 25, in which Signor Guglielmo Marconi received an injury to his right eye. For several days it was impossible to determine definitely the extent of the injury, but it now appears that it was more serious than was at first thought. The optic nerve was affected and in order to save the sight of the left eye the right eye was removed at the Naval Hospital, in Spezia, on October 16.

Obituary.

H. M. Harris, aged 72 years, an active telegrapher for fifty-two years, died in Omaha, Neb., October 17. He worked in Omaha for twenty years.

Telegraph Sending Instrument.—Mr. L. H. Jernigan of Sacramento, Cal., has obtained a patent on a telegraph transmitter. It is stated to be small and compact in size and the wiring is entirely covered up in the body of the instrument, the body itself being one of the necessary contact elements to complete the electrical circuit. The instrument is provided with adjustments for the purpose of regulating the strength of the signal to be transmitted and to add to the efficiency of the device. It is stated to be comparatively inexpensive and yet effective in operation.

The Serial Building Loan and Savings Institution.—The October 5 issue of the "Mercantile and Financial Times," of New York, contains an interesting account of the Serial Building Loan and Savings Institution, New York, and recommends that workers of all New York electrical companies become members of the association.

Fall Dinner of the Magnetic Club

The autumn banquet and meeting of the Magnetic Club was held at the Hotel St. Denis, New York, October 23. The banquet was a success, and was largely attended by many guests from out of town.

After the dinner was served president Chas. P. Bruch called the meeting to order and letters were read from Col. A. B. Chandler, Mr. E. J. Nally and Mr. F. E. d'Humy, expressing their regrets at being unable to attend.

On motion of Mr. C. C. Adams, former president of the Old Time Telegraphers' and Historical Association, greetings and good wishes were sent to the Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps in session at Jacksonville, Fla.

President Bruch reported that the committee appointed to confer with the officers of the various telegraph and kindred associations in regard to co-operating with the officers of the Magnetic Club in a movement to raise the necessary funds to erect a suitable monument or memorial to the late James Douglas Reid, had communicated with the various associations and each of these associations had appointed representatives to co-operate with the committee appointed by the Magnetic Club and that these gentlemen now form a Board of Trustees; that pamphlets requesting subscriptions had been distributed and that some subscriptions had already been received. He urged those who desire to assist the movement to forward their subscriptions promptly.

President Bruch then called upon Col. N. B. Thurston, chief ordinance officer, National Guard, State of New York, who made a brief address on the subject of the use of the signalling service, aeroplanes and the telegraph in connection with the work of the National Guard.

The meeting was followed by an excellent vaudeville programme and the exercises of the evening were concluded by the singing of "Auld Lang Syne."

Following are the names of the attendants:

Albany, N. Y.—W. M. Pruyn, N. C. Pangburn.
Allentown, Pa.—E. H. Breinig.
Altoona, Pa.—J. L. Mathews.
Atlantic City, N. J.—C. Troeller, Jr.
Baltimore, Md.—J. A. Vogt.
Bangor, Me.—J. L. Clark.
Binghamton, N. Y.—F. G. Wyman.
Boston, Mass.—C. A. Richardson, F. B. Travis.
Bridgeport, Conn.—S. H. Flint.
Brockton, Mass.—W. S. Snow.
Buffalo, N. Y.—C. H. Newman, H. D. Reynolds.
Cambridge, Mass.—T. B. Walsh.
Camden, N. J.—V. G. Ringwalt.
Cleveland, O.—R. S. Ingle.
Cumberland, Md.—J. B. Whittaker.
Easton, Pa.—S. J. Pickering.
Elmira, N. Y.—J. S. McIntire.
Erie, Pa.—S. J. Murphy.
Fall River, Mass.—W. H. Reagan.
Geneva, N. Y.—M. L. Coe.
Harrisburg, Pa.—C. E. Diehl.
Hartford, Conn.—R. P. Martin.
Hoboken, N. J.—C. Helmuth.
Ithaca, N. Y.—G. K. Parr.
Jamestown, N. Y.—C. H. Woodin.
Jersey City, N. J.—F. Ackerman, J. C. Ackerman.
Johnstown, Pa.—A. J. Cooke.
Lancaster, Pa.—R. A. Berton, H. C. McCanna.
Lynn, Mass.—G. S. Bowser.
Meadville, Pa.—J. Carroll.
New Bedford, Mass.—J. C. Crowley.
Newburg, N. Y.—A. T. Post.
New Haven, Conn.—N. C. Hall.
Newport, R. I.—L. A. Boone.
Newark, N. J.—J. F. Coogan.
New York.—J. J. Alcock, J. de J. Almonte, C. C. Adams, W. O. Bowman, Col. E. B. Bruch, C. P. Bruch, F. Brookfield, T. L. Cuyler, Jr., J. J. Cardona, A. H. Clarke, J. J. Cochrane, M. R. Cockey, S. Cohen, J. Costelloe, T. J. Cusack, W. B. Dunn, J. Doran, M. L. Dunn, T. J. Donovan, J. S. Ellis, A. J. Eaves, E. T. Flanagan, Wm. Finley, V. F. Fiore, J. Flood, F. B. Gerard, R. Gould, D. H. Gage, T. J. Howlett, W. A. Hayes, P. A. Hickey, W. S. Hallett, T. E. Heffren, E. B. Hagerty, J. Hennessey, M. Jurist, E. Kimmey, Mr. Kretchner, A. Lockwood, C. F. Leonard, L. Lemon, D. J. McQuade, J. J. McCauley, H. McNamee, D. McNicol, J. F. McNeill, E. C. Mayo, F. McKiernan, D. F. Mallen, J. McCormick, F. F. Norton, J. Nelson, J. P. O'Donohue, C. Pearce, E. B. Pillsbury, C. Ruffer, E. P. Rice, F. C. Rose, H. J. Reinhardt, Maj. S. Reber, E. Reynolds, D. F. Regan, J. F. Skirrow, J. Shandley, E. Sawyer, C. Shirley, W. Scarborough, Capt. W. B. Short, E. Smith, T. R. Taltavall, Col. N. B. Thurston, E. P. Tully, E. M. Underhill, W. J. Walsh, H. Weise, A. J. Ward, J. J. Whalen, A. Zintl, H. Zweifel, J. G. O'Brien.
Niagara Falls, N. Y.—W. J. Martin.
Norwich, Conn.—W. B. Hinds.
Oil City, Pa.—W. I. Rehr.
Olean, N. Y.—C. G. Newman.
Pawtucket, R. I.—H. C. Knowles.
Philadelphia, Pa.—C. E. Bagley, J. A. McNichol.
Pittsburgh, Pa.—A. W. Rinehart, H. Scrivens.
Pittsfield, Mass.—T. P. Dowd.
Portland, Me.—C. C. Ramsey.
Poughkeepsie, N. Y.—T. F. Burke.
Providence, R. I.—C. H. Mills.
Reading, Pa.—W. T. Phillips.
Rochester, N. Y.—R. J. Little.
Rutland, Vt.—K. Sheppard.
Schenectady, N. Y.—M. J. Carey
Scranton, Pa.—S. G. Fitch.
Springfield, Mass.—P. J. Macken.
Syracuse, N. Y.—J. W. Weed.
Trenton, N. J.—E. P. Cooper.
Troy, N. Y.—M. L. Barnes.
Utica, N. Y.—G. F. Lawler.
Washington, D. C.—G. M. Foote.
Wheeling, W. Va.—E. Y. Ouderkirk.
Wilkes-Barre, Pa.—B. F. Zeigler.
Williamsport, Pa.—G. E. Sornberger.
Wilmington, Del.—W. W. Anderson.
Worcester, Mass.—E. N. Cooke.
York, Pa.—L. A. Coleman.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "The Electric Telegraph," by F. L. Pope, is one of the most excellent books on the telegraph ever published and is a standard work of reference. It covers the entire field of telegraphy and is scientific in its treatment. For this reason and the fact that it is thoroughly exact and reliable we have chosen this work as our present text book, for the "Questions to be Answered" column. We cannot urge the student too strongly to follow the lessons from this book closely and with diligence. In order to do this and understand the subjects of the questions it will be necessary, of course, for him to have a copy of the book at hand in order to arrive at the correct answers to the questions.]

What is the strict definition of the electric telegraph?

Of what does the art of electric telegraphy consist?

What two kinds of signals are employed in the reception of telegrams?

In the visible signal class what is an evanescent signal?

Give an example of an evanescent signal?

What is a permanent signal?

Give an example of a permanent signal.

How are audible signals produced?

What is the agency employed in electric telegraphy to produce signals?

What is the nature of electricity?

What was the hypothesis suggested by Franklin as to the nature of electricity?

Enumerate the four essential elements of the electric telegraph.

How many methods are employed to produce electrical action?

Name the four principal methods.

How is electricity produced chemically?

What is the name usually given to a single cell of battery?

Does the battery produce electricity by chemical action?

What is the nature of the metals used in a cell as the elements?

If the elements were of the same kind of metal could a current of electricity be generated?

The Postal Company's New Atlanta Office.

The Atlanta, Ga., office of the Postal Telegraph-Cable Company has been moved from its old quarters to a new location in the Grant Building, a modern office structure at Broad and Walton streets. The equipment which was installed under the supervision of the division electrical engineer, Mr. J. F. Heard, is of the most modern type, and so arranged as to permit the movement of traffic with a minimum loss of motion. Everything is new throughout, and the comfort and convenience of manager A. M. Beatty and his staff of clerks and operators, was given careful consideration.

The cables leading into the building terminate on distributing frames located in a fireproof vault, under the sidewalk. The office cables are lead-covered and the switchboard and new type of vertical repeater stands are all fireproof. The dynamos are located in the basement, and have an auxiliary control in the operating room, making it unnecessary to go to the machines except for their physical care.

The messenger department is in the rear of the operating room, the two departments being connected by the Adamson automatic message carrier. The messenger uniform room and ta[illegible] shop are in the basement, as are the division and local office supply and file rooms.

Manager Beatty's private office is on the mezzanine floor, where are also located the clothing lockers. In addition Mr. Beatty has a desk at the front of the office near the counter. Vertical files are provided for two months' current business, to avoid frequent untying of packages.

The telephone equipment is located on a specially devised telephone table with sound-proof booths, and connects both with the city service and the several office departments, while a special telephone circuit connects the delivery and receiving departments. The prominent location of the office is made more conspicuous at night by a large electric sign on the corner of the building. The change from the old quarters to the new was made without any interruption to business and without the knowledge of outside offices, so well was the work planned and executed.

To Change Name of Telegraphers' Mutual Benefit Association.

In order to bring the operation of providing life insurance for the employes of the telegraph and telephone services through the medium of the Telegraphers' Mutual Benefit Association into still closer and more direct relation to the two services in the future, a proposition to change the corporate name to Telegraph and Telephone Life Insurance Association has received the approval of the Executive Committee, and the necessary petition as required by Section VII. of the Constitution signed by forty members has been filed with the secretary of the association for submission to the annual meeting on March 12, 1913.

Early Telegraph Documents.—Mr. J. C. Vail, of Morristown, N. J., has an article in the Morristown *Daily Record* on October 17, in which he publishes some documents relating to the early telegraph. One is a receipt from Professor S. F. B. Morse, in favor of Mrs. Alfred Vail for $30, which was advanced to Professor Morse to pay for a caveat respecting the electro magnetic telegraph. Other early papers are quoted relating to the invention of the dot-and-dash alphabet, and the parts taking in its development by Professor Morse and Alfred Vail.

Relations of the Telegraph and the Telephone.

In his recent annual report, president Theo. N. Vail of the Western Union Telegraph Company devotes considerable space to an explanation of the relations between that company and the American Telephone and Telegraph Company. This portion of his report is as follows:

Some confusion tending to mistaken and misleading conclusions appears to exist to some extent as to the relationship between the Western Union Telegraph Company and the American Telephone & Telegraph Company, and at the risk of repeating some things that have been said before, it is deemed desirable to succinctly state (1) the relations and (2) the differences between the properties from the telegraph standpoint in order that the stockholders and the public may have an accurate and unprejudiced understanding thereof.

I. The relations are primarily based on the complementary character of the two services and the opportunity offered for the joint use of plant and the avoidance of serious economic waste.

II. The differences are in the characteristics of the two services.

Both telegraph and telephone lines consist of wires strung on poles or placed in cables underground. The differentiation between the telegraph and telephone begins with the circuit. Technically a circuit, whether telegraph or telephone, is the path over which the electrical transmitting current passes, and consists of an outgoing and returning path. The telegraph uses the wire for the outgoing path and the earth for the returning path. By means of the duplex or quadruplex system two to four outgoing paths for the telegraph circuit can be made over one wire; that is, four messages can be sent over the same wire at the same time.

The path of the telephone circuit must be of wire both outgoing and returning because the electrical disturbances of the earth interfere with the delicate transmitting current of the telephone. These two wires, the outgoing and returning paths of the circuit, must also be arranged that each wire must be exposed to all disturbances in the same degree, and for talking any considerable distance either the wires must have more copper per mile or have special auxiliary appliances or both to enable speech to be transmitted. There is as yet no method of duplexing the telephone circuit, so that each telephonic conversation requires the exclusive use of two wires during the conversation.

The two wires which are necessary for one telephone circuit can by multiplexing be made into four, six or eight telegraph circuits and can be used for both telegraph and telephonic transmission at the same time.

A single telegraph circuit or wire cannot be used for telephonic purposes, but two telegraph wires by arranging them the same as telephone wires can be used for a talking circuit.

The next differentiation between the telephone and the telegraph service is in the character of the service.

Telegraph service consists of the collection, transmission and delivery of written messages or communications for others by the operating telegraph staff. In this service the patron takes no part.

The operating staff of the telegraph consists largely of operators skilled in transmitting and reading telegraph signals who transmit and receive for others the telegraph messages, and of an auxiliary organization for the collection and delivery of messages.

Telephone service consists of making up talking circuits by which patrons are in telephonic connection with each other. The circuit is for the time being for the exclusive use of the users, during which time it can be used for no other telephonic purposes, and since the users must be personally present, this use has all the characteristics of and is in fact a personal interview.

The operating staff of the telephone consists largely of switchboard operators who make the necessary connections between the different circuits and turn them over to the users.

Full-rate telegraph messages are transmitted as received and must have expedition or immediate dispatch. For this reason the plant and operating facilities must be at least equal to the average maximum demand of this class of business at any time. This class of service being confined largely to the working hours of the day results in an uneven load, which has been overcome to a considerable extent and the load spread more uniformly over the twenty-four hours by the introduction of various classes of service which do not require immediate transmission.

The capacity of a telegraph circuit is several thousand messages for the twenty-four hours, and of a telegraph wire, because of multiplex working, many times more. This makes the cost per message, due to the plant charges, relatively small. On the other hand, the cost per message for the collection, transmission and delivery is almost constant, varies little with distance and is relatively a large part of the cost per message.

Telephone service, since it requires the personal presence of the users, must be immediate, and cannot be deferred. This restricts the use of a telephone circuit to that part of the day when people are at their accustomed business or social places. The facilities must be equal to the maximum demand at any time, resulting in uneven load, with high peaks of service, alternated by many idle intervals even in the busy hours. The capacity of a toll circuit of any considerable distance is at the best but thirty or forty conversations in the twenty-four hours. As this circuit must consist of two wires, the cost of service per conversation due to plant costs is very large and increases rapidly with distance, while the operating cost of making the connection is relatively small and varies but little with the distance.

The telegraph plant consists of trunk and branch lines connecting the large centers of trade with each other and with the more important tributary points.

The telephone plant consists, for the greater part, of exchange plants made up of telephone circuits connecting subscribers' station at offices and dwellings with central offices equipped with apparatus necessary to connect these circuits with each other, and for the smaller part of trunk lines connecting these exchanges with each other, and of branch lines connecting rural centers with the general system (toll or long-distance lines). The exchange plant represents in cost many times the trunk and branch-line plant

The large message cost for collection, transmission and delivery, and the relatively small message cost due to plant, makes the telegraph message expensive for short distances and relatively cheap for great distances.

The small operating cost pet telephone conversation and the large cost due to plant makes the telephone cheap for short distances and relatively expensive for great distances.

These considerations show clearly the radical differences between the two services.

Independent of the personal attention necessary to a telephone conversation, which is not required in sending a telegraph message, the telegraph and telephone each has its peculiar functions and use, and, except in cases of preference or convenience, one service does not take the place of the other.

No telegraph company could go into the telephone business without substantially reconstructing its telegraph plant to adapt it for toll or long-distance use, and, in addition, building exchange plants involving an investment many times that of its telegraph plant, and also creating or acquiring telephone-operating organization.

No telephone company could go into the telegraph business without creating an entirely independent telegraph operating organization. It is generally conceded that the cost of creating an organization to operate any plant is greater than the cost of the plant.

The joint use of a common plant for telephone and telegraph purposes, because of the complementary character of the two businesses is, however, quite a different matter. Bearing in mind that a telephone plant is necessarily idle for a greater part of the time, particularly at night, and that a telegraph plant cannot be used for telephone purposes without reconstruction, but that a telephone plant can be used for telegraph purposes, such joint use would virtually make one plant answer for both purposes, and would save to the public the investment charges, the maintenance and depreciation costs of the duplicate plant, all of which charges must be cared for in the rates.

The complementary character of the two services is illustrated by the use of the telephone system for the collection and delivery of telegraph messages, particularly the all-night telegraph service, virtually making each subscriber's station a branch telegraph office

This is further illustrated by the growing use of branch telephone toll lines for extending the telegraph service into the rural districts.

The Western Union has some 25,000 offices; of these the gross revenue of over 20,000 is not sufficient to pay the expenses of the office. Eighty-five per cent of the gross telegraph business of the country is between less than 5,000 towns and cities, that is, four-fifths of the offices of the Western Union and fully one-half of its wire mileage is maintained at a loss in an effort to give that general and comprehensive telegraph service which the business and social interests of the country require.

There are estimated to be less than about 5,750,000 rural habitations in this country. The Bell System has over 3,200,000 rural telephone stations, that is, more than half the rural habitations are connected by exchange wires with central offices of rural centers and these central offices, by means of branch telephone lines, with and form a part of the Bell Telephone system. These branch lines extend to substantially every rural center. They are not used to nearly their capacity. The lines and the operating staff have to be maintained for one purpose. Under a joint working between the telegraph and telephone, these facilities, both plant and operating, could be utilized without appreciable extra cost for telephoning the occasional telegraph message. In this way a telegraph service could be given to practically every center of population in the country, and by means of the rural telephones made to reach nearly every habitation.

If the public desire, as they do, not only improved facilities, but additional methods of intercommunication, and eventually cheaper rates, these benefits can only be obtained through a combined use of plant, and to bring about such a combination, not only the purpose, but the reasons must be understood, and if it results in a broad combined system extending over the whole country, such a system is inherent to the object to be accomplished, and it cannot be accomplished in any other way. There certainly can be no complaint so long as such a service is conducted, as it must necessarily be, under public control and regulation and on a line of policy which does not intend to offer any service or give any facilities, which, as a whole, are not remunerative, and at the same time place at the disposition of the public all the advantages which can only be obtained where facilities are not wasted.

It is an axiom that the cost of operating and the cost of construction and maintenance of plant facilities must be borne by the service. If, then, plant facilities are only partially utilized, the cost of service is greater, and so must be the charges. If additional use of facilities is made, then the cost of service is less and the charges can be reduced.

If the public insist upon a duplication of plant for each kind of service, then the cost of these plants must be borne by the service, and the public must pay the cost. If you hire two carriages to carry two loads that one would carry as well, the two carriages must be paid for. No individual or corporation can be expected to nor can they be required to provide a permanent service to the public at less than cost and a fair profit. Waste of facilities and waste of duplication come out of the public either through the additional cost of service which must be maintained or through the loss of the investment made on the facilities which were unnecessary.

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New York, November 1, 1912.

Copy of Statement of Ownership, Management, etc., of Telegraph and Telephone Age, required by Act of August 24, 1912.
Editor: Thos. R. Taltavall.
Business Manager: John B. Taltavall.
Owners: John B. Taltavall and Thos. R. Taltavall.
Sworn to and subscribed before me this 30th day of September, 1912.
Theodore L. Cuyler, Jr.,
Notary Public, Kings County.
Certificate filed in New York City.
(My commission expires March 30, 1914.)

The Western Union Report.

The report of the Western Union Telegraph Company for the year ended June 30, is an interesting document and, although from the financial point of view it shows a decrease in net profits, the loss is largely represented in the increased value of the property. The total earnings was the greatest in the history of the company, a gain of over $6,182,000 being shown, thus indicating a healthy condition of business. The net profits, however, show a decrease amounting to $181,386. This decrease is due principally to the increase in salaries and wages during the last year which amounted to over $2,697,000. This, however, President Vail points out, is not out of proportion to the increase in gross revenue. The charges for repairs and reconstruction of land lines increased by $558,788 as compared with the previous year, as a result of the policy adopted by the company of improving the plant and building up reserves.

The management has undertaken a great task in the development of the telegraph to its logical limit, but that it is succeeding is evident from the large increase of business, and the stockholders have the satisfaction of knowing that their property is being steadily increased in value and that the time will come when the dividend rate can be safely advanced. The management is certainly conservative in the handling of the property, and the tone of the report is encouraging.

Mr. Vail is trying to solve the capital-labor problem, that is, he is endeavoring to harmonize the two interests as far as his company is concerned. The stockholders may not be receiving as large returns on their investment as they think they should have, but their property is being enhanced in value and in time there is no doubt that they will fare better. On the other hand, Mr. Vail is looking out for the interests of the employes and has been liberal in his treatment of them. His task is not an easy one, perhaps, but his utterances on the general subject evidence a broad and fair mind.

Mr. Vail endeavors to explain the actual relations between the telegraph and telephone services which has been and is the subject of much discussion and no little criticism, and the portion of his report dealing with this subject, which is printed in this issue, will be read with much interest. It has been stated that it would be a triumph of unreason to divorce facilities so intimately related and whose results are so beneficial.

Under the present direction some radical ideas have been introduced and put into practice in the service and it has demanded careful and skillful management to carry on the business without undue friction, but the general results no one can deny have been satisfactory to all interests concerned, including the public. Mr. Vail's main idea is to make better use of the existing plant and facilities and in order to do this business must be found. It was for this purpose that the lower-price services were devised, and although this method of increasing the business involved a public education and advertising campaign, the results, according to Mr. Vail, are very satisfactory.

Mr. Marconi's Misfortune.

Signor Guglielmo Marconi has the sincere sympathy of the entire electrical world in particular and the people of the world in general in his recent misfortune in losing his right eye. Men of his type are too scarce and, while he may be somewhat handicapped in not having the use of both organs of sight his activities will probably not be abated in the least after he is fully recovered from his injuries, and nature has had a chance to adjust itself to the new conditions.

To Change the Name of T. M. B. A.

The proposition to change the title of the Telegrapher's Mutual Benefit Association to Telegraph and Telephone Life Insurance Association will, we think, be generally regarded as a wise one. It might be advisable, however, to make the title more comprehensive so as to embrace other electrical vocations besides the telegraph and the telephone; but, on the other hand there is probably good reason to place these limitations upon the activities of the Association at this time, and no doubt this matter has been carefully considered by the proponents.

From a business standpoint the change of name will be regarded favorably no doubt, but there will be many members who will look at the matter from a sentimental point of view and regret to see the old, original name legislated out of existence. These are days of progress, however, and sentiment has small place in business affairs. After all, the association's interests will not suffer any if the name is changed. The name of any organization is merely to stamp its character and give it identity, and does not affect the material part of the business. The rose might be called a nettle, but its odor would not be impaired thereby.

Testimony of Telegraph Managers at Trial.—Fifteen managers and other employes of the Postal Telegraph-Cable Company and the Western Union Telegraph Company were witnesses at the trial in Indianapolis, Ind., of the McNamara's, who are charged with causing the destruction of the Los Angeles *Times* building of dynamite. Mr. A. J. Knight, manager of the Western Union office at Salt Lake City, Utah, and Mrs. Charles McCarthy of Alberta, Canada, who was employed in the Salt Lake City office in 1910, gave important evidence. Other managers who were called upon to produce certain telegrams stated that the old original dispatches had been destroyed.

Must Furnish Telephone Service.—The Public Service Commission, second district, New York, has ordered the New York Telephone Company to furnish telephone service to the Metropolitan Telephone and Telegraph Company at its offices in New York City. The New York Telephone Company refused service, alleging that the Metropolitan Company was created solely for the purpose of selling securities on the credit of a company of the same name which was succeeded by the New York Telephone Company in 1896. It has decided to test the legality of the commission's order to furnish service to the Metropolitan Company and the commission will now be required to seek enforcement of its order through the courts.

Korn's System of Phototelegraphy.

The electric transmission of photographs with the apparatus of Dr. Korn has been put in commercial operation in France, and the Paris newspapers are, according to recent information, making regular use of this service. Events occurring in the South of France in the afternoon are depicted with illustrations in the newspapers of the following morning.

The former apparatus of Dr. Korn, making use of selenium, operated with satisfaction upon a short line, but this method was not found applicable on long lines, due to the fact that a very small current was necessary and disturbances on the line interfered too greatly with the transmission.

The method now in use dispenses with the need for selenium. A copper sheet resembling a half-tone plate is prepared from the original negative. It consists of parallel lines in gelatine upon the copper surface, these lines being of a width which depends upon the depth of tone in the picture. The copper sheet is bent around a metal cylinder, against which a metal point bears. As the cylinder rotates, the lines of gelatine break the contact between the point and the cylinder for a greater or less time, and this interrupted current is used for transmission.

In the receiving apparatus a photographic film is wrapped upon a cylinder rotating in a dark box, in which there is a small aperture to admit a beam of light. In the path of the beam is a shutter which is controlled by the line current. The transmitter and receiver must be operated in synchronism and this is done by means of a synchronizing impulse, which is sent over the line once for each revolution. With this method a much larger current can be used and the line disturbances have proportionally a less effect.

To Prevent Collisions at Sea.—Two English electrical engineers, William and Gerald Hodgkinson, have invented a sound-direction indicator for the prevention of collisions during a fog at sea. The invention consists of a large drum, nine feet in diameter, and is slung aloft, away from interference from deck sounds, and is provided with sixteen receiving mouths, which receive all sound waves. At the base of the mouths are fixed contact breakers, which, while stable to ordinary mechanical vibration, is sensitive to general sound waves. These contact breakers are connected electrically to a relay case, consisting of relays equivalent to the numbers of receivers, in turn being connected to a box having a circle of small electric lamps, to the same number as the receivers, which will indicate the direction of the sounds. When a sound strikes the contact breakers this disturbs the electrical circuit, thus operating the relays, and at the same time lights the lamps on the indicator. If the sound is near, then more than one lamp will become ignited, but as the units are standardized the direction of the sound wave is shown by a line dividing the sections operated. At distances over one mile one lamp is lighted, and the direction is shown in a clear manner. Should the sound wave come from the right of the ship then the lamps on the right of the circle are illuminated; if to the left, then it is the lamps to the left; and if directly ahead, then the lamps pointing in that direction. With a passing vessel successive units are operated, thus clearly denoting the course upon which the ship is steering.

Mr. C. J. Steinel, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad Company, Los Angeles, Cal., in renewing his subscription for another year, writes: "I do not wish to miss a single number of TELEGRAPH AND TELEPHONE AGE."

Course of Instruction in the Elements of Technical Telegraphy—XXVI.
(Copyrighted.)

(Continued from page 665, October 16.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

Switches—*Continued*

There are many varieties of switches in use but all are constructed upon the same general principle as that shown in Fig. 19 which represents an eight-wire plug switch of a kind most commonly seen at "way" stations. This switch is provided with sixteen upright metallic bars S, S', S", etc., connected with a corresponding number of binding posts P, P', P", etc., to which the different line wires are led.

Between each pair of vertical bars is a series of metal disks, arranged and connected together in separate horizontal rows, of which the upper or lower one is put directly to ground. The other rows terminate in a like number of binding posts to which the wire terminals of the local desk apparatus are, or can be, brought. The upright bars may be connected with any particular series of horizontal disks by the insertion of a plug at the points of intersection between them, and in this way numerous changes and combinations can be made, a few of which may be briefly described for the purpose of illustrating the principle upon which the switch is manipulated.

Referring to the drawing (Fig. 19), A shows a section of the switch representing the west side of No. 1 wire to ground and the east side of the wire open.

B represents another section of the switch through which a direct connection is effected between the eastern and western sections of wire No. 2. This cuts out the local apparatus.

C also brings the two sections of a through wire (No. 3) together, besides introducing the local instrument R in the circuit. To substitute R' for R in this circuit it is only necessary to move the plugs down opposite the binding posts to which R' instrument is connected.

D E illustrates the manner of "looping" two wires—such, for instance, as the Nos. 4 and 5—which are generally united in this way to form a metallic circuit for testing or other purposes.

F G represents a practical "cross connection" in which the wires Nos. 6 and 7 are interchanged by putting the western side of No. 6 to the eastern side of No. 7, and the western section of No. 7 to the eastern section of No. 6.

The local apparatus R" can here be interposed in one of these circuits—viz., 6 east to 7 west—by removing the plug from J and inserting it at K, as will be apparent by tracing the course of the dotted arrows between these points.

H shows both sides of the through wire, No. 8, open at the switch, such action being occasionally called for when trouble is suspected in the switch itself. In making any of the above changes or other combinations, care should be taken to first remove whatever plugs may happen to have been inserted in the lower holes of the sections concerned, as well as to see that no interference with the desired or existing combinations is likely to be caused by the plugs that may be placed at other parts of the board.

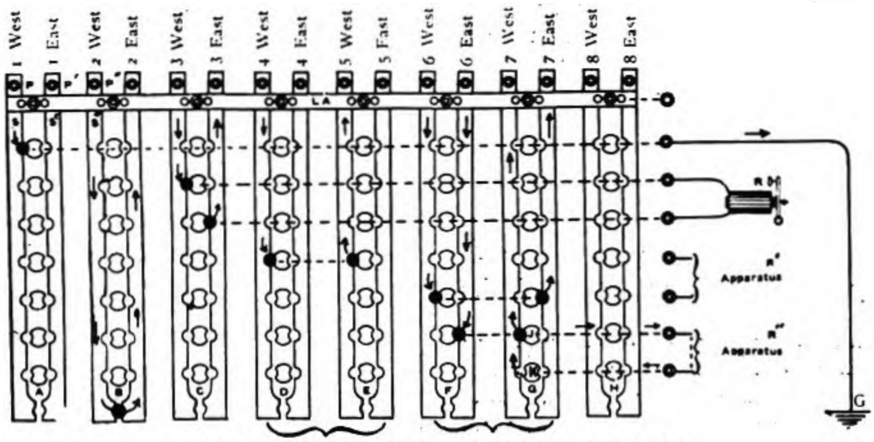

FIG. 19.—DIAGRAM OF PLUG SWITCHBOARD.

L A is a form of lightning arrester consisting of a grounded horizontal bar or plate extending across the upper surface of the vertical line bars, but separated from them by thin strips of paraffined paper or mica. These latter serve the purpose of insulating the one from the other, so far as the ordinary low tension signaling currents are concerned, but they do not prevent the high potential lightning stroke from piercing the waxed paper in its efforts to find a more direct path to ground than that afforded by way of the line and relay, the latter being thereby saved from injury at the expense of the insulating material. Hence it is always desirable after a thunder storm to examine the paper strips, to see that they are not carbonized, or in other ways defective, because one or more of the lines would be liable to "ground" through the defect. In the latest and most useful form of lightning arrester the paraffined paper is dispensed with altogether, and an air space alone of about 1-64 of an inch separates the line and ground plates. This interval which is thoroughly impervious to the normal working currents, is easily bridged over by very high pressure currents, which invariably seek the shortest path to ground.

(*To be continued.*)

Uplifting the Craft.

To the Editor TELEGRAPH AND TELEPHONE AGE.

SIR: The excellent suggestions as to ways and means for benefiting worthy telegraphers, as presented by Mr. S. D. Barger, of Chicago, in your issue of October 1, are to my mind, among the best ever submitted to the fraternity for their consideration, as to what would be the most beneficial way to uplift the craft of the whole country.

The building of a "home" for incapacitated telegraphers in any particular section of the country does not seem to meet with the universal approval of the fraternity, as has been stated at various times by well-known members of the profession.

While there is no question that a "home" would be an excellent project, and a blessing to those in distress, it would be a hardship for a great many of those who lived in distant sections of the country to be obliged, perhaps, to leave their kin and associations of many years at a time when these ties would be harder to sever.

Mr. Barger's suggestions are full of hope to thrifty telegraphers who desire to own homes, but are handicapped by adverse conditions and find it difficult to save enough of their earnings to get the necessary start that is required to enable one to acquire a home.

If Mr. Carnegie and other wealthy former telegraphers could be induced to place a fund as suggested in two of the largest telegraph centers, viz., New York and Chicago, where telegraphers desiring to buy a home could apply for the necessary funds, it would start many a member of the craft on the right road to independence and happiness.

In buying a home the fact that a high rate of interest on mortgages must be met every year is always before us and deters many from making a start.

It seems that if a representative committee of telegraphers were organized to go into the subject in a thorough manner and present to these gentlemen a well-formulated plan along the lines suggested, these wealthy and interested philanthropists might consider such a project, and thus be the means of placing many a worthy telegrapher in a position to realize his desire to have a home of his own, where he could remain, in his old age, among his friends, and not be required to go to a general "home" many miles away perhaps. DANIEL CARTER.

Boston, Mass.

Decoration of the Morse Statue.

The accompanying illustration shows the decorations on the statute of Professor S. F. B. Morse in Central Park, New York, Decoration Day, 1912.

DECORATIONS ON MORSE STATUE.

The ceremony of decorating the statue each year is performed by Mr. Marion H. Kerner, the well-known old-timer, under the auspices of the Morse Electric Club, and Mr. Kerner is proud of the honor.

Historical Notes on the Telegraph in Meridian.

Mr. E. H. Hogshead of the Postal Telegraph-Cable Company, Meridian, Miss., is the author of an interesting article in the *Meridian Dispatch*, of October 6, giving some historical notes on the telegraph in Meridian and some of its prominent workers.

Mr. Hogshead says:

"On the first day of May, 1862, the writer arrived in Meridian, where he remained until September 23, when he was assigned elsewhere—returning October 1, 1865, as an operator in the office, but becoming manager again in April, 1867, in which position he continued until his voluntary retirement on the last day of 1902.

"During my three years' absence (1862 to 1865), quite a number of operators were employed here who were afterward given high places in the service. Of these, William Cody became manager at Memphis, E. J. Saville manager at Mobile, and later at Montgomery, where he died in 1876; Emmett Howard, manager at Memphis for twenty odd years, now with the Mutual Insurance Company in Memphis; Alfred Saville, who enlisted in the Confederate army and was wounded at the battle of Missionary Ridge, after which was made manager at Columbus, Miss. While at Columbus a terrible epidemic of yellow fever suddenly broke out at Shreveport, La., the operator in charge there died of the fever, and there was a crying demand for an operator to fill the vacancy, as the town was in desperate straits without telegraphic communication. Alfred Saville nobly volunteered to go and in a few days fell a victim to the scourge, dying the death of a martyr. Then there was 'Billy' Anderson, who twenty years ago vas chief clerk to the county treasurer of Cook county in Chicago, and George W. McCann, a well-known operator and railroad accountant, who, on account of ill health, committed suicide at the old Jones House in Meridian twenty years ago, and was buried in Rose Hill Cemetery, where a neat stone now marks his grave. He was a brother of Commodore McCann of the United States Navy. L. H. Korty, who served as manager of this office for a brief term in 1865, afterward became superintendent of telegraph on the Union Pacific Railroad, and is still living.

"The manager in charge when I returned to Meridian in 1865 was J. C. Hueston, who sometime later was transferred to New Orleans, when O. C. Hatton succeeded to the position. These two men afterward made records for themselves. Mr. Hueston, after being assistant chief operator at New Orleans, then agent of the New York Associated Press in New Orleans, was called to New York as assistant general manager of that association, in which capacity he served three or four years. While so employed he took a two years' course in the law school of Columbia College, graduating with his class, when he was appointed London agent of the Associated Press, with charge of all its European business, with the same pay as the general manager. While in London he was one day visiting at Ems, in Germany, where his wife and child were summering, when in walking over a bridge he saw a woman drowning in the river below him. He instantly sprung off the bridge into the water and rescued the woman and came near losing his own life in so doing. For this act of heroism Mr. Hueston received old Emperor Wilhelm's medal for the most meritorious act in life-saving for that year. But, after seven years in London, the Associated Press insisted on his returning to New York as general manager, and as an inducement, elected him unanimously to the place and made his salary fifty per cent more than his predecessor had received. After a year and a half of brilliant management of the press association, he became dissatisfied and resigned. Some years later he died in New York.

"O. C. Hatton, after a year or more as manager in Meridian, resigned to accept a place in the office of the Associated Press in New Orleans with Mr. Hueston, then agent there. Very soon Mr. Hueston resigned the agency and Mr. Hatton was appointed in his stead. Years later Mr. Hatton became general agent in New York of the New York State Press Association, composed of all the daily papers in the State of New York outside of New York City. After some years service in that position he was appointed southern reporter of the Associated Press at Washington where he served the press of the South with news for many years; and when the Southern Press Association was formed, in connection with the United Press, he was made Washington agent of that association, and continued with it until the end, some ten years ago. He is now living in New York, engaged in other pursuits.

"Passing over the names and achievements of many fine telegraph operators who worked with me during my long term as manager in Meridian of the Western Union Telegraph Company—naming only one, because he lives in Meridian—John G. Minniece, trainmaster of the Mobile & Ohio Railroad, who was our press operator, and a good one—I must say something of an important and indispensable class of workers in the telegraph service—the messengers. I may say that the success of a telegraph service depends more upon the intelligence and fidelity of its messengers than upon any other single consideration.

"Two years or more ago I essayed the task of listing and locating all the boys who served with me, but with only partial success."

Mr. Hogshead then gives the names and occupations of such as he was able to secure, the list comprising 116 names in all, bringing the record up to 1904-5.

Mr. C. L. Rayborn, night chief operator, Western Union Telegraph Company, St. Louis, Mo., writes: "Your action in renewing my subscription to Telegraph and Telephone Age certainly meets my hearty approval. I would not care to be without this medium of information as long as I am employed in my present position."

Western Union Time Signal Service.*

A very important and rapidly increasing branch of the Western Union service is the time signal service furnished in connection with the use of self-winding synchronized clocks.

Since August, 1865, telegraphic time signals have been sent out daily (except Sundays and holidays) by the United States Naval Observatory at Washington, D. C. On November 18, 1883, time was standardized by the United States Government.

Time is obtained accurately by the astronomers at the observatory, observing the transit of certain stars every clear night, which are due to cross the meridian at a known time. The exact instant of their transit is recorded electrically by means of a chronograph, which also records the seconds from a sidereal clock. The difference between the time the stars cross and the time of the sidereal clock, as recorded on the chronograph, shows the error of the clock.

The time signals sent out each day are wholly automatic and consist of a series of short marks produced on an open telegraphic circuit by the beats of a transmitting clock located at the observatory. The signals are given the widest possible dissemination, over the lines of the Western Union Telegraph Company, for an interval of three and five minutes immediately preceding noon, and ending at exactly noon of the seventy-fifth meridian, standard time.

For the country east of the Rocky Mountains the signals are sent from the observatory at Washington, D. C.; for the country west of the Rocky Mountains the signals are sent from the United States observatory at Mare Island Navy Yard, Cal.

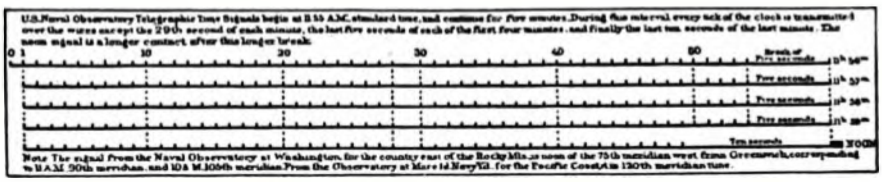

FIG. 1.—CHRONOGRAPH RECORD.

The entire series of signals as sent from both of the observatories is graphically shown as they appear on a chronograph tape. The electric connections of the transmitting clock sending these signals are such as to omit certain seconds of each minute, as shown by the breaks in the record. (Fig. 1.)

These breaks enable any one who is listening

*Journal of the Telegraph.

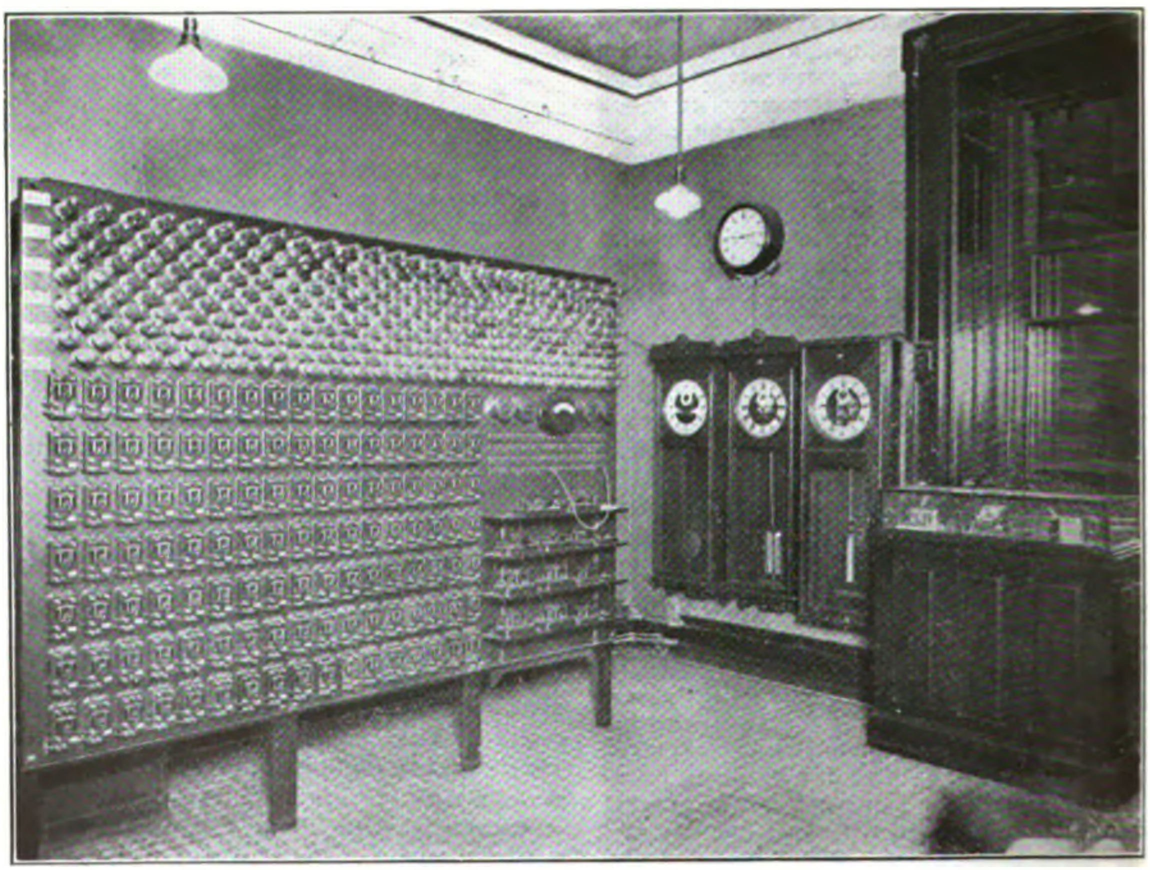

FIG. 2.—TIME SERVICE EQUIPMENT IN WESTERN UNION BUILDING, 195 BROADWAY, NEW YORK.

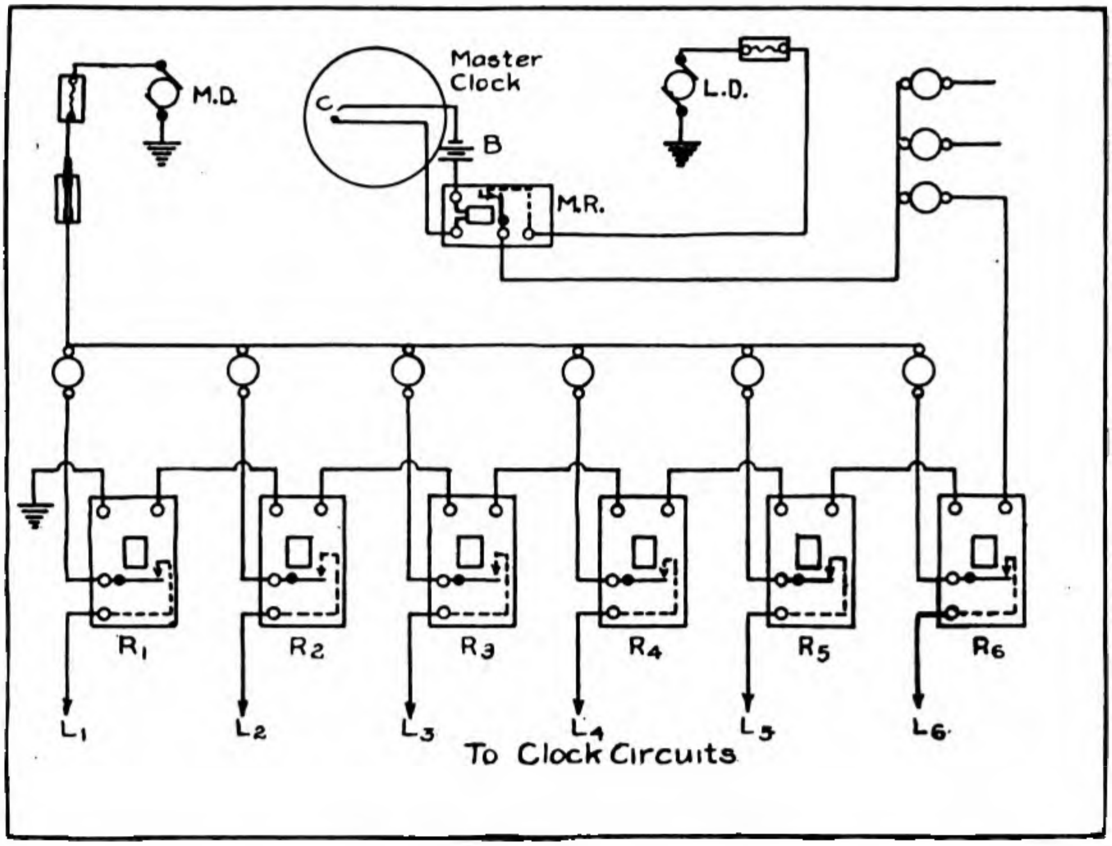

FIG. 3.—DIAGRAM OF CLOCK CIRCUITS.

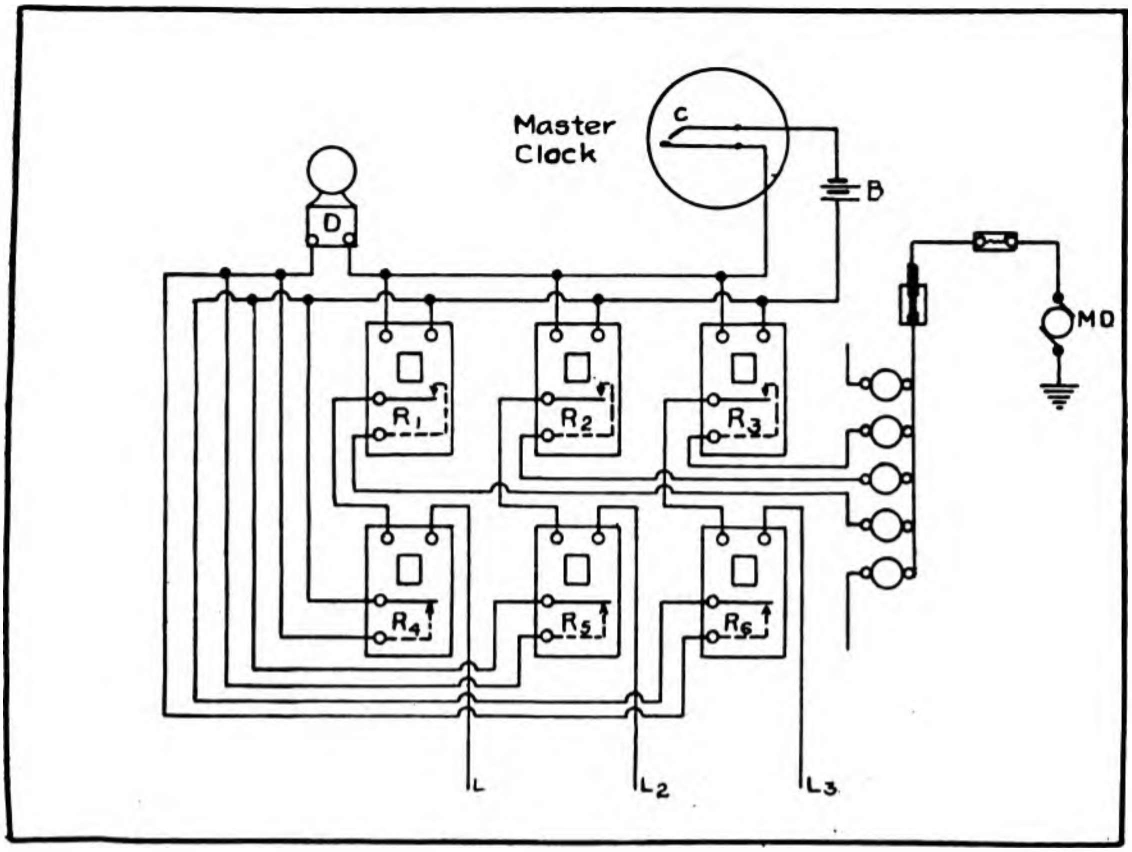

FIG. 4.—DIAGRAM OF CLOCK CIRCUITS IN SMALL OFFICES.

to a telegraph instrument at any office that is cut into the circuit during the transmission of the an interval of ten seconds which is followed by the final noon signal.

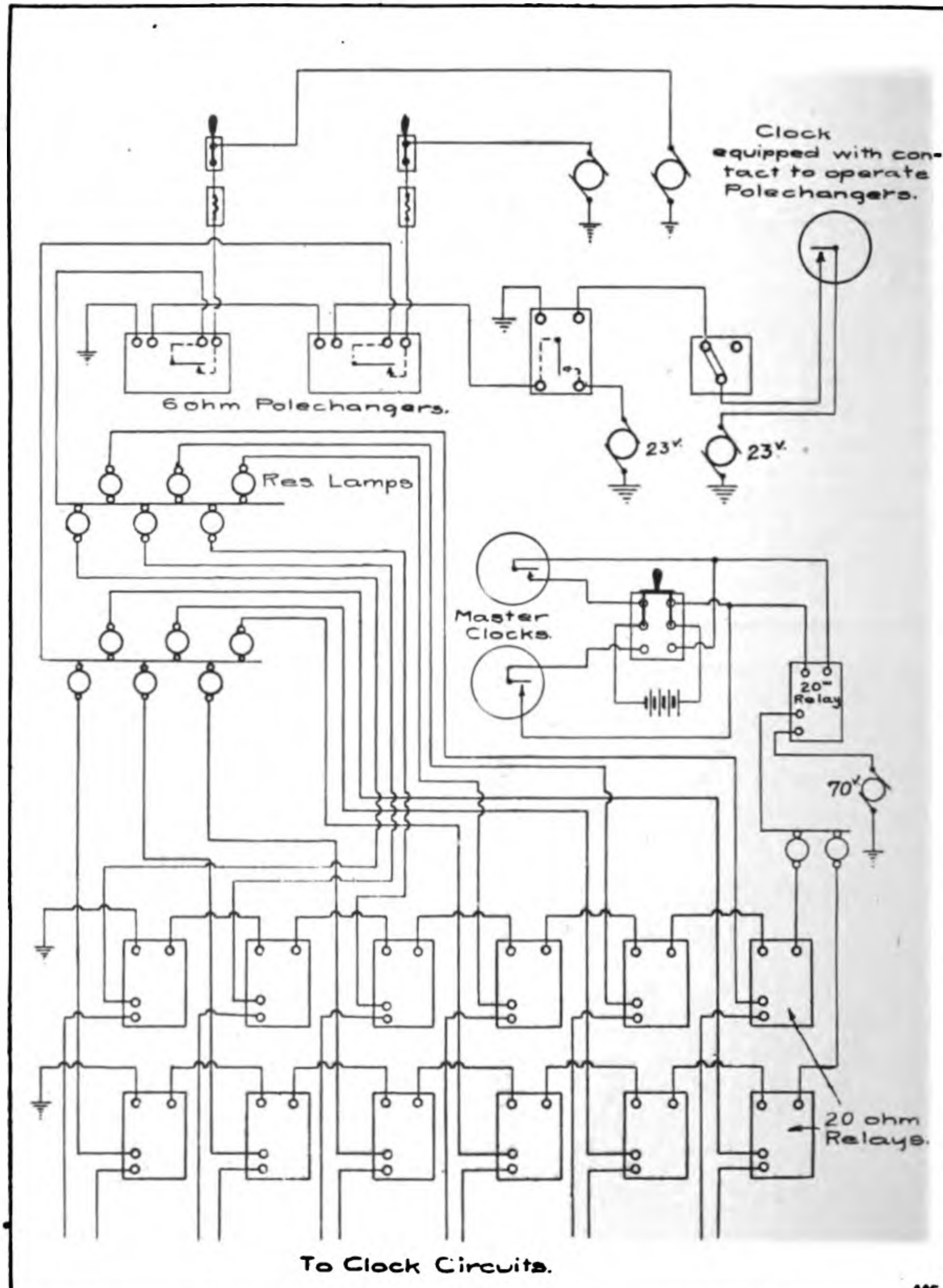

FIG. 5.—WIRING DIAGRAM OF CONNECTIONS BETWEEN MASTER CLOCKS AND RELAYS.

signals to recognize the middle and beginning of each minute. At the fifty-ninth minute there is

At each office where time service is established, there is a master clock installed for the purpose of transmitting an hourly signal to the subsidiary clocks in the following manner: Contact C in the master clock (Fig. 3) closes automatically on the hour and completes the circuit through the master relay MR and the local battery B. In response to the current sent through its magnets, this relay closes and in turn completes the circuit through the bank (or banks) of relays, R1, R2, R3, etc., and the local dynamo LD. This causes the armatures of the relays (R1, R2, R3, etc.) to draw up, thus allowing current to flow from the main dynamo MD out into the lines L1, L2, L3, etc., which are grounded at their far ends. This arrangement is for larger offices where the circuits are given constant supervision.

In smaller offices, where the circuits have no continuous attendance, it is necessary to have some method for giving an alarm signal in the event of one of the circuits becoming open. A circuit arrangement of this kind is shown in Fig. 4. Each hour, as before, the contact in the master clock closes the circuit through the local battery B and the relays R1, R2, R3, thus causing their armatures to be drawn up. This allows current to flow from the main dynamo MD through the relay coils R4, R5, R6 and out into the lines L1, L2, L3, which are grounded at their far ends. The current flowing through the magnet coils of these relays, R4, R5, R6, causes their armatures to be drawn up. The contact points of these relays are reversed and it will be seen that as the armatures draw up, no current will flow through the bell D because the circuit is broken at the relay contacts. If one of the circuits (L1) should be open, the relay (R4) on that circuit would not be energized, therefore, its contacts would remain closed and current from the local battery B through the bell D, causes the bell to ring and notify the person in charge that a circuit is open.

In New York City the clock service has become so extensive that it has been necessary to install an elaborate equipment such as is shown in Fig. 2 and which represents the largest time service apparatus installed.

The instruments on the shelves are for the purpose of operating the time ball located on the Western Union building and also to automatically cut on and off the battery potentials which supply current to the various circuits for synchronizing the clocks on the even hour.

The instruments under the glass covering are used for comparing the master clocks with the observatory clock at Washington, the variations being indicated by the recorded signals on the tape.

Fig. 5 is a theoretical wiring diagram showing the connections between the master clocks and apparatus on the relay board. Each circuit is connected with a jack which can be readily tested by the combination volt and mil-ammeter.

Perfection is a difficult target to hit but a good one to aim at, but be sure the aim is straight.

New Western Union Office in Youngstown, Ohio.

The Western Union Telegraph Company moved into its new office in Youngstown, Ohio, on September 28. The office and its equipment are up-to-date in every respect. Mr. C. W. Garver is manager and Mr. E. F. Reichle is chief operator, and the company has twenty-seven persons on its pay roll in Youngstown. Under Mr. Garver's management the receipts of the office have been doubled and the new quarters are the result of his activity.

Among the features of the new office is a messenger boys' rest room, which will be equipped with telegraph instruments for the use of the boys during their spare moments. Mr. Garver plans to take a special interest in the boys and help all who desire to take up telegraphy as their vocation. Directly above this room will be located the lady employes' rest room, which will be fitted up in an attractive manner. The American District Telegraph Company has desk room, and

C. W. GARVER,
Manager, Youngstown, Ohio.

the Bell Telephone Company will also have a desk for the purpose of handling trade accounts.

The fixtures of the office are new and of light oak, while the wood work is refinished natural oak. The customers' lobby has a tile floor, blue and white. The walls and ceiling are finished in manila.

Manager C. W. Garver came to Youngstown one year ago last April from Ashland, Ohio, where he held a similar position with the Western Union for sixteen years. He used every possible effort to obtain a better office in Youngstown, and the present quarters are a tribute to his judgment and persistency.

Mr. Reichle, chief operator, has been with the company in Youngstown for over eight years and is a very capable official.

Regulations of the London Wireless Conference.

(*Concluded from page 668, October 16.*)

All coast and ship stations should comply with the following requirements: (a) the waves sent out should be as pure and as little damped as possible. Direct spark discharges from antennas are not allowed except in cases of distress and also for certain special stations in which the primary power does not exceed 50 watts. (b) The minimum speed requirement is twenty words per minute, the average word being considered to contain five letters. New installations with a primary input of more than 50 watts should be equipped so that it will be readily possible to employ several ranges inferior to the normal range, the weakest being about 150 nautical miles. Old installations having a primary input in excess of 50 watts shall be changed to conform with the new rules as soon as possible. (c) The receiving apparatus should be able to receive wavelengths provided by the present regulations up to 600 meters, with a maximum protection against disturbances.

Stations employed only to determine the position of ships should not operate within a radius of moer than 30 nautical miles. In the case of ship stations power delivered to the radio-telegraphic apparatus, measured by the capacity of the station generator, should not under ordinary circumstances exceed 1 kw; but power capacity greater than 1 kw may be used if the distance from the nearest coast station is greater than 200 nautical miles, or, under exceptional circumstances, if the communication cannot be established except by augmenting the power. Every ship station owned or managed by private enterprise must hold a license from the government to which it belongs, and this license should be honored by all of the contracting governments as indicating the possession of an installation complying with these regulations.

Operators in charge of ship stations should possess a license from the governments to which the vessels belong, or, in case of necessity and for one voyage only, from another contracting government. First-class operators' certificates certify ability to regulate the apparatus and knowledge of its functioning, ability to transmit and receive messages by sound at a rate of not less than twenty words per minute and a knowledge of the Regulations. Second-class certificates will be issued to operators who qualify under the requirements of the first class except in failing to attain the speed requirements. Second-class operators will be allowed on boats which employ radio-telegraphic communication only for their own service and the correspondence of the crew, particularly on fishing boats, and on all boats, under the title of "assistant," provided there is in addition at least one operator holding a first-class certificate. At the ship stations having a permanent service there should be at least two first-class operators in attendance. No one may transmit a message from a ship station except a first-class or second-class operator, except in an emergency. Operators' certificates impose the burden of secrecy in relation to all correspondence. The radio-telegraphic service of all stations is subject to the authority of the captain.

Ship stations having a permanent service or limited hours of service are obliged to have radio telegraphic installations whose elements are placed under conditions of the greatest possible security. These safeguarded installations should be equipped with an adequate source of power, should be in condition to be placed quickly in service, should be capable of continuous operation for at least six hours and should have a minimum range of 80 nautical miles for ships giving continuous service and 50 nautical miles for those having limited hours of service. This safety apparatus is not required on boats whose regular apparatus already fulfils the foregoing conditions.

Infraction of the convention committed by a duly authorized station is punishable by the administration which has jurisdiction by revoking the license of the operator or the station, or both. In the case of repeated infractions by the same station, when repeated complaints to the administration have had no effect, arbitration is provided for.

II. DURATION OF SERVICE IN STATIONS.

The duration of service in coast stations is to be uninterrupted, as far as possible, day and night. Certain stations, however, may have a limited service. Each administration will fix the hours of service. Coast stations having limited service may not close before having transmitted all the radio-telegrams for ships in their sphere of action, and before having received from such ships all the radio-telegrams announced. Ship stations are divided into three classes: First, those having permanent service; second, those having limited hours of service, and, third, those not having stated hours of rest. During navigation stations of the first category should be always listening; those of the second category should listen during hours of service and also during the first ten minutes of every hour, and stations of the third class are never compelled to listen.

III. THE WORDING AND FILING OF RADIO-TELEGRAMS.

In the transmission of original radio telegrams from a ship at sea, the date and hour of filing at the ship station are indicated in the preface, and in the re-transmission over the telegraphic system the coast station is inscribed as an indication of the station of origin, with the name of the original ship and, if possible, that of the last ship which served as an intermediary. The address of radio-telegrams sent to ships should be as complete as possible, and must conform to certain detailed rules given in the regulations.

IV. COAST CHARGE AND SHIP CHARGE.

The coast charge and the ship charge are fixed according to the charge per word on the basis of a fair remuneration for the radio-telegraphic work, with an optional addition of the minimum charge per radio-telegram. The coast price cannot exceed 12 cents per word, and that of a ship 8 cents per word. However, each administration has the right to authorize coast prices higher than the maximum in the case of stations having a range exceeding 400 nautical miles or stations operating under exceptionally burdensome conditions. The minimum optional price cannot be more than the coast or ship price of a ten-word radio-telegram. When an original radio-telegram sent from a ship, destined for the land, passes through one or two ship stations, the price includes, besides the charge of the originating ship or coast station and the telegraphic line, the ship price of each boat which has participated in the transmission. The sender of a radio-telegram from an inland station addressed to a ship station deposits the amount of the telegraphic and radio-telegraphic charges, and in addition a sum to cover possible charges at intermediate ship stations. Charges for radio-telegrams from ship to ship, passing through one or two intermediate coast stations, include the ship price on board both ships, the charge at the coast station or stations and the charge for transit between the two coast stations. The charges for radio-telegrams from ship to ship, without the intervention of a coast station, include the two ship charges plus the charge of any intermediate ship. The charges for intermediate ships or coast stations are the same as for stations of origin and destination. The country on whose territory the coast station serves as an intermediary for the exchange of radio-telegrams between a ship and another country is considered, in so far as the charges are concerned, as the country of destination and not as the country of transit.

V. THE LEVYING OF CHARGES.

The total charge for a radio-telegram is collected from the sender, except, at first, in the case of the express charges and, second, in the case of combined or altered words declared non-admissible by the office or station of destination, when these extras are collected from the receiver. Ship stations should carry a list of tariffs on board.

VI. THE TRANSMISSION OF RADIO-TELEGRAMS.

The signals used are to be those of the Morse international code. The international distress signal is to be . . . — — — . . . repeated at short intervals and followed by the necessary indications.

Distress signals will take precedence over all other communications. Between two stations radio-telegrams of the same rank will be transmitted alternately, one by one, or in a series of several, following the instructions of the coast station, on the condition that the duration of the transmission of each series shall not be in excess of fifteen minutes.

The Regulations prescribe detailed rules at considerable length to govern the procedure in calling from station to station and dispatching messages. Every station which is about to send a message necessitating the use of great power must first send out a warning signal, — — . . — —, three times in succession, and shall not commence using the increased power until thirty seconds after the warning. As soon as a ship station picks up a coast station it is to indicate its approximate distance, its position, the next port for which it is bound and the number of radio-telegrams awaiting transmission. When a coast station is called by several ship stations simultaneously it decides upon the order in which these stations shall be allowed to exchange their correspondence.

When a radio-telegram contains more than forty words the sending station interrupts the transmission after each group of twenty words and sends a special signal, awaiting acknowledgment and repetition of the last transmitted word before it continues with the message. Coast stations occupied in transmitting long radio-telegrams should suspend transmission after every fifteen-minute interval and remain silent for three minutes before continuing again. When signals become uncertain it is important to have recourse to all possible expedients for securing transmission. For this purpose a radio-telegram shall be repeated at most three times, at the request of the receiving station. If then the signals are still indistinct, the message will be annulled.

In general ship stations send their radio-telegrams to the nearest coast station. However, if the ship station can choose between several coast stations practically equidistant, it gives preference to that one established on the territory of the country of destination, or to the natural destination of the radio-telegram. A sender on shipboard has always the right to designate to which coast station he wishes his radio-telegram sent, and the ship station then waits until that coast station is the nearest one, but in certain exceptions transmission may be made through more distant coast stations, provided: (a) that the radio-telegram is destined for the country in which this nearest coast station is situated and comes from a ship registered in that country; (b) that the two stations use a wave-length of more than 1,800 meters; (c) that this transmission does not interefere with transmission by means of the same wave-lengths by a nearer coast station; (d) that the ship station is more than fifty nautical miles distant from all stations mentioned in the nomenclature. The distance of fifty miles may be reduced to twenty-five miles, with the reservation that the maximum generator power does not exceed five kilowatts, and that the ship's station conforms with the regulations in respect to the character and quality of waves and the allowable power input.

VII. DELIVERING OF RADIO-TELEGRAMS AT THEIR DESTINATION.

If for any reason a radio-telegram coming from a ship at sea and directed to the land cannot be delivered to the addressee, notice of non-delivery is sent out to the coast station that first received the message. The latter in turn transmits the notice to the ship, if possible. If a ship to which a radio-telegram is addressed has not signaled its presence to the coast station within the time limit indicated by the sender, or when there is a delay of more than eight days, the coast station notifies the originating office, which in turn transmits word to the sender.

VIII. SPECIAL RADIO-TELEGRAMS.

The Regulations enumerate several special forms of messages, and stipulations in regard thereto, which will be accepted for transmission. These include radio-telegrams handled by mail over the land portion of their routes.

IX. ARCHIVES.

The originals of radio-telegrams, as well as the documents relating to them kept by the administration, are preserved, with all necessary precaution from the point of view of secrecy, for at least fifteen months.

X. REDUCTIONS AND REIMBURSEMENTS.

In all that concerns reductions and reimbursements application is made of the rules of the International Telegraphic Bureau, with due regard for the present regulations relating to special radio-telegrams. The time consumed in transmission, as well as delays in coast stations awaiting the ship of destination, is not considered in making reductions and reimbursements. If a coast station sends word to an originating office that a message cannot be transmitted to the ship for which it is destined, the administration of the country of its origin demands the repayment of the coast and ship charges to the sender.

XI. CHARGES.

The coast and ship rates have no relationship to the charges provided for by the International Telegraphic Regulations. The charges collected under these rates should be liquidated by the administration interested. In transmission over telegraphic lines a radio-telegram, from the standpoint of rates, is treated in conformity with the telegraphic regulations. The Regulations provide at some length for international settlements of the charges collected by the various administrations for the transmission of radio-telegrams.

XII. THE INTERNATIONAL BUREAU.

The supplementary expenditures resulting from conducting the International Bureau should not, in all that concerns radio-telegraphy, exceed $16,000 per annum, not including the special expenditures occasioned by the meeting of the International Conference. So far as contributions to expenditures are concerned, the contracting governments are divided into six classes, the members of each class being enumerated in the regulations.

XIII. METEOROLIGAL AND TIME SIGNALS.

Each government shall take the necessary steps to transmit to its coast stations any meteorlogical telegrams containing news of interest to the regions in which they are situated. These telegrams, which should not exceed twenty words, are to be transmitted to ships which request such information. The charges for these meteorological telegrams will be paid by the ships to which they are sent. Meteorological observations made by certain ships designated for this work by the countries to which they belong may be transmitted once a day, charged as service notices, to coast stations authorized to receive and transmit them to certain designated meteorological offices. Time signals and meteorological messages will be transmitted in succession, so that the total duration of transmission will not exceed ten minutes, and in general every station whose operation would interfere therewith should be silent during this interval except in the case of distress signals and state telegrams. Each government shall also facilitate communication for the purpose of obtaining maritime information concerning matters of danger to vessels or information of general interest concerning navigation.

XIV. MISCELLANEOUS REGULATIONS.

Messages exchanged between ship stations should be carried on in such a way as not to disturb the coast stations, the latter having, as a general rule, the right of way as regards public communication. Coast and ship stations are to assist in the transmission of radio-telegrams when direct communication cannot be established between the originating station and the destination. The number of re-transmissions is limited to two. If a radio-telegram is to be sent partly over telegraphic lines or via radio-telegraphic stations belonging to a non-contracting government, it may be transmitted on the condition that the administration of the government in question has declared itself willing, when possible, to observe the convention and the Regulations, which are indispensable to the regular transmission of radio-telegrams, and upon the further condition that the charges are paid. Modifications of the present Regulations which shall be found necessary in further conferences shall be put in force on the date decided upon by each such conference. The provisions of the International Telegraphic Regulations are applicable, by analogy, to radio-telegraphic communication, in so far as they are not contrary to the present Regulations. For the application of the provisions of the radio-telegraphic regulations, coast stations are considered as stations of transit, except when the Regulations expressly stipulate that these stations shall be considered as stations of origin or destination.

On July 1, 1913, the present Regulations will become effective. These Regulations have been signed by the respective plenipotentiaries and a copy has been deposited in the archives of the British government.

Improvement in Relay Contacts.—Where heavy currents are carried and relays are used in the control of the current, it is the practice to provide carbon contact points for the relays. The carbon contacts, however, wear rapidly under the constant arcing. It has been found that by substituting copper for the positive contact the life of both contacts is prolonged indefinitely.

Concrete Telephone Poles.—The Central Union Telephone Company is installing concrete poles from La Salle, Ill., to the county line. They are replacing wooden poles which parallel the canal, and which have been adversely affected by the moisture.

Size over all, 7 x 11½. Edison-BSCO Type 404 Cell—400 A.H. Capacity with barrel shaped Heat Resisting Glass Jar.

EDISON BSCO

Complete Edison-BSCO Renewal. Each Edison BSCO complete Renewal consists of Zinc-Oxide assembled, can Caustic Soda, and bottle of Oil.

PRIMARY BATTERY

The Standard Closed Circuit Cell

Users of electricity generally, and telephone men in particular, appreciate the importance of strict attention to details, the slightest defect in a circuit sometimes greatly impairing the transmission.

Electricity, the agent that makes telephony possible, should stand out prominently as one of the details deserving of special consideration, thus avoiding the possibility of impairing the service with an unreliable battery or one not possessing the peculiar qualities necessary for actuating a transmitter.

Edison-BSCO cells, by reason of their uniform voltage, low internal resistance, freedom from polarization, reliability and long life, are unequaled as a talking circuit battery, from the standpoint of both efficiency and economy.

The cells we recommend for telephone work are illustrated on this page, two 400 and one 200 ampere hour size being shown, also a complete renewal. The latter gives a good idea of how simple a matter is the process of recharging our Edison-BSCO cell, an operation that has been described as resembling in simplicity the changing of an electric light bulb.

Telephone men will find it to their interest to learn more about the Edison Primary cells, and should ask for descriptive catalog, voltage curves, or detailed information for any special project.

The Cheapest Form of Battery Energy

Size over all, 6 x 9 Jar only. Inside dimension, 5 x 7. Edison-BSCO Type 208 Cell—200 A. H. Capacity with porcelain jar.

Size over all, 7½ x 11. Jar only. Inside dimension, 6⅗ x 8¾. Edison-BSCO Type 403 Cell. 400 A. H. Capacity, furnished with either porcelain or heat resisting glass jar.

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POLICY OF INSURANCE
DAYS KERITE
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KERITE is the best policy. Its use insures against those interruptions to service, so costly in the end, that are due to a small saving in initial installation outlay.
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The Railroad.

Mr. F. R. Bolles, a former telegrapher for the Chicago and Northwestern Railway Company, has been appointed general manager of the Copper Range Railroad with headquarters at Houghton, Mich.

Mr. E. A. Shelnutt, formerly senior test board man (general division chief), at Nashville, Tenn., for the American Telephone and Telegraph Company, has been appointed chief clerk with the newly organized telegraph and telephone department of the Louisville and Nashville Railroad Company at Louisville, Ky.

F. F. Riefel, Superintendent of Telegraph Lake Shore Railway, Cleveland, Ohio.

Mr. Frederick F. Riefel, whose appointment as superintendent of telegraph of the Lake Shore and Michigan Southern Railway Company, the Lake Erie and Western Railroad Company, the Dunkirk, Allegheny Valley & Pittsburgh Railroad Company, the Toledo & Ohio Central Railway Company, and the Zanesville & Western Railway Company, at Cleveland, Ohio, was announced in our issue for October 16, has been with the Lake Shore road about twenty years, starting as a messenger at Buffalo. He afterwards became, successively, operator, dispatcher, chief dispatcher, assistant train master, train master, and assistant division superintendent, now becoming superintendent of telegraph. He is a thorough railroad man and is well posted on the telegraph and the telephone.

Mr. Riefel will represent the Western Union Telegraph Company in his new position.

R. F. Finley, Engineer General Telegraph Department, Lake Shore Railway.

Mr. R. F. Finley has been appointed engineer, general telegraph department of the Lake Shore and Michigan Southern Railway Company, the Dunkirk, Allegheny Valley and Pittsburgh Railroad Company, the Lake Erie and Western Railroad Company, the Toledo and Ohio Central Railway Company, the Cleveland, Cincinnati, Chicago and St. Louis Railway Company, the Pittsburgh and Lake Erie Railway Company, the Cincinnati Northern Railway Company, the Michigan Central Railroad Company, the Chicago, Indiana and Southern Railroad Company, the Zanesville and Western Railway Company and the Indiana Harbor Belt Railway Company, vice Mr. J. A. Kicks, resigned. Mr. Finley is a son of Mr. C. H. Finley, chief operator of the Western Union Telegraph Company, at Chicago, and was born at Naperville, Ill., June 30, 1881. He began his telegraphic career with the Western Union Company in 1900 as operator, and in 1902 accepted a position with the American Telephone and Telegraph Company in Chicago as wire chief. In January, 1910, he entered the service of the Lake Shore and Michigan Southern Railway as telegraph and telephone engineer, which position he occupied at the time of his recent promotion.

INDUSTRIAL.

English Catalogue.—Messrs. W. Tinsley & Co., telegraph and electrical engineers, of London, England, have just issued a neat catalogue and price list of telegraph and electrical testing and measuring apparatus manufactured by them. The instruments include standard Wheatstone bridges, galvanometers, resistance coils, standard condensers, dynamometers, etc., all of which are illustrated.

Western Electric Prosperity.—The Western Electric Company's business for July was three per cent ahead of the preceding July, August was the same percentage ahead of the same month in the preceding year and September reports an increase of four per cent over September of 1911. The nine months so far reported show a gain of three per cent over the same period a year previous, so that it now appears that the company will run close to the early estimate of a gross business for 1912 of about $67,000,000.

More Telephones on the Northern Pacific.—The Northern Pacific Railway is continuing to extend its telephone train dispatching circuits. To this end an order has been placed with the Western Electric Company to equip the Wilton Branch which covers the territory lying between Jamestown and Wilton, N. D. This stretch of road is approximately 115 miles in length, and the dispatcher will be located at Jamestown. Six way stations will be equipped along the right-of-way.

Telephone Dispatching on the Louisville and Nashville.—The Louisville and Nashville Railroad operates approximately 4,600 miles of road, and of this there is equipped for telephone train dispatching approximately 2,539 miles. The greater portion of this telephone operated mileage is covered by both train and message circuits. The installation of the two parallel circuits provides sufficient facilities to operate under the most trying traffic and service conditions. All of the telegraph and telephone work on the Louisville & Nashville has been for years under the personal direction of Mr. R. R. Hobbs, superintendent of telegraph of that road. Mr. Hobbs has taken every advantage of the outside wire plant which has been so constructed as to make possible the use of simplex and phantom service over the train and message wires. This additional simplex and phantom service is obtained without any increase in the outside wire plant, and, with but a very slight cost for the apparatus necessary at the terminal of the circuit.

Mr. Fred Taylor, of the plant department of the Western Union Telegraph Company, at Nashville, Tenn., writes: "Your action in renewing my subscription met with my approval; please accept thanks. I do not want my subscription to run out and will recommend your paper on every possible occasion."

Second Convention of Telephone Pioneers.

The second annual convention of the Telephone Pioneers of America will be held at the Hotel Astor, New York, November 14 and 15. Following is the official programme:

Thursday, November 14, 10 a. m.—Business meeting, to be presided over by Mr. Theo. N. Vail, president of the association. At 2 p. m. addresses will be made by well-known and prominent telephone people; 7:30 p. m. reception and entertainment by the New York Telephone Society at the hotel, after which a buffet lunch will be served.

Friday, November 15, 10 a. m.—Automobile ride to Briarcliff Lodge, where lunch will be served and the free and unrestricted use of the golf links, tennis court, pool room, etc., will be accorded to all Pioneers. On the trip from the city to the Lodge the automobiles will pass over the entire length of Riverside Drive, past the residences of Mr. J. D. Archbold, J. D. Rockefeller, Miss Helen Gould and other well-known persons, and over Sleepy Hollow Bridge. At 7:30 p. m. a formal banquet will be held at the Hotel Astor.

On Saturday, November 16, free admission to both the Metropolitan and Singer Towers has been arranged for all the Pioneers and their ladies, and escorts will be provided for those of the party desiring to visit the principal points of interest in the city, including the Museum of Natural History and the Museum of Art, the Public Library, Aquarium, etc.

Pioneers must, on arrival, register on the Pioneer's register record in order to obtain badges which will admit them to all of the entertainment features.

Inasmuch as it is necessary to print the names of the members on the badges and on the banquet seating list, as well as to provide proper facilities, the secretary requests prompt notice from those intending to be present.

The entertainment is provided through the courtesy of the American Telephone and Telegraph Company, the New York Telephone Company, the Western Electric Company and the New York Telephone Society. The general committee of arrangements consists of Messrs. H. F. Thurber, vice-president of the New York Telephone Company; Gerard Swope, general sales manager, Western Electric Company; A. S. Hibbard, telegraph relations, American Telephone and Telegraph Company; H. S. Brooks, general commercial superintendent, American Telephone and Telegraph Company, and H. W. Pope, secretary.

At the present time the membership of the Pioneers comprises considerably over 900 names, and it is assumed from the number of acceptances that there will be a minimum of 400 Pioneers present at the convention.

The badge for the New York convention consists of a gros-grain blue silk ribbon with a metal panel at the top to contain the name of the member. From the panel hangs a small telephone receiver and the official triangular badge of the association.

ANSWERS TO QUESTIONS.

[In this department questions on matters of a practical character, and of general interest, will be answered. Questions intended for this department must be signed by the writer's full name—not for publication, but for identity. No attention will be paid to anonymous communications.]

(104) Q. Does efficiency of an induction coil depend on an open iron circuit? Would a closed iron circuit transformer serve the purpose as well or better? W. E. C.

A. These questions are rather indefinite, but in general it may be said that induction coils are used for a wide variety of purposes and the characteristics depend largely on the use to which the particular coil would be put. Beyond any doubt, the core loss of the coil is increased when the magnetic circuit consists entirely of iron, there being no core loss whatsoever when this circuit is of air. However, the exciting current is much larger for a magnetic circuit composed partly, or exclusively, of air than it is for one made throughout of iron. In other words, a complete iron core induction coil has a large core loss and a small copper loss, while a complete air core induction coil has no core loss, but a large copper loss. The relative magnitude of these two losses would depend upon the exact design of the coil, and the design would depend on the service for which the coil was intended. If the coil is to operate at high frequencies, it would be preferable to employ an air core rather than an iron core, quite independent of the relative efficiencies of the two types.

(105) Q. How is the wave length of an aerial calculated? H. N. S.

A. The wave length is determined from the inductance and capacity of the aerial. If the inductance (L) is measured in centimeters and the capacity (C) in microfarads, the wave length is calculated by this formula: $59.6 \times \sqrt{LC}$.

Age of Pole Timber.—According to recent information the thirty-foot cedar pole is about 140 years old when cut, and the chestnut pole about fifty years. The average life of the wooden pole being only about fifteen years, it would be necessary to keep about ten poles growing for each pole in use, in order to keep up the demand. The present demand on our forests is over 4,000,000 poles a year.

Platinum in British Columbia.—It has been announced that the existence of the platinum group of metals in ore in the Nelson, B. C., district has been demonstrated recently. A report of the investigations is to be made to the provincial government by Mr. W. Fleet Robertson, provincial mineralogist before whom the experiments were made.

An Expensive Bump on the Nose.—A telephone exchange operator at Connellsville, Pa., has sued the telephone company for $10,000 because she bumped her nose on a voltmeter while groping around the office in the dark. She should not be nosing around in the dark.

Jacksonville Reunion of the Old Time Telegraphers and Historical Association and Society of the United States Military Telegraph Corps.

The Jacksonville reunion of the Old Time Telegraphers and Historical Association and the Society of United States Military Telegraph Corps has passed into history. It was one of the best reunions that has so far taken place, and everyone who was fortunate enough to be present departed from Jacksonville with a feeling that he had left behind many old and valued friends. The class of entertainment was of an exceptionally high order. Dignity and grace, as well as thoughtfulness were apparent on all sides, and the Jacksonville people vied with each other to make the sojourn of the visitors an event long to be remembered. To thank each of those who aided in entertaining the visiting old timers would prove an almost impossible task.

We cannot permit the opportunity to pass, however, without mentioning a few of those who were especially active in caring for the comforts of the visitors. Hon. W. S. Jordan, Mayor of Jacksonville, and president of the Old-Timers Telegraphers and Historical Association, laid aside his executive duties entirely, so as to devote all of his time and attention to the visiting members of his Association. Everyone was loud in his praise of the city's executive, and the name of president W. S. Jordan will long be cherished for his marked courtesy, dignity and urbanity.

Mr. Paul R. Wiggs also gave up his business for the time being so that he could devote his entire time to caring for his old telegraph associates and friends. Mr. Wiggs was to be found at headquarters day and night, planning to make all happy and felt that the visit to Jacksonville was an occasion that will long linger in the minds of those whose names were recorded as present. Messrs. L. J. Maxwell, S. L. Burts, L. A. Mitchell, G. D. Ackerly, J. E. Peacock, and other Jacksonville old timers and business men also contributed very largely of their time and means to this same end. To Mr. A. E. Lang, Mayor Webb, and citizens of St. Augustine, especial thanks are due for arranging for the one hundred and fifty visitors who motored around St. Augustine, the oldest city in America, on Wednesday, October 23. It was a splendid diversion of the Jacksonville programme. The weather during the entire time could not have been more propitious for the carrying out of an outdoor programme of entertainment and pleasure.

To the Board of Trade of Jacksonville the thanks of the visitors is also due for the splendid entertainment furnished by that body on the evening of October 22.

The various ladies' committees, under the leadership of Mrs. A. E. Heston, were indefatigable in their efforts in caring for the lady visitors, and many warm friendships sprang up between the visitors and their fair hostesses.

All departed with a firm determination to meet again next year in the beautiful city of Detroit, Mich.

The New York delegates, to the number of thirty-six, sailed from New York on October 19 on the steamer "City of Columbus" for Savannah, Ga., where they took the train for Jacksonville, reaching the latter city at noon, Tuesday, October 22. During the trip the members of the party enjoyed themselves in various ways. On Sunday morning, October 20, Mr. Maxwell Green read the religious services and Mr. Marion H. Kerner and secretary F. J. Scherrer conducted the singing.

During the voyage vaudeville and other forms of entertainment were indulged in, which, altogether made the trip one long to be remembered.

Mr. J. J. Ghegan, president of J. H. Bunnell & Company, New York, distributed snapper sounders among the members and during meals genuine wireless communication was incessantly kept up. Mr. Ghegan also introduced the famous Elks puzzle which kept the key-experts busy during their spare moments trying to separate the antlers.

Some of the lady members enjoyed the sensation of sea sickness in a mild form. Several delegates from other states accompanied the New York party on the voyage. The officers of the steamship company literally consigned the boat to the Old Timers for the voyage, and the steamer's officers were untiring in their efforts to make everyone comfortable and happy, in which they were eminently successful.

The meeting of the Old Time Telegraphers and Historical Association was called to order at 10 a. m., Tuesday, October 22 by the president, Col. William Bender Wilson, in the parlors of the Windsor Hotel, Jacksonville, Fla. Col. Wilson presented the Morse daguerrotype badge of office to the incoming president, the Honorable W. L. Jordan, Mayor of Jacksonville.

President Jordan, in a very appropriate and happy speech, welcomed the visitors and tendered the freedom of the city to the members of the association, their families and friends. The response on behalf of the association was made by Mr. T. J. Benson, of Chicago, after which the meeting listened to the reading of the reports of the secretary-treasurer and the auditing committee, all of which were satisfactory.

Mr. R. J. Murphy of New York brought to the attention of the meeting the Reid Memorial project and the association voted $15 as its contribution toward that worthy object. Many members of the association, it was said, would make personal contributions.

One of the pleasant features of the meeting was the presentation by Col. George M. Dugan, of Tip Top, Ky., of a piece of the earliest cable ever laid. It was a part of the cable laid under the Ohio River at Paducah, Ky., in 1853. Upon the announcement of the presentation there were loud calls for the donor who, in rising, was greeted with rounds of applause. A vote of thanks was also tendered to Col. Dugan and the gift was ordered kept among the treasures of the association.

The report of secretary F. J. Scherrer was comprehensive and most satisfactory, and showed that the Association was in a flourishing condition. The enthusiasm and *esprit de corps* among the members are well maintained.

The report of the treasurer indicated a balance of $1,000 on hand.

Mr. E. P. Griffith, chairman of the Harriman Monument Fund Committee made his report through the secretary and the committee was discharged with thanks.

Mr. J. B. Taltavall, treasurer of the fund, gave an itemized statement of receipts and expenditures as follows:

RECEIPTS.

Total Contributions	$2,298.25
Interest on Deposits	25.34
Refund on Tablet Insurance	7.50
Grand Total	$2,331.09

EXPENDITURES.

Printing 6,000 copies of prospectus, descriptive matter, mailing the same, addressing envelopes and folding circulars	$127.42
Charles Keck, sculptor	1,550.00
Insurance on tablet	25.00
Erie Railroad Company for foundation	203.84
Dedicatory expenses	199.38
1,200 copies of booklet giving a history of the project, report of dedicatory exercises, with engravings, etc.; mailing the same to all contributors	225.45
Total expenses	$2,331.09

Mr. H. J. Kinnucan was elected president; Mr. W. A. Jackson and A. L. Lafferty, vice-presidents, and Mr. F. J. Scherrer, secretary. Mr. Kinnucan is district commercial superintendent, Western Union Telegraph Company, Detroit, Mich. Mr. Jackson is with the Michigan State Telephone Company in Detroit, and Mr. Lafferty is district superintendent of the Postal Telegraph-Cable Company, having jurisdiction over Michigan, with headquarters at Chicago.

Detroit, Mich., was selected as the place for the next re-union, and it is generally acknowledged that the choice is a most happy and agreeable one. This is the first time that the honor as a place of meeting has fallen to the beautiful "City of the Straits." Tuesday, Wednesday and Thursday of the last week in August, 1913, were the dates selected for the reunion.

The Society of the United States Military Telegraph Corps, met at 10 a. m. October 23 in the same room, with Col. William Bender Wilson, of Philadelphia, president of the society in the chair.

Mr. Marion H. Kerner, of New York, was made secretary, in the absence of Mr. David Homer Bates, who was unable to be present at the reunion.

The reports of the president and secretary were then read and ordered printed, as were all other reports and resolutions, letters of regret, etc.

Col. William Bender Wilson's presidential address was full of thought and cheer. He referred to the military telegraph corps during the Civil War as being the nerves of the army; it quickened the life of the army and sounded the alarm when danger was imminent. Yet for over half a century the members have suffered injustice at the fount of justice by being denied the recognition of their services and by being deprived of their merited rewards.

"Our lack of success in the non-passage of the bill," continued Col. Wilson, "was not due to any lack of importunity, for during the year * * * our canvas for seeking congressional support of our cause has been unremitting and nation-wide. * * * The cause has been brought to the attention of all the members of the Senate and the House, and their support solicited. Home influence has been solicited and generally secured to strengthen our appeals, and the effect has been to build up strong sympathetic sentiment in Congress which must enforce a successful issue. This fact, fortified by conversations I had with legislators during my visits to Washington, and by many letters received assuring support, inspires me with a confidence that the long-fought battle will be won before a newly-elected president reaches the White House. This assurance, however, should not," he said, "lead us to abate our activities."

Col. Wilson acknowledged the indebtedness of the members to Mr. A. A. Zion, chairman on the committee on congressional action. "The present favorable shape our measure stands in before Congress," he continued, "is largely due to the campaign Mr. Zion outlined and which he pursued, and with the full co-operation of his committee."

Col. Wilson urged those members who had not received their certificates of honorable service in the United States Army to make application at once. Mr. Carnegie's military telegraph pension list was also referred to, and he spoke in a complimentary manner of the services of the secretary, Mr. David Homer Bates.

In his report, Mr. David Homer Bates, secretary and treasurer, referred to the efforts exerted to secure the passage of a pension measure by Congress in favor of needy members of the corps, also to the consideration of applications for Carnegie pensions, which are renewable each succeeding twelve months. The executive committee approved fifteen new applications, and five names have been dropped because of the death of the beneficiaries. One widow remarried and surrendered her claim upon Mr. Carnegie's bounty. The Carnegie list now numbers sixty-eight men and twenty-nine women. Twenty comrades died during the year.

A poem dedicated to Mr. Andrew Carnegie was read and greatly appreciated by those present.

Mr. A. A. Zion, of Indianapolis, Ind., chairman of the Committee on Congressional Action, read his report. It showed that a considerable amount of work had been accomplished during the past year, and he predicted that the bill now before Congress would become law during the present session.

Col. William Bender Wilson, of Philadelphia, was re-elected president; W. L. Ives and C. A. Tinker, of New York, vice presidents; David Homer Bates, of New York, secretary-treasurer. President Wilson reappointed the old committees.

Mr. W. L. Ives of New York was presented with a gold-headed ivory cane by Mr. M. F. Robinson, of Sanford, Fla., on behalf of the United States Military Telegraph Corps, in commemoration of the seventy-second anniversary of his birth. The presentation speech was made by Col. Wilson, and "Senator" Ives replied in a feeling manner.

President Wilson arose and said: "Before entertaining a motion for adjournment, it would please me and no doubt all of you to recognize the services to the society of comrade Marion H. Kerner, and with your unanimous consent I will appoint him an additional vice president of the society. On motion, the action was unanimously approved.

The meeting then adjourned.

Following is the programme of the reunion and entertainment as carried out:

Tuesday, October 22, 2:30 p. m.—Business meeting of the Old Time Telegraphers and Historical Association at the Windsor Hotel. 3:30 p. m.—Visit to Florida Ostrich Farm. 8:30 p. m. —Entertainment by the Jacksonville Board of Trade at the rooms of the Board.

Wednesday, October 23.—10:00 a. m.—Business meeting of the United States Military Telegraph Corps at the Windsor Hotel. 1:15 p. m.— Train to St. Augustine; returning from St. Augustine at 6:15 p. m., and arriving at Jacksonville at 7:30 p. m. The Florida East Coast Railway gave a special rate of $1.25 for the round trip.

Thursday, October 24.—9:00 a. m.—Automobile trip around city and to Atlantic Beach. 3:00 p. m.—Trip on St. Johns River on steamer "Dixieland." 8:30 p. m.—Banquet at the Seminole Hotel.

On Thursday evening, October 24, the banquet took place at the Hotel Seminole and was the crowning event of the reunion. About two hundred persons assembled in the banquet hall of the hotel which was beautifully decorated. Above the entrance door and immediately back of the speaker's table was the symbol "73", wrought in oranges. Telegraph wires were strung all over the room from which Spanish moss was hung making an effective picture. The insulators to which the wires were fastened were patterned after those used by Professor Morse in 1844. Direct telegraphic communication was maintained with New York and, while the dinner was in progress, many telegrams were exchanged with prominent members who were unable to attend. Among them was a characteristic telegram from Mr. Thomas A. Edison reading: "I am not quite awake yet. Call me at four a. m." Other messages were received from Andrew Carnegie, Theo. N. Vail. Col. Robert C. Clowry, Col. Albert B. Chandler, Belvidere Brooks, E. J. Nally, C. C. Adams, C. P. Bruch, and others.

Secretary Scherrer also read a telegram from Mr. H. J. Kinnucan, the new president, thanking the association for the honor conferred upon him, regretting his inability to be present at the Jacksonville reunion, and tendering a hearty invitation to everyone to attend next year's reunion at Detroit.

A telegram was also read from Mr. Chas. P. Bruch, president of the Magnetic Club, submitting a resolution passed by the Club at its annual fall dinner in session in New York, felicitating the Old Timers and expressing the hope that everyone may have a royal good time in the land of flowers.

After coffee had been served, the Hon. Wm. S. Jordan, president of the association, gave expression to his pleasure, as well as the citizens of Jacksonville, in having been able to entertain such a large gathering of old timers and military telegraphers.

After three rousing cheers and a tiger were given the mayor, he announced the selection of Col. W. M. Toomer as toastmaster, who, in eloquent and witty addresses, introduced the various speakers. Among those called upon were Marion H. Kerner of New York, who responded to the toast, "The Old Timers;" Col. Wm. Bender Wilson, "The United States Military Telegraph Corps;" Mr. M. J. O'Leary, "Fraternity."

In the course of Mr. O'Leary's address, he referred eloquently to the many historical services which were rendered by the late James D. Reid in the early days of the telegraph, and to the fact that a movement is on foot for the erection of a more suitable memorial to his memory than the simple stone which now marks his grave at Rochester, N. Y. He closed with a stirring appeal to all present to support the movement and bring it to an early and successful conclusion.

The old timers were also honored by the presence of the United States Senators from Florida, Hon. D. U. Fletcher and Hon. N. P. Bryan, and the Congressman from the Jacksonville District, Hon. Frank Clark. These gentlemen delivered scholarly and stirring addresses. A paper written by Mr. David Homer Bates of New York was read by Mr. Chas. D. Hammond of St. Petersburg, Fla.

The various addresses were of such an interesting character that not a single individual retired from the banquet hall notwithstanding the fact that the hour of adjournment was after one o'clock a. m.

A resolution was carried by acclamation embodying the high appreciation of the visitors for the splendid hospitality and generous entertainment tendered them by President Jordan, Paul R. Wiggs, L. J. Maxwell, L. A. Mitchell, J. E. Peacock, S. L. Burts, Mrs. A. E. Heston, Mrs. L. J. Maxwell and the other members of the various committees, including Mr. H. R. Waterbury.

The New York delegation which returned by way of Savannah remained at that place for a day and were agreeably entertained by the members of the Cotton Exchange and other business men in the form of an automobile ride to the many points of interest in that beautiful city, and concluding with a characteristic Southern luncheon at the famous "Thunderbolt" resort.

Mr. M. J. O'Leary of New York, secretary of the Telegrapher's Mutual Benefit Association, was indefatigable in his efforts to push the welfare of his association, and the interest which he created among the visitors and the local telegraphic fraternity will doubtless result in many new members being enrolled.

Those present were:

Arlington, N. J.—J. H. Dresser.
Atlanta, Ga.—Geo. H. Usher and wife, H. C. Worthen and wife, E. Waldron, E. E. Williams and wife, L. H. Beck and wife, W. B. Word, L. B. Thompson and wife.
Baltimore, Md.—A. Stevens, F. G. Adams.
Boston, Mass.—J. B. Colson and wife.
Buffalo, N. Y.—L. M. More and wife.
Chicago, Ill.—A. H. Bliss, Thos. J. Benson and daughter.
Crystal River, Fla.—M. H. Baum.
Cumberland, Md.—C. H. Myers, wife and daughter.
Detroit, Mich.—T. D. McGarry and wife, J. Moxam, R. H. Dunphy, R. M. Ross and daughter.
Elmira, N. Y.—J. H. Shearer.
Gainesville, Fla.—H. H. Hankins.
Hebron, N. S.—J. K. Butler and wife.
Holmesburg, Pa.—Col. Wm. B. Wilson.
Indianapolis, Ind.—A. A. Zion.
Jacksonville, Fla.—W. J. Burt, Paul R. Wiggs and sister, D. A. Mitchell, S. L. Burts, C. M. Holmes, A. E. Heston and wife, W. L. Brenner, H. G. Reich, John S. Arnold, L. J. Maxwell and wife, F. H. Elmore, G. D. Ackerly and wife, J. E. Peacock and wife, Mrs. W. F. Coachman, A. J. Mitchell, H. H. Richardson, A. B. Hernandez, Hon. Wm. S. Jordan, J. H. Nelson, V. T. Reynolds, Robt. McNamee, W. J. Johnston, Geo. E. Mundee, wife and two daughters, A. E. Lang, V. G. Shearer and wife, Harry Hartley, Geo. C. Harris, F. M. Houser, A. J. Dillon and wife, Jno. W. Murnan.
Jersey City, N. J.—J. Fliegauf and wife, C. B. Molineaux and daughter.
Jersey Shore, Pa.—H. W. Wedge and wife.
Louisville, Ky.—P. G. Kern.
Monroe, N. Y.—J. B. Bertholf.
Montclair, N. J.—J. C. Barclay and wife.
Montgomery, Ala.—F. E. Meyer.
Montgomery, Ala.—E. Winter.
New Haven, Conn.—Hon. C. E. Graham, Hon. M. T. Rogers.
New York—C. A. Kilfoyle and wife, M. Green and wife, H. C. Wildner and wife, W. L. Ives, F. D. Murphy and wife, C. H. Bristol and wife, S. R. Crowder, Lewis Dresdner and wife, G. W. Fleming and sister, J. M. Winder, J. McRobie and wife, M. J. O'Leary and wife, F. J. Sheridan and niece, Mrs. M. C. Gates, F. J. Scherrer and wife, M. H. Kerner and wife, J. P. Cullen and daughter, J. J. Ghegan, R. J. Murphy, wife and daughter, J. B. Taltavall, wife and daughter, J. F. McGuire, wife and son, James R. Beard and wife.
Palatka, Fla.—J. W. Kemp.
Philadelphia, Pa.—W. T. Westbrook, John A. Chapman, J. W. Collins and wife, J. W. Crouse and wife.
Pittsburg, Pa.—J. W. Yealy, wife, daughter and niece, W. J. McQuown, wife and son, John Wentz and son, J. A. Watson, T. S. Fleming and wife, C. M. Hicks and wife, Mrs. J. H. Amend and son, W. R. Smith and wife, Miss J. L. Collins, Miss S. R. Haney, Miss L. J. Duncan, Miss A. F. Bell, D. Kelly and wife, Theodore F. Moreland and daughter.
Portsmouth, Va.—W. F. Williams.
Sanford, Fla.—M. T. Robinson.
Savannah, Ga.—L. W. Wortsman, wife and niece.
St. Petersburg, Fla.—C. D. Hammond.
Tampa, Fla.—W. S. Taylor, wife and daughter.
Tip Top, Ky.—Col. Geo. M. Dugan.
Washington, Del.—J. H. Mehaffey.
Washington, D. C.—H. M. Woodward and wife, W. H. Potter, W. H. McKeldin and wife, E. W. Emery, wife and daughter.
Wilmington, N. C.—W. P. Cline.

NOTES.

Mr M. J. O'Leary, secretary of the Telegraphers' Mutual Benefit Association, New York, attended the reunion in the interest of that association. He was kept busy greeting his old friends and pointing out the advantages of membership in the association to many new acquaintances, both in the telegraph and telephone fields. Mr. O'Leary's visit with the old-timers will no doubt result in the addition to the membership roll of many new names.

The Western Union and the Postal Telegraph offices were very appropriately decorated in honor of the visiting old timers and military telegraphers.

Comrade Charles D. Hammond read the address of the secretary, Mr. David Homer Bates, during the banquet, in which Mr. Bates expressed his regrets at not being able to be present at the reunion. Mr. Bates referred in a complimentary manner to Colonel William Bender Wilson, president of the corps, and to the latter's commission as Colonel of Pennsylvania Volunteers granted by the State of Pennsylvania by special act of the Legislature, March 29, 1903. "The Colonel," he said, "will never resign that unique commission, and he is, therefore, an officer in the Pennsylvania Militia for life. The Act defines his duties as Military Telegrapher and Scout."

Mr. Bates then indulged in a little war history and gave the names of thirteen men who are recorded in Heitman's Official Army Register as officers in the United States Military Telegraph Corps. These names are: Samuel Bruch, Charles S. Bulkley, Robert C. Clowry, T. B. A. David, Thomas T. Eckert, J. R. Gillmore, W. L. Gross, S. G. Lynch, E. S. Sanford, George H. Smith, Anson Stager, John C. Van Duzer and Leonard Whitney.

Colonel Clowry, T. B. A. David and J. R. Gillmore are the only survivors.

The battle of Antietam and the emancipation proclamation were next referred to and the relation of the military telegraph service to these two important events was pointed out in an interesting manner.

A telegram of greetings from the surviving members of the military telegraph corps was sent to Mr. Andrew Carnegie at New York by president William Bender Wilson and secretary David Homer Bates. Mr. Carnegie replied as follows:

"New York, October 23.

"President William Bender Wilson,
"Jacksonville, Fla.

"Delighted to receive your message which makes us all boys together again '73.'

(Signed) "Andrew Carnegie."

Annual Entertainment New York Telegraphers' Aid Society.

The annual entertainment of The New York Telegraphers' Aid Society will take place Tuesday evening, November 19, at the Lexington Avenue Opera House and Terrace Garden, Fifty-eighth Street and Third Avenue, New York. The previous entertainments given by this Society have been of high class, and have brought together both telegraph and telephone executive officials as well as employes. This year's entertainment promises to be more enjoyable and better attended than any of the previous affairs.

The net proceeds of these annual gatherings are added to the Relief Fund of the Aid Society. This fund is used exclusively to defray sick and mortuary expenses of members of the profession who are not eligible to, or have neglected to affiliate with the society. Mr. R. J. Marrin is chairman of the entertainment for this season. Those desiring to assist this worthy charitable project should communicate with Charles A. Kilfoyle, financial secretary, 195 Broadway, New York.

The officers of the society are: A. M. Lewis, president; J. F. Zeiss, vice-president; T. M. Brennan, treasurer; C. A. Kilfoyle, financial secretary; Mary E. Saunders, recording secretary.

T. M. B. A. Assessment.—Assessment No. 543 has been issued to meet the claims arising from the deaths of Frank J. Mulcahy, at Bridgeport, Conn.; Willis E. Fisher, at Canton, Ohio; Daniel R. Miller, at Emaus, Pa.; Myron O. Morgan, at Springfield, Mass.

Telegraph Tournament in the Middle States.—The Kansas City Railroad Telegraphers' Club, Kansas City, Mo., contemplates holding a telegraph contest in the middle states (Nebraska, Iowa, Kansas and Missouri). Mr. Alvin J. Jones, secretary and treasurer of the club, has the matter in charge.

LETTERS FROM OUR AGENTS.

PHILADELPHIA WESTERN UNION.

A new office has been opened at Coatesville, Pa., and a joint telegraph and telephone office has been established at Havre de Grace, Md.

District traffic superintendent J. M. Creamer on October 25th entertained a number of traffic employes and commercial managers at luncheon at Kuglers. Mr. J. A. Hill, of New York, was among those present.

District commercial superintendent J. W. Reed on October 28 held a meeting of district commercial managers with a view to urging upon them the necessity of constant solicitation of business. He held similar meetings in Philadelphia and Baltimore during the previous week, the principal managers and solicitors being in attendance.

PHILADELPHIA POSTAL.

Among the recent visitors at this office were M. M. Davis, electrical engineer and chief engineer of telephones, and D. H. Gage, Jr., assistant electrical engineer, New York; J. A. Downs, manager, Dover, Del., and Jeff W. Hayes, of Portland, Ore.

Chief operator E. W. Miller, with a corps of assistants, went to Princeton, N. J., October 26, to oversee the wire assignments on account of the Dartmouth football game.

Manager J. A. McNichol has returned from the conference of superintendents and managers in New York. Superintendent Harvey D. Reynolds, of Buffalo, and manager F. B. Travis, of Boston, Mass., together with fifteen or twenty New York state managers, accompanied manager McNichol and visited this office October 24 on their return from the conference.

Telegraph and Telephone Age

No. 22. NEW YORK, NOVEMBER 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Improved Apparatus and Uniform Equipment.

Many operators of the present day remember the time when there were many different makes of one class of instrument. Morse keys, especially, seemed to have been made in the greatest variety, and each operator backed his individual opinion as to which was the best by many a heated argument. In the earlier days we had large, cumbersome keys with heavy bar levers; keys with long spring steel levers; keys with short stubby levers; some with thumb screw and others with wedge trunnion adjustment; besides, there were keys with rotating discs for contact points. The consequence was that users of one kind of key were at a disadvantage when they were assigned to a circuit equipped with a different one. The natural result of these differences was the evolution of the present uniform, small, neat and serviceable key furnished to all alike. It embraces all the desirable features that have been proved to be most satisfactory for practical use.

In like manner nearly all apparatus and items of equipment have been improved and standardized for the benefit of the service. The modern relay particularly represents great improvement in design. In early types the wires under the wooden base were connected with the binding posts and brass framework by means of nuts and washers which in time were sure to work loose or break, and thus cause trouble. In the modern instrument all such connections are soldered and so protected as to seldom give trouble. The magnet wires leading into and out of the spools are no longer unprotected, but shielded by means of metal tubes, through which they pass. The flat type binding posts which supersede the former thumbscrew pattern are less liable to work loose, and, besides, look neater. Even the retractile spring is standardized—so many turns of a given gauge of phosphor-bronze wire, with a helix of a specified diameter. Not only that, but the base dimensions of all Morse relays, whether 35, 150, or 300-ohm instruments, are all of a standard size, for reasons which will appear later. Last but not least, the wire used in winding modern relays and many other magnets is insulated with black enamel instead of silk or other fabric, thus assuring longer life on account of being better able to withstand the heating effect of an excess of current.

Sounders, polechangers, transmitters, rheostats, etc., have also undergone a thorough inspection and then trimmed, pruned, and otherwise altered to give greater efficiency. Old-style instruments still in use and giving good service on unimportant circuits when finally turned in for repairs will be rewound and remodeled in accordance with the latest specifications.

Porcelain or slate now supersedes wood for the bases of apparatus of nearly every description, such as switches, fuse blocks, polar and neutral relays, and main line switchboard panels. Telephone pin jacks supersede spring jacks; terminal boards are now located behind or near the main switchboards instead of in basements as heretofore; special designs and construction of rheostats and condensers have been evolved to meet different requirements and simplify the installation of apparatus. Multi-sheet condensers are now superseded by the smaller and more compact types in which the "plates" consist of one continuous roll of material of specified capacity, a double set of which is contained in a much smaller wooden box than that required for one set of the former type.

Uniformity of equipment even goes to the extent of specifying the particular size or gauge of wire that must be used in the installation of each separate class of apparatus.

The next move naturally was to standardize the mountings for apparatus generally. Along this line we find office furniture, such as operating and repeater tables, standardized as to dimensions and design, with a view of affording minimum, but ample space for the installation of each repeater, multiplex or other set in a certain prescribed uniform manner. The allotted space also includes that required for all accessory equipment, such as switches, fuse boxes, condensers, etc.

Nor has the comfort of the operator been neglected. Today he finds the different blanks placed in a neat multi-compartment tin box set in front of him; a clip-jaw near his typewriter to hold received messages instead of having to reach for a box as heretofore, and in the near future he will merely have to lay the messages on a running carrier belt and thus be relieved of the responsibility of delay at his desk, through the tardiness of messengers in picking them up.

Obviously the advantages gained by means of improved apparatus and uniform equipment explains why, notwithstanding the increased cost of material, the telegraph companies have been able to not only reach their present high mark of efficiency, but attain that end without retrenchment in the way of diminished salaries.

Telegraph and Telephone Patents.

ISSUED OCTOBER 22.

1,041,718. Telegraphic Relay. To H. J. Archer, Chicago, Ill.

1,041,965. Party-Line Telephone System. To H. P. Clausen, Chicago, Ill.

1,042,188. Adjustable Telephone-Instrument-Locking Device. To C. H. Bard, Mount Vernon, N. Y.

ISSUED OCTOBER 29.

1,042,389. Telephone System. To C. C. Bradbury, Chicago, Ill.

1,042,457. Electric Telegraphic Apparatus. To H. G. Martin, East Rutherford, N. J.

1,042,482. Signaling System. To H. O. Rugh, Sandwich, Ill.

1,042,772. Carbon-Grain Cells of Telephone Transmitters. To C. E. Egner and J. G. Holmström, Saltsjö-Storängen, Sweden.

1,042,811. Telephone-Receiver Holder. To W. D. Miller, Butler, Pa.

1,042,855. Interference Preventer for Wireless Telegraph Circuits. To W. L. Walker, Boston, Mass.

1,042,954. Selective Ringing Key. To C. H. North, Cleveland, Ohio.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange, November 11:

American Telephone and Telegraph Co.	143¼
Mackay Companies	80
Mackay Companies, preferred	67½
Western Union Telegraph Co.	78

Personal.

Messrs. Carl Hersen and A. Kruckon, engineers in the German government telegraph service, Berlin, are in New York inspecting the various telegraph and telephone plants.

Mr. R. H. Marriott, formerly engineer of the Marconi Wireless Telegraph Company, New York, has been appointed government radio inspector with headquarters at New York.

Mr. Carl D. Sheppard, Associated Press representative in the United States Supreme Court at Washington, has been admitted to the bar in in the District of Columbia.

Mr. A. Sal, director of telegraphs of the Argentine Republic, was recently in England and other foreign countries inspecting the telegraph and telephone systems in behalf of the Argentine government.

Mr. O. D. Street, of the Western Electric Company, New York, left on October 18 for a seven weeks' trip to the Pacific coast, in the course of which he expects to visit Omaha, Denver, Salt Lake City, Los Angeles, San Francisco, Portland, Seattle and Minneapolis.

Institute of Radio Engineers.

At the regular meeting of the Institute of Radio Engineers, at Columbia University, New York, November 6, Dr. Lee De Forest lectured on the apparatus and work of the Federal Telegraph Company. The company has stations at Honolulu, Hawaii; Seattle, Wash.; Portland, Ore.; Medford, Sacramento, San Francisco, Los Angeles, San Diego, Cal.; Phoenix, Ariz.; El Paso, Tex., and Chicago, Ill. At times, he said, it is possible to relay from Chicago to Seattle, and the system works continuously between Los Angeles and San Francisco, Cal., day and night, two hundred to three hundred words have been transmitted daily for the past year for firms which require thirty minute delivery.

Since August 12 between 15,000 and 20,000 words have been transmitted between San Francisco and Honolulu at night. There are two stations at San Francisco; one can send while the other receives. The larger stations use about 12 kw. Two waves of about 3,260 and 3,100 meters are used.

The dots and dashes are longer and the spaces are shorter, except when it is found that the shorter dots and dashes carry better, then the order is reversed.

The system employed by the company is the Poulsen system highly refined. The arc is used at the transmitter and a "tikker," or interrupter, at the receiver.

In the winter season the 12 kw. station at San Francisco can send direct to the El Paso station in the day time.

Mr. Holberg, of the Marconi Wireless Telegraph Company, also gave an interesting talk on the Marconi transatlantic stations.

Wire-Tapping Swindle.—Several so-called wire tappers were arrested in New York recently on the charge of fleecing a leading attorney and real-estate operator of Wilmington, N. C., and Dr. J. W. Powell, of the same city, out of $22,000 and $3,000 respectively. It is the old story of holding horse-race results back until the victims have had an opportunity to bet on the "sure thing."

Telegraph Poles for Morocco.—The Sherifian Telegraph Company of Casa Blanca, Morocco, has invited bids until December 15 for 4,000 telegraph poles.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay, president of this company, on the night of November 5, entertained a large number of prominent New York society people in his offices at 253 Broadway, where election returns were received and announced. Several operators received the returns at a long table in the rear of Mr. Mackay's office, which had been banked with palms and American flags. Among Mr. Mackay's guests were Mr. and Mrs. E. H. Gary, prince Andre Poniatowski, Mrs. William K. Vanderbilt, Jr., Col. George Harvey, Mr. and Mrs. Cornelius Vanderbilt, Mr. and Mrs. W. F. Sheehan, Gen. Howard Carroll, Mr. and Mrs. Claus Spreckels, Mr. and Mrs. Henry Clews, Alfonso de Navarro, and many others.

Mrs. Clarence H. Mackay, wife of president Mackay of this company, accompanied by their daughter Helen, will leave Cherbourg, France, for New York on November 18.

Mr. H. G. Haddon, general manager Marthas Vineyard Telegraph Company, was a recent executive office visitor.

A new long distance telephone line between Tacoma, Spokane, and Seattle, Wash., and Portland and Ashland, Ore., was put into operation by this company on October 29.

An effort is being made to organize in the Chicago office a mutual investment association similar to the one in New York.

Horace H. Stryker, aged twenty-four years, an operator for this company at Asbury Park, N. J., died on October 31 of tuberculosis.

Generally speaking the use of gravity battery has been practically discontinued in the Eastern Division of this company and before long this will be true in the entire Postal service. Dynamos, motor-generators, storage batteries and rectifiers are rapidly being installed everywhere to replace primary batteries.

Mr. L. M. Moore, manager of the Buffalo, N. Y., Board of Trade office, accompanied by his wife, visited friends in New York a few days ago, while en route from the Old Timers' Reunion at Jacksonville, Fla. Mr. and Mrs. Moore report having enjoyed the trip to Florida.

In our issue of December 1, will be printed a description of the Postal Telegraph-Cable Company's improved quadruplex system, showing connections and improvements.

Pneumatic tubes have been laid between the Commercial Cable Company's building at 20 Broad Street, and the new office at the corner of Front and Wall Streets, New York.

Extensive changes are to be made in the pneumatic tube system at the main and branch offices in Chicago. Many equipment improvements are being made in every division of the company to increase the efficiency of the plant.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Newcomb Carlton, vice-president of this company, New York, is expected to arrive on November 22 from Europe on the White Star Line steamer "Adriatic."

Mr. S. Fenn has been appointed traffic manager of the Western Union cable system, vice Mr. J. H. Carson resigned. Mr. Carson was general manager of operating with headquarters at London.

Conferences were held in Buffalo, N. Y., November 7, Philadelphia, Pa., November 11, and Washington, D. C., November 12, of managers of offices in the vicinities of these cities. They were presided over by Mr. E. M. Mulford, division commercial superintendent, New York, and addresses were made by the district commercial superintendents, also by Mr. A. C. Kaufman, division cable manager, New York.

A conference of commercial officials was held on October 18 in the office of district commercial superintendent E. Boening, Seattle, Wash. Among those present were C. H. Daniels, district commercial agent; J. F. Haas, district commercial inspector; O. H. Tomlin, district messenger supervisor, Portland, Ore., and managers W. A. Robb, Portland, Ore., W. J. Smith, Seattle, Wash., B. S. Jones, Spokane, Wash., P. M. Fulton, Vancouver, B. C., R. R. Sprinkle, Tacoma, Wash., S. Wortheimer, Walla Walla, Wash., and E. C. Johnson, North Yakima, Wash. The party were guests of superintendent Boening at the theatre in the evening.

The office of Mr. W. G. Higgins, superintendent of supplies, has been changed from 152 Franklin Street to 189 Broadway, New York.

Mr. E. A. Baird, manager of the Pittsburgh, Pa., office was a recent executive office visitor.

This company is fitting out a new office at Wheeling, W. Va.

New lighting and ventilating systems are being installed in the Chicago office. The lighting system will give a more uniform distribution of light over the entire working plant.

This company will hereafter operate all former Great North Western offices in New York State except Bombay and Fort Covington, which two offices will still stand as Great North Western offices.

Mr. Americus K. V. Hull for the past twenty-nine years traffic chief in the Baltimore office, whose retirement was announced in our issue dated November 1, was born in Frederick County, Md., March 9, 1842, and entered the telegraph service in 1859 on the Baltimore and Ohio Railroad at Oakland, Md. He was manager at various offices in West Virginia and Maryland and during the civil war, was in the United States Military Telegraph service at Gallipolis, Ohio, as manager and chief operator of the government wire up the Kanawha River to Charleston and Fayetteville, W. Va. He afterwards served as operator at various offices throughout the country and finally, in 1874, settled in Baltimore where he served for the past twenty-nine years as traffic chief, with the exception of about two years when he was engaged in outdoor pursuits.

Mr. J. F. Wallick, special agent, Western Union Telegraph Company, Indianapolis, Ind., gives, in the Indianapolis *News* of October 4, an interesting account of the celebration in that city in 1858 of the laying of the first Atlantic cable. It is a humorous story of how the local committee laid the plans for the celebration with no money in sight to pay the expenses. The committee, however, taking advantage of the popular enthusiasm over the event, had no difficulty in collecting sufficient funds from the citizens to defray the costs of the celebration.

Canadian Notes.

The Western Union Telegraph Company will move into larger and up-to-date quarters in Victoria, B. C.

Mr. G. A. C. Phillips, assistant manager of the Canadian Pacific Railway Telegraphs, Toronto, Ont., has been appointed manager of the Calgary, Alta., office, and is succeeded at Toronto by Mr. G. Paton, who was accountant at that place.

The Great North Western Telegraph Company has leased additional space for its Winnipeg office to better care for the increased traffic. Mr. C. E. Davies, supervisor of equipment, has lately been in Winnipeg supervising the work of making the necessary changes.

Underground Wires in Hamilton, Ont.—The city of Hamilton, Ont., has applied to the Board of Railway Commissioners for an order to compel telegraph, telephone and other companies using overhead wires to place their wires underground in the central portion of the city.

Obituary.

John A. Miller, aged forty-six years, manager of the Western Union office at Clarion, Pa., died in Pittsburgh, October 22.

D. R. Thompson, an old-time telegrapher, well-known throughout the country, died in Los Angeles, Cal., November 3 from an acute attack of gastritis.

Rosington Elms, aged 91 years, and for the past sixty years identified with the telegraph service in St. Louis, Mo., died in that city October 30. Deceased was born in Dublin, and was retired by the Western Union Telegraph Company on a pension many years ago. He received the Scottish Rite thirty-third degree in masonry in Scotland.

Dr. Theoron Woolverton, aged seventy-three years, a medical director of the United States Navy and a former telegrapher, died in Grimsby, Ont., October 25. Dr. Woolverton was born in Grimsby and was an operator at Hamilton, Ont., fifty-five years ago. He afterwards studied medicine, and when the civil war broke out he joined the northern military service and was later transferred to the Navy.

Major Daniel Hogan, aged 63 years, member of the Society of the United States Military Telegraph Corps, died at Park Ridge, Ill., October 24. He was born in Ireland and came to this country during infancy. He studied telegraphy at Cairo, Ill., and served as an operator in the Union Army throughout the Civil War. In 1887 he was appointed internal revenue collector for the southern district of Illinois and afterwards served as collector of the port of Chicago. He was clerk of the Federal Court at Danville at the time of his death.

John S. Owen, aged fifty-four years, division chief operator for the Western Union Telegraph Company at Omaha, Neb., was killed in that city on October 24 by being run down by a street car. The funeral took place October 27, and was largely attended. The Western Union employes sent a blanket of flowers, seven feet long and three feet wide, which completely covered the casket. The pallbearers were W. Salisbury, district plant superintendent; J. P. Barnhart, district traffic superintendent; G. H. Nichol, manager of the Council Bluffs, Iowa, office; J. B. Prichard, wire chief and division chiefs E. H. Farrer and W. J. Rusland.

G. S. Davis, Superintendent Wireless Department United Fruit Company.

Mr. George S. Davis, who has been appointed superintendent of the wireless department of the United Fruit Company, with headquarters at New Orleans, La., has had an extensive wireless career. He was born at North Platte, Neb., October 1, 1885, and entered the wireless telegraph service at the New York navy yard, September 1, 1903. He was at one time chief electrician of the United States Navy, and later was in charge of the wireless station at the New York Navy Yard and was afterward instructor in the Naval electrical school. Subsequently he became chief electrician of the United States battleship "Georgia," afterward becoming chief operator of the wireless department of the United Fruit Company, which position he held at the time of his recent appointment as superintendent.

A Model Small Office.—One of the neatest little offices in the upper peninsula of Michigan is that of the Western Union Telegraph Company at Ishpeming. A photograph of it shows an ample counter at the front of the room and a sextette instrument table back of it fitted with modern apparatus. At the left of the table is the manager's rolltop desk, on which is a telephone. A standard strap switchboard is on the wall at the back of the room, within easy reach of the manager's desk and the instrument table. Mr. Wilbur Frewerd is manager at this point.

Mr. L. C. McIntosh of the Southern Pacific Railway, Los Angeles, Cal., writes: "Keep the paper coming. Its receipt is looked forward to with great pleasure. I never overlook an opportunity to solicit a subscription for you."

Pensions, Disability Benefits and Insurance for Telegraph and Telephone Employes.

On November 11 president Theo. N. Vail of the Western Union Telegraph Company made the following announcement:

To all Western Union Employes:

It affords me much pleasure to announce that the provisional pension plan has been replaced by a permanent plan providing not only for pensions but also for sickness and accident disability and for life insurance, and that the company has set aside a liberal amount for the establishment of an Employes' Benefit Fund from which beginning January 1, 1913, such benefits will be paid.

Briefly, the plan provides for a pension of one per cent of the average annual pay during the ten years next preceding retirement, for each year of continuous service, with a minimum of $20 per month to be paid to the following:

1. On application of the employe or in the discretion of the company to all male employes sixty years and to all female employes fifty-five years of age who have been twenty or more years in the service.

2. In the discretion of the company to any employe whose term of employment has been thirty or more years.

3. In the discretion of the company to any male employe aged fifty-five or female employe aged fifty whose term of employment has been twenty-five or more years.

For disability due to accidental injury incurred during employment and in the performance of work for the company full pay for thirteen weeks and half pay until able to earn a livelihood or for remainder of disability not exceeding in either case six years in all.

For disability due to sickness or accidental injury during employment while not in the performance of work for the company as follows:

a. If term of employment is ten or more years, full pay for thirteen weeks and half pay for thirty-nine weeks.

b. If term of employment is five to ten years, full pay for thirteen weeks and half pay for thirteen weeks.

c. If term of employment is two to five years, full pay for four weeks and half pay for nine weeks.

These benefits begin after seven days' absence on account of sickness.

All employes having relatives dependent on them will be entitled to insurance against death by accident occurring in and due to the performance of work for the company in the sum of three years' wages, not in excess of a total amount of $5,000, payable to their dependent relatives.

All employes having relatives dependent on them and who have been five years in the service will be entitled to insurance against death in a sum equal to six months' wages when the term of employment has been from five to ten years, and to one year's wages when the term of employment has been ten years or more, with a maximum of $2,000 in either case. Such insurance to be paid to the dependent relatives left by the employe.

(Signed) THEO. N. VAIL,
President.

On the same day the following announcement was made to the employes of the American Telephone and Telegraph Company:

A fund of $10,000,000 for pensions, sick benefits and life insurance will be available on January 1, for the 175,000 employes of the Bell system and associated interests, and their families and dependents, amounting altogether to more than a quarter of a million people.

This $10,000,000 fund will be made good from year to year by annual appropriations on the part of the American Telephone and Telegraph Company and Associated Companies, and the Western Union Telegraph Company and the Western Electric Company.

The plan for the distribution of this fund has been characterized as the most liberal, comprehensive and ideal ever inaugurated. President Theo. N. Vail has provided combined benefits for superannuation, sickness, accident and death, for an industrial army more than twice as large as the standing army of the United States.

This provision is made entirely at the expense of the various companies interested, without contributions of any kind from the employes themselves. The application of these varied benefits will be strictly democratic and will be for the benefit of all employes of every rank. The plan will provide for free change of employment from one company to another, with full credit for combined terms of service.

The Bell system and associated interests provide employment for about 175,000 people; of this number 130,000 are employes of the Bell telephone system. The total yearly pay for the whole group is about $115,000,000, something over $80,000,000 being paid out in wages by the Bell telephone system alone.

The terms by which provision is made for the needs of age, illness, accidents and death, may be summarized as follows:

Pensions:

Male employes who have reached the age of sixty years and who have been twenty years or more in service, may retire on pensions. They may be retired at the option of the company when they have reached the age of fifty-five years and have been twenty-five years or more in service. The pension age of female employes is in each case five years younger than that of male employes. Any employe who has been thirty years in service, regardless of age, may be pensioned on the approval of the president of the company.

The amount of the pension is automatically based on the years of service and the amount of pay, and will be one per cent of the average annual pay for ten years, multiplied by the number of years of service. Therefore, a man who had been thirty years in service would get thirty per cent of the average salary which he had been receiving during his last ten years of service. No pension will be less than $20 a month.

Accident Disability Benefits:

In the case of accidents occurring in and due to the performance of work for the company the employe will receive for total disability, full pay for thirteen weeks and half pay for the remainder of disability, up to six years.

If the disability is temporary, he will receive full pay for thirteen weeks and half pay until able to earn a livelihood, not exceeding six years.

Sickness Disability Benefits:

Employes who are disabled by sickness or accident outside of the regular course of duty after ten years or more in service, will receive full pay for thirteen weeks and half pay for thirty-nine weeks; if from five to ten years in service, full pay for thirteen weeks and half pay for thirteen weeks; if from two to five years in service, full pay for four weeks and half pay for nine weeks. In the case of employes who have not been two years in service, heads of departments will be permitted the same discretion as heretofore, in continuing pay during temporary illness.

Life Insurance:

In the case of death resulting from accident in and due to performance of work for the company, an insurance amounting to three years' pay, will be paid to the dependents of the employe, the maximum payment being $5,000.

In the case of death resulting from sickness or from accident outside the business the payment will be one year's pay for employes who have been ten years or more in service, and one-half of one year's pay for employes who have been from five to ten years in service, the maximum payment being $2,000.

If any state statutes provide for more liberal compensation than is provided under the benefit plan, the statutory provision will prevail. Where the employes have legal rights, as in some accident cases, they will have the option of exercising such rights or accepting the company's benefits.

The American Telephone and Telegraph Company has set aside from its surplus a fund which provides for those whom it directly employs, and also provides a reserve, upon which, under certain conditions, the associated companies may draw. This fund is supplemented by funds set aside by each company. The total appropriations will aggregate something more than $10,000,000. The benefits, it is estimated, will cost annually about $1,000,000 more than the present payments on this account.

The administration of the funds will be in the hands of employes' benefit committees of five, to be appointed by the Board of Directors of each company. The committee of each associated company will have jurisdiction over the benefits for employes of that company.

The employes' benefit committee of the American Telephone and Telegraph Company will have general jurisdiction over the plan for the entire system and specific authority as to the American Telephone and Telegraph Company's employes' benefits.

The Cable.

Mr. M. Pettit has been appointed general superintendent of the West India and Panama Telegraph Company at St. Thomas, D. W. I., vice Robert Morrell deceased.

Mr. N. McLeod, manager of the West India and Panama Telegraph Company at Kingston, Jamaica, has been promoted to the position of assistant general superintendent of the same company with headquarters at St. Thomas, D. W. I.

Mr. S. H. A. Greet, superintendent of the Halifax and Bermudas Cable Company in Bermuda was in New York this week on his return from England, where he spent an enjoyable holiday.

Mr. John C. Hagen, superintendent of the Direct West India Cable Company at Kingston, Jamaica, who has been spending some time in Halifax, N. S., has returned to Jamaica. He was accompanied by Mrs. Hagen and their two daughters.

Central and South American Telegraph Company.—The Public Service Commission, second district, New York, has dismissed the application of the Central and South American Telegraph Company for permission to issue $2,100,000 additional capital stock on the ground that it has no jurisdiction over expenditures outside of the state.

Submarine Cable Relay.—Mr. S. G. Brown, of London, England, the inventor of the telephone relay described on page 193 of our issue for March 1, 1911, has recently patented a relay for submarine telegraph cables. Two thermo-electric couples, usually of platinum and platinum-rhodium, are mounted on the end of a light, rigid, swinging arm, controlled by the currents in the cable circuit. The couples may be heated by two small burners with fine vertical and transverse adjustments and normally lie symmetrically just outside and between them, so that they are both at the same temperature. A small movement of the couple plunges one junction into the outer portion of its flame, so that a large temperature difference is produced. The recorder coil is preferably of low resistance.

The Commercial Cable Company's New Station at Far Rockaway.—The new cable station at Far Rockaway, L. I., of the Commercial Cable Company is nearing completion and will be ready for occupancy about the first of the new year. It is a substantial structure of white brick, trimmed with granite, 100 feet long and about 70 feet wide. The distance from this station to headquarters at 20 Broad Street, New York, is twenty-two miles. Seven of the shore ends of the submarine cables extending two miles out to sea have been laid at Far Rockaway, under the direction of Capt. F. H. Lardner of the cable steamer "Mackay-Bennett," and these will be spliced to the European cables as soon as everything is in readiness. In addition to the European cables there is one to Havana, which will also be spliced and connected with the new station. Mr. Charles Priest, electrical engineer for the company has charge of the work of laying the underground cables.

The Telephone.

Mr. J. Balch, formerly assistant treasurer of the Western Telephone and Telegraph Company with headquarters at Boston, Mass., has been elected assistant treasurer of the New England Telephone and Telegraph Company at the same place.

Mr. George S. Reinoehl, formerly manager of the Pittsburgh district of the Central District and Printing Telegraph Company, has been promoted to be division manager at Harrisburg, Pa., vice J. H. Crosman, jr., who has been appointed general commercial superintendent with headquarters at Philadelphia.

Mr. Leonard H. Kinnard, general commerical superintendent of the Bell Telephone Company of Pennsylvania, Philadelphia, has been elected second vice-president and general manager of that company to succeed Mr. Philip L. Spaulding, who has been elected president of the New England Telephone and Telegraph Company, as announced in our issue for November 1.

Interurban Telephony in Italy.—A contract has been signed for the construction of telephone lines to connect various Tuscan communes.

Telephones in Victoria, B. C.—The British Columbia Telephone Company has expended $400,000 in Victoria, B. C., this year in new stations, cables and other improvements. There are now 4,000 telephones in use in the city.

Wireless Telephone.—According to a Rome, Italy, dispatch, Dr. Ricardo Moretti has succeeded, after eight or nine years of experimentation, in developing a wireless telephone which has worked satisfactorily between Rome and Tripoli.

New Telephone Lines in Brazil.—Tenders are being called for establishing telephonic communication between Rio de Janeiro and Sao Paulo, Brazil, taking in various cities on the way which so far are not in communication with either. The distance is 310 miles.

Telegraph Extensions in Venezuela.—The national telegraph system of Venezuela is to be extended 93 miles from Castillos de Guayana, the present terminus. Arrangements have been made by which telegrams from Venezuela, as well as Colombia, can be transmitted over the lines of Peru, via Ecuador, without an extra charge in rates.

Telephone Operators Rewarded.—Several hundred telephone operators of the New York Telephone Company recently received checks ranging from $25 to $100 as bonuses for good work. Nearly 1,000 operators are thus benefited and it is calculated that $35,000 will be distributed in this manner during the first year.

Story of the Telegraph and Telephone.—The October issue of the "Southwestern Telephone News," of Dallas, Tex., has an interesting article by Mr. George W. Foster, entitled "The Tale of the Telegraph and Trials of the Telephone Retold." It is an historical account of the development of these two inventions and is illustrated with portraits of the principals in the early work and views of the apparatus used. It is a very interesting and readable story.

Telegraph Telephone Calls.—The Maryland Public Service Commission has ordered the Chesapeake and Potomac Telephone Company to adopt the word "Postal" as a call-word for the Postal Telegraph-Cable Company and the words "Western Union" as a call-word for the Western Union Telegraph Company.

Municipal Telephones in Cleveland.—Mr. Allen C. Morse, formerly chief engineer of the Cuyahoga Telephone Company, Cleveland, Ohio, and now consulting engineer to the mayor of that city, has completed a plan to establish a municipal telephone system. It is estimated that such a system would cost $6,500,000 and that this expenditure would care for 65,000 subscribers. Mr. Morse advises against the city buying either of the existing telephone companies. He favors the installation of an automatic or semi-automatic system.

Constantinople Telephone System.—The Société Anonyme Ottomane des Téléphones de Constantinople expects to inaugurate its service by the end of August, 1913. The company has now a technical staff of some thirty persons engaged in supervising the laying of its lines. It has to date some 5,000 km. (3,100 miles) of cable, 3,000 km. (1,860 miles) of underground wire, and 30,000 km. (18,600 miles) of duct in position. The company has to date received subscriptions for 2,101 stations. Of the subscribers 22 per cent are purely Turkish.

The Municipal Construction Gang.—In a recent number of the Seattle (Wash.) *Times* is an illustration showing a municipal telephone construction gang in practical operation. One cross arm is being carried by five men, and four men are holding a coil of wire at the foot of a pole waiting on the lineman who, half way up the pole, has stopped to light his pipe. Other groups of men, toying with wires, holding spades, etc., are standing around talking and smoking. The picture is exaggerated a little perhaps but it illustrates the principle very well.

Russian Telephone Lines.—The number of telephone lines maintained by the Russian government is ninety-nine. The total length of these lines at the end of 1909 was 7,749 versts (approximately 5,200 miles) and of wire, 86,091 versts (approximately 57,680 miles). The area covered was 6,280 square miles with a population of 2,500,000. The principal line is that between St. Petersburg and Moscow, a distance of 415 miles. During the year the gross profit amounted to $86,684 and the expenses were $24,772, leaving a net profit of $61,912 or about twenty-seven per cent on the capital invested. There are several private telephone companies in the principal towns in the empire, the length of their lines being 2,627 versts (1,760 miles), and of wire, 272,738 versts (approximately 191,000 miles). Besides these there are 529 local lines in towns, 133 government and district lines and twenty-eight lines connecting different towns, representing a total of 26,758 miles of lines, 500,040 miles of wire, 10,729 stations and 31,064 instruments.

Delivery of Messages by Telephone.—The Western Union Telegraph Company has issued instructions that in every case where the delivery of a message has been prepaid and the message is telephoned to the addressee without expense for the telephone service, and where the addressee expresses himself as being satisfied with the telephone delivery and as not desiring the delivery of a written copy of the message by messenger, the office of destination shall notify the office of origin by mail of the facts and request the originating office to refund the delivery charge to the sender. The originating office will thereupon make such refund.

Northern Pennsylvania Telephone Society.—At the meeting of the Northern Pennsylvania Telephone Society held at Wilkes-Barre, Pa., November 15, addresses were made by Mr. John A. Hill, of the Western Union Telegraph Company, New York; Mr. L. B. Foley, superintendent of telegraph of the Lackawanna Railroad, New York, and Mr. Richard O'Brien, traffic supervisor, Western Union Telegraph Company, Scranton, Pa., and a director of the Bell Telephone Company of Pennsylvania. Mr. Hill talked on co-operation; Mr. Foley described the use of the telephone in railroad service and Mr. O'Brien related his early experiences in the telegraph and telephone business.

Loaded Telephone Lines in Europe.—In continental Europe there are now more than 6,000 miles of telephone lines loaded with Pupin coils. The longest overhead loaded lines are from Berlin to Aix-la-Chapelle, 420 miles, and from Berlin to Frankfort, 350 miles. Still longer will be the line from Berlin in Germany to Milan in Italy now under construction, 840 miles, which is to be extended later to Rome, with a total length of 1,200 miles. This, however, is still below the longest American loaded line, from New York to Denver, 1,900 miles. There are also a number of underground cables and the following submarine cables loaded with Pupin coils: From Friedrichshafen to Romanshorn, 7 miles; from Dover to Calais, 24 miles; from St. Margaret's Bay in England to La Panne in Belgium, 53 miles.

Telephonic Compensator.—Mr. S. G. Brown, of London, England, the well-known inventor of a telephone relay, has recently obtained an English patent on a method to prevent sounds entering the telephone transmitter from appreciably affecting the receiver at the same end of the line. A transmitter is shunted with a high resistance coil arranged in opposition to the primary coil of the adjacent receiver, relay or primary of the transformer used in connection with it whereby the inductive effect of the primary for current changes due to the transmitter is annulled. Telephonic relays may be arranged to work in the middle of the line with little loss in efficiency by connecting the primary of the receiving transformer in series with the secondary of the sending-on transformer and compensating the effect of the former on the latter by means of the compensation coil.

The Necessity of the Telephone.

Two hundred telephones are added every day to the New York Telephone Company's system "in and around" this city, says the New York *Evening World*. Every year, therefore, it gains 60,000 new subscribers. Population shows an average yearly increase of 133,000. The increase in telephone patrons is nearly half this figure, although the comparison can not be exact, since it includes suburbs as well as city. As fast as families can afford it nowadays, they have a telephone installed. The increase keeps pace with savings bank accounts, and helps keep down the latter. The nation-wide use of the telephone more than doubled between 1902 and 1907, in the latter year reaching 11,000,000,000 messages. In this State in the year 1907 the per capita average of messages was 128. The American people will pay in telephone tolls far in excess of $200,000,000 this year. It is hard to grasp these immense totals. Let it suffice that the telephone, the scientific toy of a generation ago, has elongated the legs and projected the voice of men, making the world a whispering gallery, realizing the myths of the Seven-League Boots and the Magic Carpet and enabling the reader to hold in a single day a greater number of significant conversations than fell to the lot of Methuselah in his nine centuries.

Miseries of French Telephone Service.

The Chinese telephone service is perhaps as bad, but certainly not worse than that of Paris, which is operated by the government, says the *Denver Republican*. American visitors prefer taking a taxicab to trying to communicate with any one by telephone.

Besides the difficulty of pronouncing the French numbers there is something most confusing in having to talk aimlessly in the direction of a seemingly blank wall. The French telephones have no mouthpieces or other device in which to talk, the subscriber, customer, victim, or whatever he may be called, merely shutting himself in a booth and talking to a piece of yellow plank which he learns at some time or other in his attempts at being friendly is a sounding board.

An annoying instance of telephonic incompetency came up recently when Doctor Serison complained of being constantly annoyed by calls from various persons whom he did not know, but who familiarly ordered him to call for their laundry or urged him "to come over to the club and take a hand at bridge."

When he investigated he found that the telephone "central" had mixed up his number with those of a highly respectable washerwoman and a most notorious sporting club. So the affable doctor brought suit before a magistrate. He was awarded $40 damages against the state. The latter appealed to a higher court, which reversed the decision, declaring that the lower courts had no right to grant damages against the state for errors due to the negligence of its employes, even in a case of operating a public service akin to a private enterprise.

Telephone Subscribers' Line Wires.*

In the early days the telephone wires connecting subscribers to the central office or exchange were very conspicuous, being run separately on poles and housetops. Today these have largely disappeared, and beyond a general notion that they are underground, it is something of a mystery to the uninitiated how the wires go from their houses and offices to the switchboard in the central office. Many people living in the suburbs of cities wonder also why the wires and cables are not so well hidden as they are in the heart of the city. It is the purpose of this article to trace the wires from the switchboard through the streets to the subscribers all over the town.

The central office building is near the center of the city, or of the section of the city it serves, if there are several central offices. The wires leaving the central office are grouped into cables, each of which contains from 100 to 600 pairs of wires, one pair for each subscriber's line. In the case of a large office with many cables, they start out from the central office in conduits, or long tubes, buried under the streets, and branch out through the streets in all directions.

Some of the cables extend only a short distance before they are connected to telephones, others are carried on to the limits of the city. If we follow one of the large cables to the section it serves, we shall find that it splits up into smaller cables, and these into still smaller cables, which spread out like the branches of a tree, so that every street has a cable large enough to serve all the subscribers expected for some time.

Not all of these cables are buried underground for their entire length, because to do so would be expensive beyond all reason. The large cables are kept together on the principal streets as far as possible, and buried, but where they thin out very much it is better to carry them in the air.

In the heart of the business district there are usually enough cables to have them entirely underground, and a small cable is led through an underground pipe into the cellar of one or more buildings in each city square or block. The other buildings in the block are reached from this one.

In the residence districts of the larger cities, where the houses are built close together in blocks, the street cables are usually underground, and a small cable is brought into each block behind the houses, where it comes up out of the ground and is carried either on poles in the alley, if there is an alley, or on the back fences or back walls of the buildings.

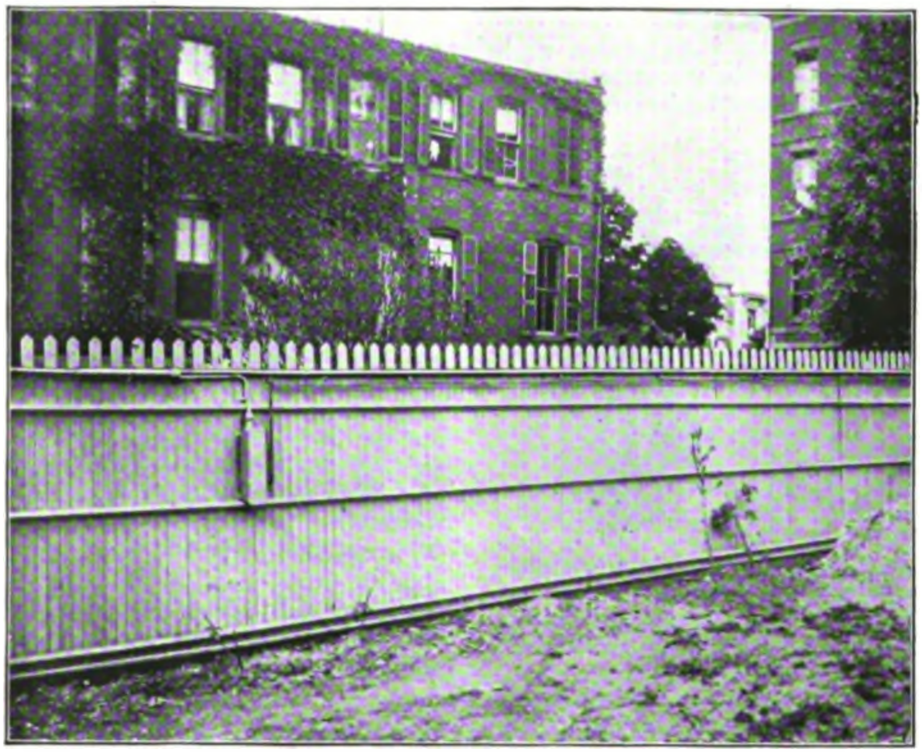

FIG. 1.—TELEPHONE CABLES ON BACK FENCE.

In this case the smallest cables are not underground, but they are not conspicuous from the street, and therefore the wires may seem to be entirely underground.

In the residence and suburban districts, where the houses are separated and there are no alleys or backyard fences, the cables are carried on poles in the streets, there being no other good place for them, and it is, of course, impossible to hide them.

*Western Electric News.

The system of cables described, starting as a large bunch of large cables at the central office, and spreading out thinner and thinner over the city so there is a cable within easy reach of every building, is what may be called permanent plant, which costs a great deal to install and is disturbed as little as possible except to add to it every few years. The telephones themselves are frequently moved, and must be connected to the permanent cables by wires which can be installed, and later removed, if necessary, without great expense.

For this purpose each branch cable ends in what is called a cable terminal. This is an iron or wooden box in which the wires of the cable are separated and provision is made so they can be easily connected to loose pairs of rubber and braid covered wires, called drop wires, which run direct to the subscribers' premises.

Frequently short branches from a cable are led to different cable terminals in the same or adjacent city blocks, so that several telephones may be

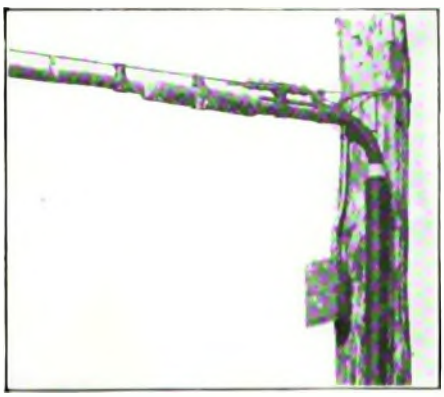

FIG. 2.—VIEW OF OVERHEAD CABLE, SHOWING MESSENGER STRAND.

connected to the same pair of wires in the cable, to make a party line.

The cable terminals may be placed in the cellars of business blocks, hotels and large apartment houses, but in the residence districts they are usually outdoors and above ground, either on the poles or the back fences or back walls of buildings. The drop wires are run along walls or fences, or through the air from the poles to the houses.

A cable consists of a bundle of wires in a lead pipe. Each wire is of pure, soft copper, usually No. 22 B. & S. gauge (1-40 inch in diameter) and is covered with a wrapping of paper. The two wires for each subscriber's line are twisted together in a pair to prevent cross talk. The largest cables contain 600 pairs, and many smaller sizes are used, down to 10 pairs.

At the ends of a cable, and wherever a smaller branch cable is spliced on to it, great care is taken to seal it against the entrance of any moisture.

Where the cables are to be placed underground a trench is dug and the required number of conduits or ducts, usually made of hard baked clay, are laid in and cemented together, so as to make long smooth pipes, one for each cable. At the street crossings or other frequent intervals the ducts run into underground chambers of brick or concrete, with iron covers. These are called manholes, and give access for splicing on branch cables or pulling in additional cables as needed.

Where the cables are to be carried overhead, poles are erected and a strong steel rope called a messenger strand is strung along from pole to pole. The cable hangs from this by hooks or loops of twine about every eighteen inches.

We will now describe how the wires in the lead-covered cables, bunched together at the central office building, are connected to the switchboard in a flexible manner, so that only the wires actually in use are connected to switchboard lines, and so that when a subscriber moves to another neighborhood and is connected to a pair of wires in another cable, this new pair of wires can be connected to the same old number in the switchboard.

For this purpose an iron framework called a main distributing frame is provided in the central office. The cables from the street are brought to one side of this frame and the wires are separated and soldered to little metal points called terminals. Other cables from the switchboard are brought to the other side of the main distributing frame and their wires are similarly separated and soldered to other terminals. Then each working line in the street cables is connected to the switchboard line of the proper number by means of a loose pair of wires called cross connecting jumpers.

On the main distributing frame are mounted also the protectors, one for each line, which keep lightning and other dangerous currents which may get on the street wires from getting to the apparatus in the central office.

Telephone Operators.—Over 50,000 young women are employed throughout the Bell Telephone system as telephone operators. The telephone industry was a pioneer in welfare work. From the earliest history of the telephone, these telephone girls have been carefully selected and trained and have been protected from overwork and unhealthful conditions. Only normal, healthy girls are selected, and those who would endanger the health of others are carefully excluded. Telephone girls are sheltered more than any other class of workers. They are not in direct contact with the public, as are girls who work in public places. They work secluded and in the rare cases where a patron is discourteous, the girls always have the remedy of not listening. As a result, the army of telephone operators is made up of bright, competent, attractive girls who are earnest and fine, and who, as a whole, range considerably above the average young woman in business life

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New York, November 16, 1912.

COPY OF STATEMENT OF OWNERSHIP, MANAGEMENT, ETC., of TELEGRAPH AND TELEPHONE AGE, required by Act of August 24, 1912.

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John B. Taltavall, publisher.
Sworn to and subscribed before me this 30th day of September, 1912.
THEODORE L. CUYLER, JR.,
Notary Public, Kings County.
Certificate filed in New York County.
(My commission expires March 30, 1914.)

Old Time Telegraphers.

When old-time telegraphers move *en masse* they generally carry everything before them, with them and after them, as was the case with the Jacksonville reunion. This particular reunion, however, is not an exception in this regard; it is the case in all their reunions, and why, it may be asked, do these people receive so much attention and consideration when they meet once a year to renew old acquaintances, make new ones and help to make telegraphic history? The Jacksonville pilgrims who sailed from New York by steamer virtually owned the ship for the time being and at Jacksonville the city received them with open arms and entertained them with an enthusiasm that was as delightful as it was sincere.

Old timers are made much of wherever they go because of their intimate relations with the life of the nation. Every one, even in the smallest hamlet, knows of the telegraph to some degree, and looks upon the telegrapher as one who has a greater insight into the mysteries of nature and science than has the ordinary layman. With this air of respect and deference on the part of the masses the telegrapher, especially the old-timer, is looked upon as an extraordinary being and one who is entitled to special recognition and favor when opportunity offers. This is why the old timers receive so many plaudits when they get together once a year to propagate the faith, look back over the past and gain inspiration and encouragement to meet the future.

The old-timers do not thus gather together for enjoyment alone; underlying their organization is the historical idea that may not always be recognized on the surface, but is silently at work accumulating records which will be a memorial of the achievements of telegraphers for all time to come.

If there were no such organization, the telegraph of the past and its splendid achievements would be forgotten and the young telegrapher of today and tomorrow would look upon a very dry and unpromising prospect were he not able to find inspiration from the high telegraphic characters of the past and their deeds.

Electric Sleep.

Almost every day some new applications of electricity are found, and who knows but what electricity may be the means of the salvation of the race. The latest use for it is indicated in some experiments made by Dr. Nagelschmidt, a German physician, who has found that sleep is induced in rabbits and dogs by the application of a suitable current to the base of the brain, and, he argues, if these animals are so affected why not human beings, as well?

This message is full of hope to those who are afflicted with insomnia. A sleep-inducing machine is a possibility of the future and then there will perhaps be no more sleeplessness. By pressing a button or turning a switch, drowsiness will come over the wire and gently steal over the senses until unconsciousness is complete.

Nothing is said, however, about turning the sleep current off. What might happen under such circumstances any one may imagine for himself. Dr. Nagelschmidt might do well in further carrying on his investigations to determine whether an alarm clock will be sufficiently noisy to wake one up out of an electric sleep in case the current is not turned off.

Wheatstone Working in Canada.

Mr. J. Lockhart, of the British Post Office, London, England, is the author of an article in the October number of "The Post Office Electrical Engineer's Journal," of London, on the subject of "Wheatstone Working Over the Pacific Cable Board's land line in Canada." The article is illustrated and Mr. Lockhart gives some construction details of the British Pacific cable itself, which runs from Bamfield Creek, Vancouver, to Australia and New Zealand.

Referring to the operation of the land line, which was leased from the Canadian Pacific Railway Company, Mr. Lockhart states that interference from neighboring circuits is abnormally great. These disturbances, however, were overcome in a satisfactory manner by the use of proper appliances. The line is operated on the Wheatstone system by the Pacific Cable Board's own staff. The repeater used on the line is briefly described and illustrated. The diagram accompanying the description shows a milliammeter on the duplex side capable of being bridged across either relay by means of a plug and jacks for increasing the accuracy of the duplex balance. This milliammeter, however, was abandoned after the first few attempts because the inductive disturbances rendered it quite valueless for the purpose for which it was supplied. Despite these disturbances, however, it was found that the maintenance of balances was very much easier than on mixed circuits in England, and that but for earth current troubles the circuit might almost take care of itself.

It was a new experience to Mr. Lockhart to find Leclanché batteries supplied for use for main line duplex Wheatstone working. No trouble was experienced with them, however, although the line was worked duplex constantly dav and night for two months. Speeds of 165 words per minute with a shunted condenser in the line between White River and Montreal, a distance of 750 miles, were at first attained, and with the addition of a condenser in the receiver circuit, they were able to get 230 words per minute. These results, Mr. Lockhart thought, are largely due to the exceptionally high insulation resistance in the dry climate of Canada.

The speed of the line was somewhat reduced on account of the necessary closing of two repeater offices, but it is still well above that of the cable and is able to carry all the traffic with which the cable is capable of feeding it.

Telephone Rate Revision in Chicago.

Mr. Edward Bemis, who has been investigating the Chicago Telephone Company in relation to a proposed revision in rates submitted his report to the committee on gas, oil, and electric light of the Chicago city council on October 31. Mr. Bemis made a critical examination of the appraisal of the physical property of the company prepared in 1911, jointly by the Arnold Company and H. M. Byllesby & Co., and concludes that items amounting to $2,065,947 should be rejected, leaving a net reproduction value of $32,259,947. After deducting depreciation, Mr. Bemis estimated the present value of the physical property in the city as $25,495,036.

A rate of return on the investment amounting to from six and one-half to seven per cent was advocated as reasonable under the circumstances. After examining the revenues and expenditures in detail, Mr. Bemis concluded that a reduction in the telephone rates which would diminish the company's revenues about $700,000 annually can be fairly made. It was suggested that part of the proposed reduction could be attained by taking $475,000 from the annual depreciation reserve and the remaining $225,000 by reducing the dividend from eight per cent to seven and one-tenth per cent on the whole property, or to six and three-quarters per cent on the city portion of the property. It was also suggested that the annual rentals paid to the parent company, the American Telephone and Telegraph Company, which will amount to some $475,000 or more in 1912, could be reduced $200,000 annually and still leave the parent company a reasonable return.

The report further states than an annual reduction of $700,000 in the company's revenue, due to reductions in rate schedules, may reasonably be expected to stimulate the growth of the company's business. While operating expenses per telephone are increasing, the investment per telephone is decreasing, and the business is growing rapidly. No recommendation has been submitted by Mr. Bemis in reference to the rate schedule.

Wireless Election Bulletins.

Very few people can fully realize the wonders of wireless telegraphy. It makes no difference where a person may be, on land or sea, he is in touch with the rest of the world and its throbbing activities. Passengers on ocean steamers, although they may be hundreds of miles from the nearest land, have the means of knowing what is going on in the rest of the world. On such an important occasion as an American presidential election the wireless has a splendid opportunity to demonstrate its extreme usefulness.

On the night of election day, November 5, wireless election bulletins were sent out by the *New York Herald* for the benefit of every one who had the means of receiving them, on land or sea. Passengers at sea received the returns as quickly as did people on land by the usual channels, and the thousands of amateur wireless land stations profited by the bulletins and enjoyed the advantages of a service that they did not pay for, yet cost thousands of dollars to provide.

How Public Ownership of Public Utilities Works in Practice.

Under public ownership it seems to be the invariable custom for employes to regard themselves as under no obligation to give value for the wages or salaries that they draw, says the Winnipeg *Post*. Loafing is looked upon as a right—ancient and inalienable—of every public servant. Consequently, a public utility, operated by a government or a municipality, is invariably operated in an extravagant manner. This does not depend upon the kind of government or municipal administration that we may have. The mental attitude of the average man towards public property is responsible. "I regard it as a duty to myself to protect my property and my interests. You regard it as a duty to yourself to protect your property and your interests. But how easy it is for both of us to be careless and neglectful in protecting the property that belongs to both of us and to every one else!"

Course of Instruction in the Elements of Technical Telegraphy—XXVII.
(Copyrighted.)

(Continued from page 704, November 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

Switches—*Continued.*

Fig. 20 shows a spring-jack switchboard at a way station. The spring-jack is the peculiarly shaped spring shown under strap 6, Fig. 20, which, when the instrument wedge is withdrawn, rests against a brass plate in metallic connection with the wire terminal. The wedge consists of two flat metal strips, insulated from each other by hard rubber. The instrument cords are connected to the strips, and to relieve some of the

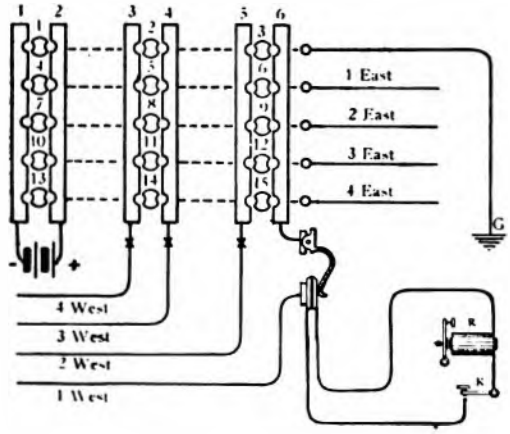


FIG. 20.—SPRING-JACK SWITCHBOARD.

strain a piece of stiff rubber tubing incloses part of the cord and wedge handle. By inserting the wedge as shown, the circuit is completed through the relay R, and if desired another instrument can be included in the circuit by inserting a second instrument wedge over the one already in position; or if the board has double spring-jacks, one below the other, the second wedge can be inserted at the remaining spring-jack. Each vertical strap or bar is provided with a spring-jack although only one is shown in the drawing, so that R may be included in any of the western wires by simply inserting the wedge at the spring-jack of the wire in question. The positions of the different spring-jacks are indicated by the mark X.

Vertical straps 1 and 2 would ordinarily be used for western wires, but to give more scope to the Question Paper they are shown in connection with the poles of a battery.

At terminal offices the western wires Nos. 1, 2, 3, 4 and 5 would represent the wires entering the board via the spring-jacks, while the eastern wire terminals would be used for batteries. For example the terminal of No. 1 east might be in connection with the copper pole of a main battery, and the terminal of No. 2 east with the zinc; so that by inserting a plug between disk 6 and vertical strap 5, the copper pole would be to line on No. 2 wire, and by inserting plugs between disk 9 and strap 6, and disk 3 and strap 6, the zinc would be to ground, No. 6 strap in this arrangement being reserved for ground. If one battery pole only were required at the board, a lead would be taken from the other pole direct to ground. A sufficient number of spare disk rows must always be left above those occupied by the batteries to afford the necessary space for wire changes without battery interference.

There is no fixed method for joining up a switchboard; the requirements of the office generally govern the strap and disk connections, but from the foregoing, the student should be able after a brief examination of the connections to make any required change.

QUESTION PAPER.

[Note.—In making the required changes quote the numbers of disks and bars between which plugs must be inserted.]

Fig. 20.

(1) (a) Join 2 east and 4 west.
(b) Join 4 east and 1 west.
(c) Join 2 west and 3 east and include test relay R.
(d) In Fig. 20 is 3 east open or closed.
(e) Ground 4 east.
(f) Ground 4 west.
(g) Put battery to 4 east, copper to line, zinc to ground.
(h) Loop 2 east and 3 east including the battery.
(i) Put battery to 1 east, zinc to line, copper to ground.
(j) Reverse the battery on 1 east.
(k) Ground 3 west and cut in there.
(l) Short circuit the battery by inserting two plugs.
(m) Ground all the western wires.
(n) Ground all the eastern wires.
(o) Open all the wires.
(p) Put 1 east to 2 west and 1 west to 2 east.

(To be Continued.)

The Wood Double Loop Repeater.

BY J. B. DILLON, DALLAS, TEX.

I have found the Wood double loop repeater to be an extremely useful device and in order to better acquaint your readers with its utility the following notes are submitted.

If one were required to repeater one quadruplex into another, and place a grounded legged loop between the two sets, it can be accomplished in this way.

Place the grounded legs in jack No. 2 of the repeater (see illustration); ground the relay side of the sending quadruplex and connect the bottom side of repeater jack No. 1 to the sending side of the other quadruplex. The receiving side of the receiving quadruplex must also be grounded and connected to the upper side of repeater jack No. 1. jack No. 2 of the repeater, and connect the main line wedge of the half repeater into the single line. Notice that the shunt current holds the Wood repeater relay closed in finding its ground on the sending side of the half-set. The single line current energizes the half-set relay and holds it closed. Current from the multiplex jack energizes and holds the repeating sounder of the Wood repeater closed, grounding it at the sending side of grounded "leg" in jack No. 1. Current from the opposite side of the multiplex jack passes through the local points of the Wood relay and grounds the receiving side of grounded leg. If the operator on the sending side of the leg opens his key, he demagnetizes the Wood repeating sounder and causes the half-set transmitter to repeat into the single line. If the single line operator opens his key the Wood relay is demagnetized and repeats into the receiving side of the

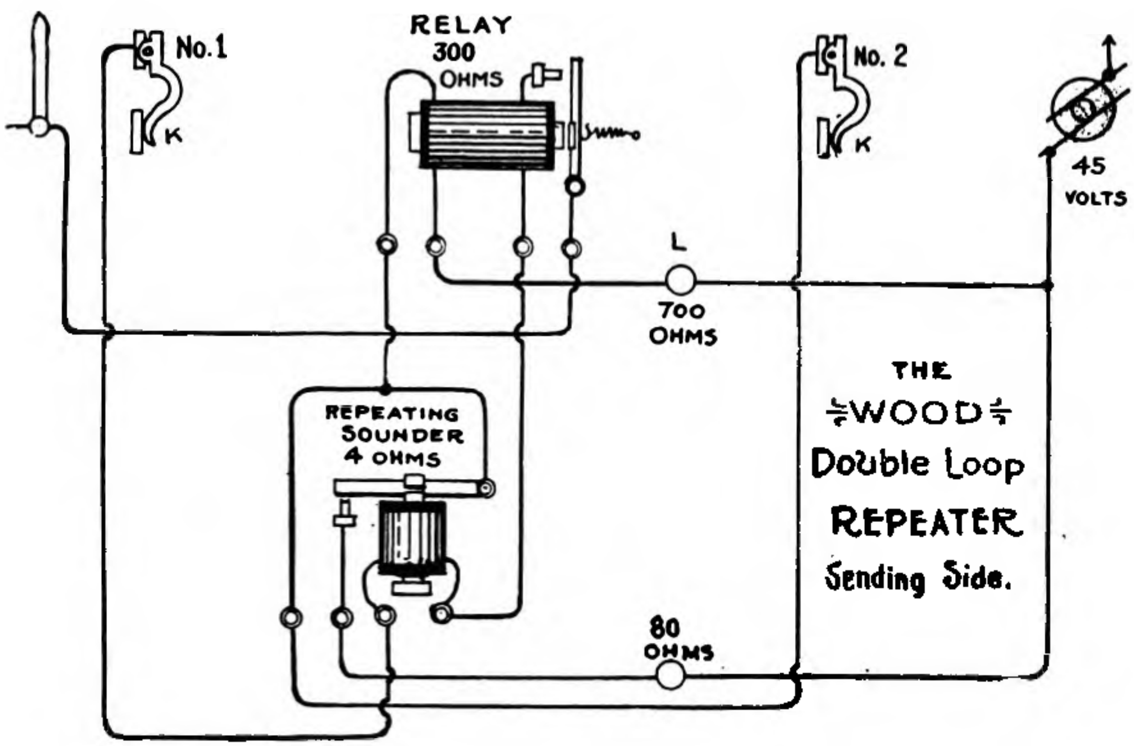


DIAGRAM OF WOOD'S DOUBLE LOOP REPEATER.

grounded leg. Hence it will be understood why the wedge in No. 1 jack is turned over, in order to gain the advantage of the proper sides on the jumper table.

To ground the receiving side of an Athearn quadruplex throw the right hand local switch lever to the right. Throwing the center lever and left hand lever to the extreme left places both receiving and the sending sides of the quadruplex to the jack board.

Suppose only a grounded "legged jumper" were available and it was desired to use it as a single line instrument. The Wood repeater will solve the problem. Place the battery to both sides of an idle multiplex jack by throwing all the switches to the left. Close the key and relay points; connect the grounded legs in repeater jack No. 1 upside down, that is to say, place the receiving side on top. Now connect a half-set to

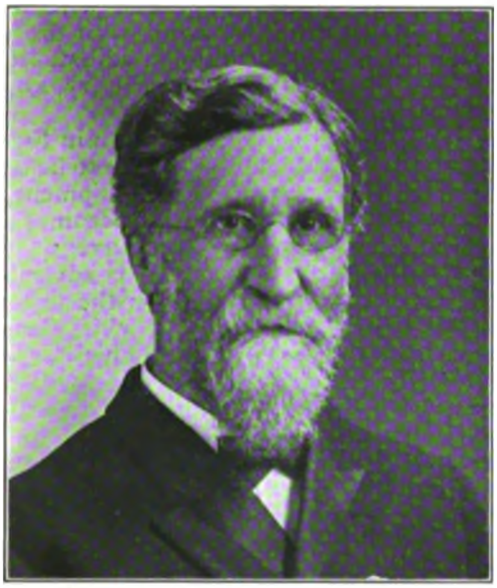
It is not advisable to wire the jumpers as straight grounded legs, yet it is easy to wire them in combination, and as a grounded leg may suffice most of the time the Wood repeater idea shown may be used in an emergency.

If the half sets are wired with local switches throw the battery to both sides of the half set, connect these sides to grounded leg jumpers and the Wood repeater will not be needed. Why waste switches on half sets nowadays when the Wood repeater is available.

Telephone Pioneers of America.

G. C. MAYNARD.

Mr. George Colton Maynard, curator division of mechanical technology, United States National Museum, Washington, D. C., was closely associated with the early development of the telephone, having entered the service in Washington, January 10, 1877. Under a contract covering all telephone business in the District of Columbia, made with Mr. Gardiner G. Hubbard, Mr. Maynard constructed and leased private telephone lines, organized the exchange business in Washington, and held the active management until



GEORGE COLTON MAYNARD.
Curator, Division of Mechanical Technology, U. S. National Museum, Washington, D. C. (1877).

March, 1881, continuing the private line interests for several years afterwards.

Mr. Maynard was born in Ann Arbor, Mich., October 23, 1839, and his early business career was associated with the telegraph. He entered the service when he was fifteen years of age as an operator on the Erie and Michigan lines. During the Civil War he joined the Military Telegraph Corps under General Thomas T. Eckert, and was employed as cipher operator in the War Department at Washington. Later he became chief operator of the Western Union Telegraph Company and afterwards re-entered the government service to organize the telegraph system of the weather bureau.

Mr. Maynard has written much on electrical and telegraphic subjects. His spare time is spent on his fruit farm in Maryland.

Electricity in Baseball Contests.

The new baseball park of the Boston Americans is equipped with the very latest electrical apparatus for scoring the game and for distributing the story of the contest to the city and to all parts of the country, says the *Electrical Review*. Behind the left fielder's territory and opposite the grandstand and pavilion a large scoreboard is operated electrically from a signaling desk in the press box, located in the center of the main stand and at the highest point in the structure. Every ball, strike-out and batter number are registered on the score board by pressing a push button in the desk set, which contains twenty-three keys, twenty-three signaling buttons, an operator's telephone set and a generator circuit. The indicators in the field score board are actuated by electromagnets, fourteen dry cells normally being used in the transmitting circuits. A telephone is also provided at the score board itself for use in setting up the score of innings.

The press box also contains a plug switchboard and circuits for sixteen telegraph instruments, including wires for the Associated Press, local press and foreign service. The features of the game are recounted by telegraph even for downtown papers, the contention being that greater speed and accuracy are obtained than with the telephone. Direct wires are in service between Boston and the home city of the visiting team at all games. Rubber-covered wires run in twisted pairs are used in all of the circuits of the press-box service.

The Late Jules Lumbard.

Jules Lumbard, whose death at Chicago on October 10, was announced in our issue for October 16, had a wide reputation during the civil war as a singer of patriotic songs. His voice was rich in tone and powerful and his songs produced a great effect upon those who had the pleasure of hearing them. Fifty years ago he and his brother Frank toured the country singing the "Battle Cry of Freedom," and they made this song so great an instrument for the inspiration of patriotism that Abraham Lincoln, at a public banquet, remarked that the singing of the two brothers got more men to enlist in the United States Army than fifty times 150 of the best recruiting officers ever addressed. Jules was credited by President Abraham Lincoln with having inspired, by means of his singing, 20,000 volunteers to enter the Union Army.

Mr. Lumbard sang in Henry Ward Beecher's church in Brooklyn, N. Y., during the sixties. He was eighty-one years of age at the time of his death, having been born at Honeoye Falls, N. Y., April 18, 1831. He was a telegrapher on the Pennsylvania Railroad early in life and afterward became a printer. Mr. Lumbard attended the reunion of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps in New York in 1905, on which occasion he delighted the members with some of his famous songs.

Installation of the Dispatcher's Station.*

BY JOHN A. KICK.

The safe and proper handling of trains is of grave concern. The dispatcher is required to plan and execute quickly with the factor of human error ever present, and every safeguard against a failure should be thrown around him in his work. Therefore, I believe a dispatcher's office should be separated from all other offices. No one should be allowed to enter except those who have company business with the dispatchers which can not wait or be handled through the chief dispatcher.

Other business carried on in a dispatcher's office results in more or less confusion to the dispatchers. This is especially so where a number of telegraph instruments on message wires keep up a constant din. Added to this may be more or less conversation on subjects not of interest to the dispatcher but bound to attract his attention.

It appears to be generally agreed that a dispatcher's office should be separated from the general telegraph office, and this being so, the question arises as to where the selective signaling equipment should be located. Some contend that the location should be in the telegraph office under the care of the wire chief; others that the dispatcher's signaling equipment should be in the dispatcher's office and so placed that tests can be made with the apparatus all under observation. The latter plan appears to be the more satisfactory and where properly carried out, excellent results are obtained.

As a general proposition I believe it is the best policy to have the lines strung and ready for service; then the dispatcher's station completely wired ready for test to the way stations as they are completed in order. Thus the installing gang can make the final adjustment on the return trip and the work is done.

The following described method of locating and mounting equipment is one which has been used quite extensively and found to be quite satisfactory. It is of course understood that conditions are sometimes met which prohibit following the details of any standard assembly of the apparatus but it will be found that cases are few where the method herein outlined will not generally meet the requirements.

A standard of protection should be adopted; a circuit for proper and positive operation; an order of installation of the units of equipment; a fixed standard of location of the units; a standard of efficiency for grounds for protectors; an alignment of mounting centers, connecting wire, capacities and methods.

It is preferable to mount the signaling equipment near the dispatcher so that the wire chief can have the dispatcher operate the signal key while the wire chief makes the relay adjustments. The proper adjustment of the signal transmitting relays is very important and will be given special mention later.

The coils, condensers, relays, switches and fuse blocks should be mounted in a cabinet or on a mounting panel. Where the equipment for two or more circuits is mounted on one panel, the mounting should be so arranged as to indicate, by position, the equipment belonging to each circuit.

It is taken for granted that the line switches, arresters and fuses, will be mounted with the arresters, fuses and general switchboard equipment, the dispatcher's office being treated as a "Drop Side" on the regular test board. The mounting panel in the dispatcher's office should be equipped with the signal apparatus with the adjustable relays mounted on a line with the eye of an average sized person, the non-adjustable condensers and coils above with the battery, switches and fuse blocks below.

This arrangement includes a switch in the main signaling battery to allow the battery to be opened while making any renewals of equipment, also fuses for protection in case the line becomes short-circuited and draws an excessive current. When a wire chief is always at hand, it is advisable to fuse the main signaling battery in the test room instead, in order that the wire chief must be called in case of fuses blowing. This is done as it has been the experience that fuses will be repeatedly renewed by those not familiar with line troubles and testing methods, while a wire chief will test the line first, perhaps saving equipment which might otherwise be damaged.

Equipment so mounted can be wired in forms to be laced, shellaced and strapped to the face of the mounting panel, making a very presentable outfit. A containing cabinet for each complete signal outfit is a preventive against accumulation of dust and in some locations is strongly advised.

The wires leading from the signaling panel to the dispatcher's table should be protected by circular loom where it is necessary to go under the floors and by trunking along walls below the chair board.

A master selector is placed with its center on the center line of the dispatcher's working position, as it is operated by either hand. The position as respects the distance from the working edge of the table is gauged by the width of the train sheets, available space, etc. Transmitter and switching keys should be placed to the left of and in a line with the face of the master selector, as these keys are worked with the left hand while using the pen in the right.

The jacks for the dispatcher's talking set should be in the apron of the table about eighteen inches to the left of the center line of the position, or at least far enough to prevent the operator's clothing from rubbing and wearing the cord where it enters the plug. It is advisable to wire-in a duplicate set of jacks in each position to allow the chief to cut in on the circuit with the dispatcher whenever necessary.

*From *Telephony*.

The dispatcher's main and local battery is best located by placing in a battery cabinet in the dispatcher's office, thus providing short runs of wire between the battery and equipment and giving means of quick action in case of battery troubles.

Some installations have been made placing the main and local battery in the attic or basement. Both places are either locked or inaccessible during the night or so difficult to inspect that the night force is unable to clear troubles, causing the system to remain out of service until morning.

Simplex coils and other equipment not in the dispatcher's signaling or telephone talking sets can be located in the telegraph office. Where a test panel is not used, the simplex coil should be placed on the circuit by using a switch which allows its removal for test.

As a general proposition telegraph and telephone operating tables should be [illegible] terminals, the wiring neatly formed and strapped up to keep the wires out of the way as well as to protect them. This method supplies an easy means of test by using a receiver across the terminals as well as serving to provide a safer way for renewals or additions.

Telephone Communication with Moving Trains.

Mr. D. D. Biggers of May, Okla., is the inventor of a system of telephone communication between railway trains and stations along the line. The train telephone is placed at any convenient place on the train.

Along the side of the rail about six or eight inches away from it a wire is held by steel clamps made of some insulating material. At the end of the wire coming from the train telephone is a wet sponge which is kept in contact with the track wire by means of an automatic arm, thus providing connection between the track wire and telephone and enabling conversation between any of the stations along the right of way and the moving train. The wire on the other side of the telephone is lead to the tender of the engine and is attached to a funnnel-shaped spout resembling an engineers' oil can. From this spout a small stream of water flows thus providing a ground connection for the telephone. The feature of this system is the method of securing electrical connection between the telephone and the track wire and between the telephone and the ground.

Mr. Biggers makes provision for the proper supply of water for these flexible electrical connections which are practically reliable. He points out the many advantages such a system as this offers for passenger train service, and claims that his invention is as practical as it is simple. Anyone interested in this invention can receive further particulars regarding it by addressing Mr. Biggers at May, Okla.

Self-Sealing Condensers.

In the early days of telephony condensers were invariably built up from solid tin foil and waxed paper. Such condensers are, however, liable to break down and become crossed or short-circuited, especially under modern conditions.

A grit in the foil or a pin-hole in the paper is sufficient to cause a breakdown and the defect can seldom be made good because the two foils become welded together by the current passing through the fault. Occasionally the weld can be burnt out by a strong current, but this generally damages the condenser seriously, because the solid foil is of appreciable thickness and requires a heavy current to fuse it. The minimum thickness of foil commercially usable is determined partly by the high cost of rolling the metal, and partly by the difficulty of handling extremely thin foil. Consequently, the foil used is much thicker than is called for by the electrical conditions.

The ideal conditions of an extremely light and thin film of metal, combined with considerable mechanical strength have been attained by Mr. G. F. Mansbridge, an English telephone engineer, who conceived the idea of employing for condenser work a specially prepared metalized paper, i. e., a paper upon which is deposited an extremely thin film of pure tin, forming an even and continuous conducting layer in absolute contact with, and inseparable from, the paper.

In this combination, the paper provides the necessary mechanical strength, and the thin film of tin the conducting electrode. The thickness of this film is such that, whereas there is ample conductivity for all telephonic currents, there is so little mechanical strength in the film alone that it instantaneously shrivels up if subjected to currents greatly in excess of its normal carrying capacity. The property of shriveling up under excessive current is of great value, since a condenser made from such material is rendered proof against breakdown from internal crossing or short-circuiting. If an internal short-circuit be accidentally or purposely produced, the condenser at once begins to discharge itself across the point of short-circuit and the momentary current concentrated at this point is strong enough to shrivel up the conducting film immediately surrounding the point. By this localized shriveling up, the film isolates itself from the point of breakdown, and the insulation of the condenser is preserved, since the heat developed by the transient current is insufficient to scorch the paper. This automatic sealing of the breakdown point may be repeated thousands of times, and still the condenser will retain its capacity and its insulation.

Local Signal Corps.—Adjutant-general Verbeck of the National Guard, State of New York, Albany, has issued an order creating the first and second companies, signal corps, of New York and Brooklyn respectively, as the first battalion signal corps of the National Guard.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "The Electric Telegraph," by F. L. Pope, is one of the most excellent books on the telegraph ever published and is a standard work of reference. It covers the entire field of telegraphy and is scientific in its treatment. For this reason and the fact that it is thoroughly exact and reliable we have chosen this work as our present text book, for the "Questions to be Answered" column. We cannot urge the student too strongly to follow the lessons from this book closely and with diligence. In order to do this and understand the subjects of the questions it will be necessary, of course, for him to have a copy of the book at hand in order to arrive at the correct answers to the questions.]

What type of battery is usually employed in telegraphy?

What are the component parts of a gravity cell?

In charging a gravity cell, why is it essential to use pure and soft water?

What is the effect of hard or impure water?

When a freshly-charged cell stands undisturbed for some time, what action takes place?

To what element of the cell do bubbles adhere?

Of what gas are the bubbles composed, and what causes the bubbles to form?

What is the chemical composition of water?

In a battery what chemical substance results from the combination of oxygen of the water and the zinc?

What becomes of the hydrogen set free by this action?

Where does this hydrogen gas come from?

If the bubbles of hydrogen are detached from the zinc element, what becomes of them?

Why do the hydrogen gas bubbles not collect on the copper element; in other words, why do they form on the zinc element?

What is the effect of adding sulphuric acid to the water and joining the zinc and copper elements by a wire?

Why do the hydrogen bubbles now collect on the copper element?

Is the presence of the hydrogen bubbles detrimental to the action of the battery?

Why does the strength of the battery diminish?

What means are employed to avoid the formation of hydrogen bubbles?

Why is the "gravity" cell so named?

How many solutions are there in a gravity cell? Name the different solutions.

Are they of equal densities?

Why do they remain separated?

What is specific gravity?

What substance is used as the standard for specific gravity?

Why does linseed oil float on the top of water?

What instrument is used to determine the specific gravity of liquids?

Describe the general construction of the instrument and how it is used.

(To be continued.)

Test Force of the American Telephone and Telegraph Company, St. Louis.

The accompanying illustration is made from a photograph of the test room employes of the American Telephone and Telegraph Company, at St. Louis, Mo., of which Mr. D. B. Grandy, a well-known old-time telegrapher is a prominent member. The names of the gentlemen shown are

MEMBERS OF THE TEST FORCE,
American Telephone and Telegraph Company, St. Louis, Mo.

(back row from left to right), O. M. Eaves, W. L. Carey, T. E. Williams, M. M. O'Neill, W. J. Powers. (Middle row from left to right), W. L. Rhoads, D. B. Grandy, J. D. Stephens, L. P. Brazell, C. A. Marsh. (Front row from left to right), M. R. Talley, F. N. Overlin.

This picture was taken during July last and since then some of the members have left St. Louis, Mr. Eaves now being in Dallas, Tex., Mr. Marsh in Las Vegas, N. M., and Mr. Carey having gone with the United Press.

Mechanical Effects of Magnetization.—An iron bar, when strongly magnetized, increases $\frac{1}{720000}$ in length, and with stronger magnetizing forces it contracts again. Iron rods stretched by a weight contract more when magnetized than unstretched rods do. At the moment when a bar is magnetized or demagnetized a faint metallic clink is heard in the bar. This is taken as proof that magnetization is an action affecting the arrangement of the molecules. A twisted iron wire tends to untwist itself when magnetized. A piece of iron, when powerfully magnetized and demagnetized in rapid succession, grows hot, as if magnetization were accompanied by internal friction.

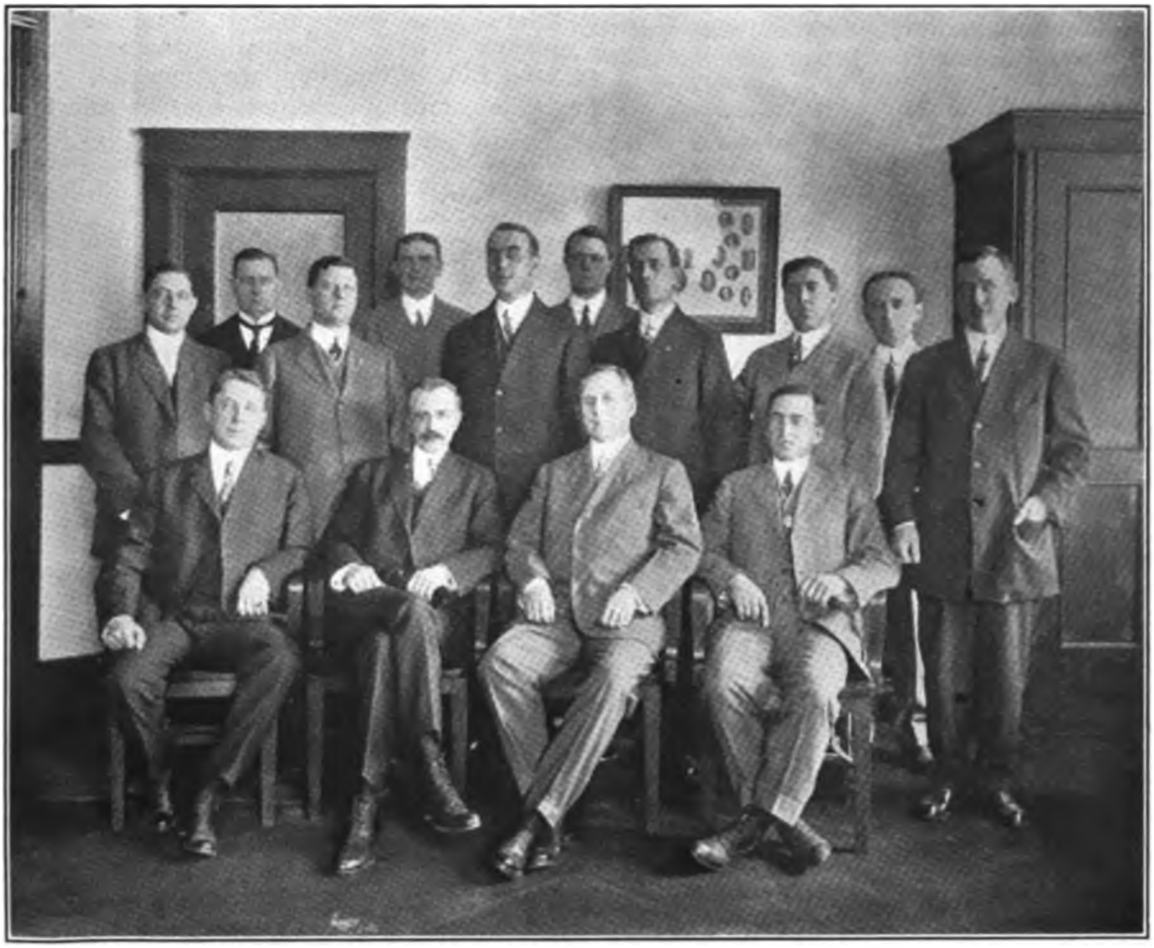
Western Union Pacific Division Officials.

The accompanying group picture, loaned by the *Journal of the Telegraph*, is of the Western Union Telegraph officials who attended the conference in San Francisco, Cal., September 14. For the purpose of identification of the various individuals their names are appended as follows:

Lower row, left to right—H. F. Dodge, division commercial superintendent; C. A. Rhodes, division auditor; H. C. Chase, division traffic superintendent; R. W. Gray, division plant superintendent, all of San Francisco.

Upper row, left to right—H. E. Dodge, chief clerk of traffic superintendent, and H. J. Jeffs, division traffic superintendent, San Francisco; Hugh McPhee, district commercial superintendent, Los Angeles, Cal.; J. G. Lay, district commercial agent, San Francisco; E. Boening, district commercial superintendent, Seattle, Wash.; Geo. E. Palmer, division traffic supervisor, San Francisco; R. H. Miller, district traffic superintendent, Los Angeles, Cal.; Geo. D. Hood, district traffic superintendent, Seattle, Wash.; A. H. May, district commercial superintendent, and G. S. Tulloch, district plant superintendent, San Francisco.

Russian Government Telegraphs.—The Russian Government telegraph lines cover 108,880 miles, with 292,994 miles of wire. Telegrams sent in 1909, numbered 33,516,196, or eleven per cent more than in 1908. Of these 28,523,000 were inland messages and 4,993,000 were exchanged with foreign countries. The former show an increase of ten and six-tenths per cent, the latter of thirteen and five-tenths per cent. The total number of words telegraphed was 463,116,000, of which eighty-seven per cent belonged to inland and thirteen per cent to foreign telegrams. The average length of each telegram was 13.81 words.



ATTENDANTS AT CONFERENCE OF WESTERN UNION OFFICIALS IN SAN FRANCISCO, CAL.

Telegraphy in Rhodesia.—The telegraph revenues in Rhodesia, South Africa, for the year 1911 were $273,482, and the expenditures $207,906, as compared with $211,380 and $236,589, respectively, in 1910. The total number of telegrams dealt with rose from 1,023,951 to 1,127,527. All of the principal towns in Rhodesia have telegraph offices and telephone exchanges. Telegrams are dispatched to points in Rhodesia at the rate of 2 cents per word, and to points in other South African States at 4 cents per word.

The United Fruit Company's Wireless Telegraph System.

Port Limon is the only Atlantic seaport of Costa Rica. It is a city of about 10,000 inhabitants, and one of the most attractive towns on the Atlantic coast in Central America. It is also the largest export centre of bananas of any single port in the world, besides doing a large export trade in coffee and cacao.

The United Fruit Company buys its wireless sets outright and operates its own system, both at shore stations and on its steamers.

The station at Port Limon was the first erected by the company, about eight years ago. Mr. H. O. Easton, a member of the force at 195 Broadway, New York, for some time, entered the service of Dr. De Forest in his early work and was sent to install the stations at Port Limon and Bocas del Toro.

Mr. M. Musgrave, well known throughout the United States by the old timers, who was at that time superintendent of the electrical department in Costa Rica for the United Fruit Company, inaugurated the wireless system and was also made superintendent. He recently resigned to go into business for himself.

After the completion of the two stations Mr. Easton remained in charge of the Port Limon station, and Frank S. Barager, another old-timer, well known at 253 Broadway, New York, took charge of the Bocas del Toro station.

For the last six years Mr. Easton has been assistant superintendent of the electrical department with headquarters in Port Limon, having charge of the wireless department and the telegraph and telephone lines of the company, which are quite extensive.

Mr. Barager resigned from the wireless department about two years ago to enter the clerical department of the Bluefields Steamship Company at Bluefields, Nicaragua, and at the time it was taken over from the hands of the receivers he was assistant manager and cashier at that point.

Mr. Charles L. Pitcher, for several years manager of the Postal Telegraph-Cable Company at Newburg, N. Y., and for a number of years employed at 253 Broadway, and well and favorably known in newspaper telegraph circles in New York, who has been in charge of the Port Limon station for the past four years recently left for a vacation in the United States, after which he will take charge of the New Orleans, La., station for the United Fruit Company.

Mr. J. W. Laughlin, formerly well known in broker circles in New York, is in charge of the Port Limon station and is assisted by J. A. Bryan of North Carolina who commenced his telegraphic career on the Seaboard Air Line, and was later with The United Wireless Company being in charge of its station at Havana, Cuba, for some time.

Conditions in this latitude are quite different from what they are in the North Atlantic where there is a practically continuous line of ships crossing. In that service if the operator can work 100 to 125 miles in day time it is all that is required of him, while along the Central American coast where ships are not so frequent the operators are expected to work at least 300 miles in day time and under certain circumstances as far as 600 miles.

Port Limon is a relay point for the United Fruit Company's stations at Bluefields, Nicaragua, Bocas del Toro, Panama, the Costa Rica government station at Barra Colorado, Costa Rica, and the ship stations at Colon, Panama. Besides working its own boats it has an operating agreement with the Marconi Wireless Telegraph Company which controls the French, Spanish, Italian and English lines landing at Port Limon, and the Telefunken Wireless Company which operate the Atlas Line of the Hamburg-American Line.

The company's business consists principally of code or foreign languages and in the matter of efficiency per kilowatt output the Port Limon station, it is stated to be second to none. This in a great measure is due to "system." Instead of spending a lot of time in useless calling and waiting for the other party to start up his generator and answer, the company has established time schedules with all its ships and stations and each man is expected to be on duty at the appointed time. His call letter is sent two or three times, the calling station signing its own call letter then the business is proceeded with. All ships that have no regular schedule are instructed to call in the same manner then wait for a reply.

With ships and stations within 300 miles a typewriter is used in receiving messages, and with good atmospheric conditions and a minimum of interference one can handle the wireless as fast as on a land line.

The Port Limon station is in what is called the "static belt." The static condition generally lasts from June to November. This has been a great bugaboo, but has been overcome to a great extent by the high frequency outfits which are being generally used now. During the past season but few schedules on account of "static," were missed.

At present the station handles most all of the company's cable business via wireless to Colon, and cable from there to the United States.

The United Fruit Company is now erecting a 50-kw. station at Santa Marta, Colombia; another is to be established at Swan Island, and another at New Orleans, La. It expects also to install a 10-kw. outfit at Port Limon. After the completion of these stations it expects to handle, by wireless, all its cable business to and from the United States.

Among the other old timers in this company's employ is William C. Pearse, chief operator on the steamer "Almirante"; Paul Bowen, chief operator on the steamer "Zacapa"; John Cole, in charge of the Cape San Antonio, Cuba, station, and John Parpel at New Orleans, La.

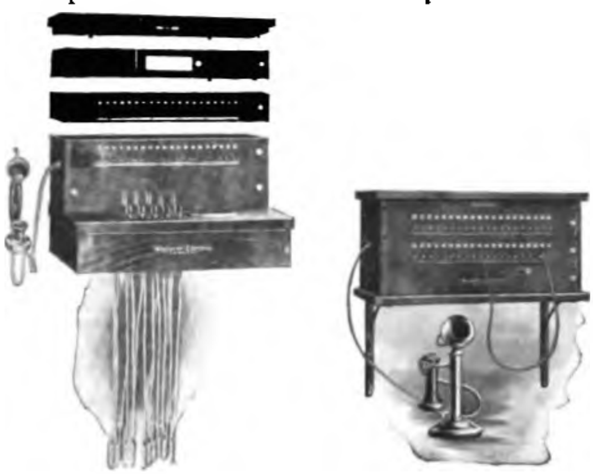
Among the younger operators in the service are Robert Smith, from Mobile, Ala., in charge of the Bocas del Toro, Panama, station: Ray H. Miller, formerly of the Western Union office in Buffalo, N. Y., and other places, in charge of the Bluefields, Nicaragua, station; E. L. Harvey, of Havana, Cuba, recently from the Southern Pacific Railroad in charge of the Colon ships.

From the United States Navy the company has in its service Geo. S. Davis, acting superintendent at New Orleans, La.; A. F. Parkhurst, wireless inspector at New York City; Ray Fuller, in charge of the Swan Island station, and Cyril D. Reinhard, at Santa Marta, Colombia.

New Sectional Unit Switchboard.

The Western Electric Company has developed and placed upon the market an intercommunicating switchboard of a distinctly unique type. It follows out the sectional unit idea used in filing systems and libraries. The purchaser need only buy as much equipment as his present needs demand. When the business expands or the necessity for additional extensions arises, he can buy another section of switchboard which will fit in with those already installed.

The sectional unit switchboard was developed to step in when the number of telephones exceeds



FIGS. 1 AND 2.—SECTIONAL UNIT SWITCHBOARD.

twenty or is likely to exceed twenty in a short time. The units fit together like those of a sectional book case; and, by adding units, it is possible to make a switchboard of twenty, forty, sixty, eighty, or one hundred line capacity.

One of the features which makes this the ideal switchboard for schools, factories, prisons and other institutions is its arrangement for sounding a general alarm. This is a means of ringing and talking to all stations simultaneously, thus providing a fire or general alarm system without extra cost.

Mr. W. F. Orr, Western Union Telegraph Company, North Adams, Mass., in renewing his subscription writes: "I cannot get along without your paper."

New Books.

"Wireless Telegraphy and Wireless Telephony," by Chas. G. Ashley and Chas. D. Hayward. Chicago: American School of Correspondence.

This latest addition to the literature on wireless telegraphy and wireless telephony is brought up to date and covers the subjects very comprehensively. The work was gotten up for the purpose of instruction in the correspondence school and is an excellent text book. The illustrations are very clear and well designed, and a careful study of the book will give one a good working knowledge of this interesting branch of the telegraphic art. The section on wireless telephony covers Bell's radiophone, selenium cell, Bell's photophone, "light telephony," telephony by means of Hertzian waves, nature of a high-frequency telephone current, oscillation generators, telephonic control of oscillations, transmitting circuits, receiving arrangements, two-way transmission, and systems of radiotelephony. The section on aeronautics covers the wireless on dirigibles and on aeroplanes, giving the earliest experiments on balloons, dangers from electric discharge, preventive methods, wireless on the Zepplins, Horton's experiments, recent records, and general problems. The book contains 144 pages and is fully illustrated.

"The Electric Telegraph," by Chas. Thom and A. Frederick Collins. Chicago: American School of Correspondence. This is a manual of complete instruction in the principles, mechanism and practices of telegraphy including multiplex and wireless systems. It is divided into two parts, Part 1 relating to wire telegraphy, the author of which is Mr. Chas. Thom, and Part 2, by A. Frederick Collins, on the subject of wireless telegraphy. It is purely instructive in character and brings the subjects up-to-date. The book contains 160 pages and 81 illustrations and its text explains the various telegraphic codes, forms of messages, press service, cipher messages, etc., and describes practical telegraphy and telegraph apparatus. By the aid of the illustrations, which are unusually clear and simple, one may readily obtain an understandable knowledge on all of the matters covered in the book. The principles of the telegraph are clearly stated, and when these are once mastered the practical applications are easily understood. The work is devoid of mathematics and the young student who is anxious to advance will find this latest book a great help. The part devoted to wireless telegraphy gives a comprehensive description of the various systems of wireless telegraphy. The price of these books is $1.00 each and copies may be obtained from TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Mr. L. W. Storror, of San Francisco, Cal., writes: "Accept my congratulations on the always progressive character of the contents of TELEGRAPH AND TELEPHONE AGE."

Loud-Speaking Telephones at Boston Electric Show.

One of the features of the recent Boston Electric Show was an exhibit of Western Electric loud-speaking telephones, which combine the articulating qualities of a telephone receiver and the sound intensifying qualities of a megaphone.

FIG. 1.—LOUD SPEAKING TELEPHONE.

Ninety of these instruments were installed in various parts of Mechanics Hall, where the show was held.

The installation of the telephones was made to demonstrate their use as announcers—to announce interesting events about to take place, to page visitors to the show, and to furnish music from a phonograph in the transmitting booth. An equally important use to which they were put was to announce the inning-by-inning scores of the World's series baseball games, a feat made possible by the co-operation of the New England Telephone and Telegraph Company and one of the leading Boston daily papers.

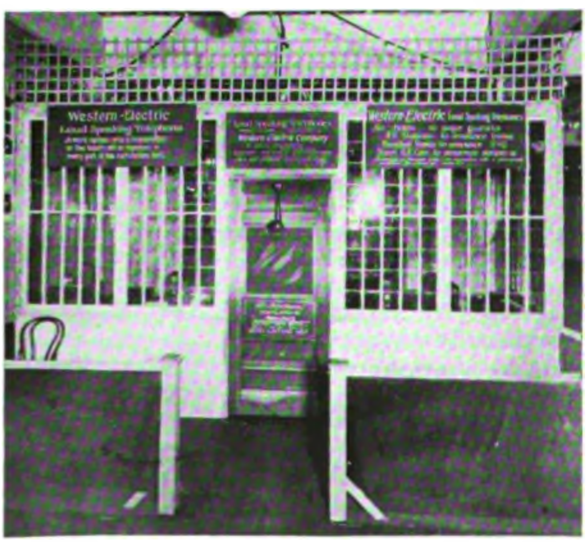


FIG. 2.—LOUD SPEAKING TELEPHONE IN USE.

The efficacy of the telephones in producing music transmitted from the phonograph in the basement booth, may be adduced from the fact that Creatore, the famous Italian band master, protested that they interfered with the music rendered by his band. Accordingly arrangements had to be made to use the telephones for furnishing musical selections only during the band pauses.

Prizes for New Subscriptions To Telegraph and Telephone Age.

It having been suggested to us that a subscription contest, similar to the one of last year, might be advantageous to the fraternity as well as to ourselves in widening the circulation of our journal we have decided to comply and therefore make the following announcement:

TELEGRAPH AND TELEPHONE AGE offers prizes to the amount of $60 in cash to those of its regularly appointed agents who send in the greatest number of new subscriptions and renewals during the months of November, December and January. The prizes will be distributed as follows: First, $25; second, $15; third $10, and fourth and fifth, $5 each.

This contest is limited to new subscriptions and renewals only and does not include book orders, on which we make very little if any profit.

The contest is urged in the interests of our circulation, which we think ought to be very largely increased during the three months named, and we are certain that with a little effort on the part of our agents they can assist us very materially to increase our field of usefulness along educational lines. Many of our agents secure subscriptions or renewals for from two to ten years. In cases like this a five or ten years' subscription will count as five or ten yearly subscribers, as the case may be. In fact, the total amount of money received for subscriptions will decide the contest. In the event of a tie on any of the prizes, the prize will be divided equally between those entitled to share in it.

Those at points where we have no agents will find it to their advantage to secure an agency appointment to canvass their section and participate in this contest.

Many subscribers can be secured in this way, and the active canvasser in a small town will find as great an opportunity to win a prize as will a regular agent in a large city. It must be remembered that all operators are not in the cities. Many permanent agencies can thus be established to the present and future advantage of those participating in the contest.

Write to J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, for fuller particulars.

Mr. C. M. Baker, assistant general superintendent of the Postal Telegraph-Cable Company, Chicago, in remitting to cover his subscription for another year, writes: "TELEGRAPH AND TELEPHONE AGE is like a temperance drink that I have read about. It gets better with 'Age.'"

The Railroad.

Mr. E. A. Klippel, who has the title of assistant general manager of the Oregon (Wash.) Railroad and Navigation Company, which was assigned to him some months ago, performs the same line of work which is usually assigned to railway telegraph superintendents, in addition to other duties.

Railroad School at Dubuque.—The Chicago Great Western Railroad has opened a school in Dubuque, Iowa, the purpose of which is to teach the practical side of the railroad business. The course covers six months. The electrical equipment is said to be very complete and every phase of telegraph work will be taught. The school will be in charge of Prof. L. B. La Force of Chicago, who is a practical railroad man of twenty-three year's experience. Mr. G. O. Perkins, superintendent of telegraph of the Chicago Great Western is a member of the educational committee. The school is conducted under the personal direction of the railroad officials.

Buffalo, Rochester and Pittsburgh to Install More Telephones.—The Buffalo, Rochester and Pittsburgh Railway Company has decided to equip an extension to its existing telephone lines. The entire equipment is to be furnished by the Western Electric Company. Two separate divisions will be equipped, both dispatchers being located at Du Bois, Pa. One circuit will extend eastward to Clearfield, Pa., a distance of about twenty miles and the other south to Indiana Junction, and thence to Vintondale, Pa., branching off at several points. The total distance covered on the Indiana branch will be approximately 100 miles. The twelve way stations on the Clearfield branch and the thirty on the Indiana branch will be equipped with selector sets, and all trains will be equipped with portable telephone sets and line poles. At sidings, wall type telephones will be installed in concrete booths.

Association Railway Telegraph Superintendents.

A joint meeting of the Eastern and Western divisions of the Association of Railway Telegraph Superintendents, will be held at 9.30 a. m., Wednesday, November 20, in the office of Wm. Bennett, superintendent of telegraph, Chicago and Northwestern Railway, Chicago, Ill.

A chairman and secretary of each division are to be elected, and such other matters discussed as may be presented.

The Automatic Electric Company, through Mr. J. H. Finley, has extended an invitation to the members to visit its works and make a trip through the Illinois Tunnel. It is planned to start from the meeting place at 2 p. m., devoting the afternoon to such an inspection.

Mr. Charles Selden, superintendent of telegraph and general inspector of transportation, Baltimore and Ohio Railroad, Baltimore, Md., and Mr. E. A. Chenery, superintendent of telegraph, Missouri Pacific Railroad, St. Louis, Mo., are chairmen of the Eastern and Western divisions of the association, respectively.

Death of F. S. Spafard.

F. S. Spafard, assistant superintendent of telegraph of the Chicago, Rock Island and Pacific Railway, died in Chicago, October 27, of cancer. Mr. Spafard was born in 1853 and entered the railway service September 15, 1869. He served in various capacities on different western railroads and was superintendent of telegraph for the Burlington, Cedar Rapids, and Northern Railway at Cedar Rapids, Iowa, from June 1, 1893, to July 15, 1902. On the latter date he accepted the position of assistant superintendent of telegraph of the Chicago, Rock Island and Pacific Railway at Chicago, Ill., which position he held at the time of his death.

Meetings of Municipal Electricians.

On Monday evening, December 9, the Philadelphia section of the American Institute of Electrical Engineers will hold a "Municipal Night," at the Engineers' Club, Philadelphia. The subject for discussion will be "Electrical Methods Used by Fire and Police Departments in Municipalities." The discussion will be opened with papers by John W. Kelly, Jr., Camden, N. J., president of the International Association of Municipal Electricians; Clayton W. Pike, chief of electrical bureau, Philadelphia, and Washington Devereux, chief electrical inspector of the Philadelphia Board of Fire Underwriters. The papers will be discussed by James B. Yeakle, superintendent of fire alarm, Baltimore, Md.; C. E. Diehl, superintendent of fire and police telegraph, Harrisburg, Pa.; Leo P. Firman, electrical bureau, Philadelphia, and others. Municipal electricians and others interested in these vital subjects are invited to attend.

An informal meeting of the International Association of Municipal Electricians will be held the same day at 10 a. m., at the Electrical Bureau, City Hall, Philadelphia, Pa., for the discussion of plans for the advancement of the interests of the association.

Telephone Extension in Venezuela.—A $20,000 company has been formed to operate a system of telephones in several towns near Rio Chico, east of Caracas, Venezuela, near the coast. The present system is to be extended. The name of the company is Teléfonos de Barlovento.

Powerful Earth Currents.—During magnetic storms earth currents on the British telegraph lines have been known to attain a strength of forty milliamperes.

Mr. U. W. Boggess, Western Union Telegraph Company, Clarksburg, W. Va., writes: "Your action in renewing my subscription is very much appreciated. I do not know what I should do without my old friend, TELEGRAPH AND TELEPHONE AGE every two weeks. It would be like losing an old associate. The paper is too valuable for a telegraph man to be without."

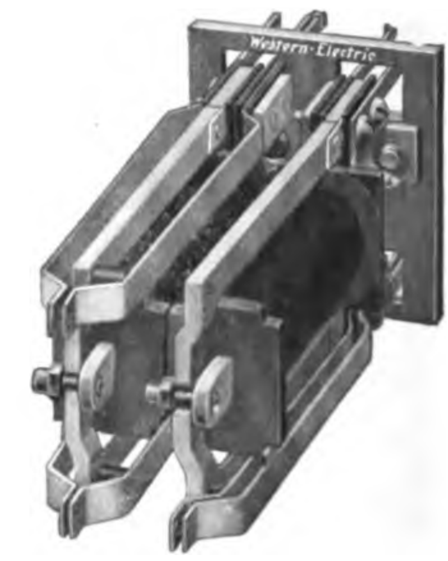
Supply Men at Conventions.

The question as to just how far the privileges of the floor should be extended to the representatives of the railway supply interests in railway conventions is a perplexing one, and all conventions have this problem to meet at some time or another in their experience. The Association of Railway Telegraph Superintendents has dealt with it, but new questions are constantly arising which render the problem not an easy one to settle. "The Traveling Engineers' Association, more than any other organization we know of," says the *Railway Age-Gazette*, "seems to be handling this problem in such a way as to secure the best results. It seems to be the practice of that association to call upon the engineering experts of the supply companies for such information as the members of the association may be specially desirous of knowing. Listed in the ranks of the railway supply fraternity are a large number of ex-mechanical department railway officers, who, when in railway service were noted for their executive ability and their engineering knowledge. In many cases since leaving railway service these men have concentrated their attention on the development and construction of railway devices, and are exceptionally well fitted for explaining to railway men just how the devices in which they are interested can best be employed and maintained. They are thus in a position to be invaluable to the mechanical department associations, and wherever desirable the associations should take advantage of this. They must make it thoroughly understood, however, that such representatives are not asked to appear before their capacity of salesmen, but as technical engineers and experts. With such an understanding there should be little possibility of the supplymen overstepping the bounds of propriety and of abusing the privileges which are extended to them. One of the most important railway supply companies is noted because its representatives, located throughout the country, are not known because of their ability as salesmen, although they are not deficient in this respect, but because of their ability as engineers. They are not only consulted by the railway officers from time to time as to difficulties arising in the handling of trains on which their apparatus is used, but are welcomed before the railway clubs and mechanical department associations, either in presenting papers or in discussing reports in which they are interested. This is a most desirable condition of affairs, and railway supplymen who are anxious to make their influence felt should use every effort, when they are thus privileged, to try to add to the occasion by giving in a dignified, clear-cut and positive way the best data and advice of which they are capable. If this course is followed and the various associations insist upon having it lived up to, a troublesome question can be solved to the mutual advantage of the railways and the supplymen."

This plan is now practiced by the Association of Railway Telegraph Superintendents and seems to be satisfactory to the members, who gain much information in this manner.

New Telephone Relay.

The Western Electric Company has developed a new telephone relay, which is of the type known as the "line and cut-off" and designed primarily for switchboard equipments. The new relay is made entirely of punchings. Numerous installations have, it is stated, already shown that, from an operating standpoint, it possesses many advantages, principally that of being easier to adjust over lines of varied length. The maximum



TELEPHONE RELAY.

line resistance over which it can be adjusted to operate satisfactorily is greater than that over which most other relays will work. It may be used in old equipments where the new and old must align with each other, although originally designed for new installations.

The contacts are more accessible, number of parts is smaller, and the instrument can be mounted on a narrower mounting. The windings are of black enameled wire; and atmospheric conditions, such as high temperature and excessive humidity have practically no effect on its operation.

Los Angeles Electrical Society.—The Western Union Electrical Society of Los Angeles, Cal., publishes a monthly magazine entitled "The Western Telegrapher." The contents of the magazine are of an instructive and gossipy nature. In the September issue TELEGRAPH AND TELEPHONE AGE is referred to in a complimentary manner as a progressive and up-to-date publication. G. C. Terry is president of the association; P. G. Tompkins, secretary-treasurer; T. W. Kane, P. G. Tompkins and G. E. Palmer, committee on education.

INDUSTRIAL.

Western Electric in Indianapolis.—The Western Electric Company has moved into new quarters in Indianapolis, Ind. The new building is five stories high, and a retail store is to be opened on the ground floor. The remaining floors are to be used for offices and warehousing. The new building will serve as a distributing point for material intended for the use of the Central Union Telephone Company.

Steel-Clad Cord Weight.

A steel-clad cord weight for telephone switchboard use, developed and manufactured by the Western Electric Company, has, it is claimed, effectually solved the problem presented by the battering which cord weights undergo when in use. It has a two-piece electro-galvanized steel shell, firmly riveted to prevent spreading. The shell is filled with lead to give the required ten-ounce weight, and is so shaped that it presents no sharp corners to damage other weights with which it may come into contact. The pulley is of hard brass with a smooth-polished surface so that wear on the cords is reduced to a minimum.

"Weekly Letters" in Texas.—Recent "Weekly Letters," of Mr. S. M. English, president of the Postal Telegraph-Cable Company of Texas, Dallas, Tex., were devoted to "Efficiency," "Lost Motion," "Room for a Good Man," "Success is always a Gradual Process with Small Beginnings," etc. These letters are full of encouragement to the employes and their effects are seen in the improvement of the service. Mr. English is giving considerable time to writing these "Weekly Letters" and he makes a strong appeal to all employes to read them and profit by them.

Mr. N. E. Smith, superintendent of telegraph of the New York, New Haven and Hartford Railroad Company, at New Haven, Conn., writes: "Your paper is indeed very interesting and instructive and I could not think of allowing it to be discontinued."

Mr. J. McMillan, superindent Canadian Pacific Railway Company's Telegraph, Winnipeg, Man., writes: "Please keep the AGE coming, as I do not wish to lose a single copy."

Radio-Telegraphy.

Re-examination of Wireless Operators.—Wireless operators are now being re-examined in compliance with the new wireless laws which go into effect December 13.

Wireless in Austria.—A wireless station has been erected at the Ministry of War, in Vienna, Austria, which has a range of about 500 km. (310 miles) reaching as far as Budapest, Prague, Krakow and Passau.

Wireless from Belgium to the Congo.—A powerful wireless telegraph station is being constructed at Laeken, near Brussels, Belgium, which will permit communication with Boma in the Congo. There are at present ten stations in the Belgian Congo.

Use of Wireless in the Eastern War.—Wireless apparatus is extensively used in the armies of Greece, Turkey and Bulgaria now at war. Before the outbreak of hostilities Germany supplied fourteen complete equipments to Greece, five to Turkey and two to Bulgaria.

Another Wireless Rescue.—An outbreak of fire occurred recently in the cargo of cotton on the steamer "Berkshire," off the coast of North Carolina, endangering the lives of one hundred passengers. Help was, however, called for by the wireless and the passengers were taken from the ship while fifty miles from land.

New Wireless Station in Germany.—A large wireless station is being erected at Neumünster, Germany. It will have three masts, each about 250 feet high, made out of a special kind of durable and tough wood. The station will be used principally for military and naval purposes, but it will also be available for the general public.

The Arlington Wireless Station.—Official tests of the Navy wireless station at Arlington, Va., were made on the night of October 8, and the results, it is reported, were satisfactory. The Federal Telegraph Company, San Francisco, Cal., has, according to reports, been invited by the Navy department to make a series of tests of the Poulsen wireless telegraph system at the new station at Arlington.

Wireless Standard Time.—One of the uses of the new wireless station at Arlington, Va., just opened by the Government will be to determine the exact time at a given moment in America and Europe by wireless telegraphy. Hitherto European and American time has been established by cable, allowances being made for loss of time in transmission, and it has been accurately fixed only three times, namely, in 1866, 1870 and 1872.

Portable Wireless Generator.—A new form of electric generator developed by the United States Signal Corps for use in connection with portable wireless telegraph sets permits of a wireless range of operation of about 15 miles. The generator is operated by two men by means of a crank. Low and high speed releases are provided which disengage the driving gear when the speed rises above or falls below the predetermined limit so that the motor may be kept at a fairly constant speed.

A Brave Wireless Operator.—The wireless operator on the Norwegian steamer "Norenga," which was badly damaged by collision at sea, November 4, refused to leave his post, while the crew favored deserting. He continued sending out calls for help and finally they were answered by the revenue cutter "Onondaga," which rescued the passengers and towed the disabled steamer to Norfolk, Va., in a sinking condition.

Extensive French Wireless Plans.—The French Government has decided to establish a series of wireless stations, connecting Paris with the various French colonies, and with North and South America. The point of connection in North America has not yet been specified, but the South American-Pacific girdle includes stations in Morocco, St. Louis, (Senegal), Martinique, the Marquesas Islands, Tahiti, Noumea, (capital of New Caledonia), and thence to Saigon, Indo-China.

Spark Gaps in Running Liquids.—In a paper read before the recent meeting of the British Association for the Advancement of Science in Dundee, Scotland, Messrs. W. H. Eccles and A. J. Makower described experiments in which spark-gaps immersed in running liquid were used for the production of electrical oscillations. The voltage required is lower than in air. The efficiency depends on the rate of flow of the liquid and on the voltage applied, but not greatly on the length of the gap. Water may be used for the purpose, but it has been found that oil has better quenching properties.

Course in Radio-Engineering at City College.—The College of the City of New York has established a course in radio-engineering as a result of the presentation to that institution by Mr. Gano Dunn, a former telegrapher, and past president of the American Institute of Electrical Engineers and of the New York Electrical Society, of a complete Poulsen radio-telegraph and radio-telephone set. Dr. Alfred N. Goldsmith, instructor in radio-engineering at the City College, gave an interesting illustrated talk regarding this apparatus at the meeting of the New York Electrical Society, October 29.

The Imperial Wireless System.—The British Postmaster-General recently made a motion in the House of Commons to appoint a select committee to investigate the circumstances connected with the negotiation and completion of the agreement between the Marconi Wireless Telegraph Company, and the Postmaster-General for the establishment of a chain of imperial wireless stations. Sir Henry Norman attacked the agreement on the ground that it was a bad bargain. He held that the stations under the agreement would not be state-owned and that the arrangement was unbusinesslike. The government might have to pay a royalty for twenty-eight years on a patent having a life of only fourteen years. Mr. H. Samuel, Postmaster-General, explained that the royalty contract could be terminated by the Postmaster-General at a moment's notice. Royalties would only be payable for valid unexpired patents. The motion was agreed to.

Second Convention of Telephone Pioneers.

As we go to press the second convention of the Telephone Pioneers of America is being held at the Hotel Astor, New York.

At the business meeting in the morning of Thursday, November 14, secretary Henry W. Pope read his annual address. He stated that during the year the membership had increased to over one thousand, much of the increase being due to the activities of the corresponding secretaries. He referred to the distinction made in the by-laws between pioneers and junior pioneers and pointed out that in time the pioneers would be automatically wiped out and the association would become an association of junior pioneers only. He stated that notice would be given at this meeting of the proposed amendments to bring about a change in the constitution and by-laws to cover this point, to be acted upon at the next annual meeting. He suggested that the time of future meetings of the association be changed to October instead of November in order that members may take advantage of reduced transportation rates then in effect.

Referring to the utility of the organization he stated that it is of greater material benefit than is generally conceded. It is very apt to be considered from a jollification point of view. On the contrary, it inculcates loyalty, steadfastness; accentuates ambition and in these respects alone justifies its existence. It sympathizes with the broad and liberal policy towards employes laid down by president Vail which eliminates labor contentions, dissatisfaction, unrest and uncertainty, and it raises the dignity, self-respect and loyalty of every member. He called attention to the interesting fact that Japanese telephone officials contemplated the formation in Japan of a similar organization to that of the Telephone Pioneers, but along somewhat modified lines. In conclusion he expressed his appreciation and thanks for the hearty support and assistance of the members in putting the organization on its feet; to the parent and associated companies and their officials for their assistance at the annual meetings; to the president, "broad in mind and stature" and to Mr. Angus S. Hibbard "whose genius in constructive entertainment you are to become cognizant of."

The attendance is over five hundred not including the ladies.

An active canvass is being made to hold the 1913 convention in Chicago and it is likely that that city will be selected.

The American Telephone and Telegraph Company invited forty guests to be present including such men as Mr. H. J. Pettengill of the Southwestern Telegraph and Telephone Company, and others. These guests are supplied with Pioneer badges with the word "guests" marked thereon. The officials of the Pioneer's association wear badges of gold ribbon; the guests and Pioneers' badges are blue and the badges of the general committee of arrangements white.

Invitations have been distributed by the Telephone Society of New York for the reception at the Hotel Astor on the evening of Thursday, November 14, and by the American Telephone and Telegraph Company to a dinner at the same hotel on Friday evening, November 15.

P. L. Spalding, President New England Telephone and Telegraph Company.

Philip L. Spalding, whose election as president of the New England Telephone and Telegraph Company, with headquarters at Boston, was announced in our issue for November 1, has been closely identified with the Bell telephone system in Pennsylvania, New Jersey, and Delaware for the past eighteen years, and since 1910 has held the position of second vice-president and general manager of the Bell Telephone Company of Pennsylvania, the Central District and Printing Telegraph Company, the Delaware and Atlantic Telegraph and Telephone Company and the Diamond State Telephone Company.

Mr. Spalding was born in Connecticut in 1871 and was graduated from Harvard University in

P. L. SPALDING,
President New England Telephone and Telegraph Company, Boston.

1892 with the degree of A. B. Two years later, he received the degrees of A. M. and B. S. for post-graduate work. He entered the telephone service in July, 1894, in the mechanical department of the American Telephone and Telegraph Company, at Boston, Mass. He went to Philadelphia in February, 1895, as general inspector, and in 1897 was made assistant engineer of the then Bell Telephone Company of Philadelphia, rising to the position of engineer three years later. In 1905 he was appointed general superintendent of the company and in 1906 was elected general manager, and continued in that position when the company was purchased by the Pennsylvania Telephone Company in 1908. In April, 1910, he assumed, in addition to his other duties, the position of general manager of the Central District and Printing Telegraph Company of Pittsburgh, and in 1911 was elected second vice-president and general manager of the Bell Telephone Company of Pennsylvania and its associated companies, and subsequently a director.

The Old Timers' Reunion.

At the reunion of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, held in Jacksonville, Fla., October 22 to 24, the following resolution was adopted:

Resolved: That in order that our campaign for securing national legislation providing for pensions for needy members of the corps shall be prosecuted with vigor, and to enable the committee on congressional action to proceed unhampered, each member of the society is urged to contribute at least one dollar to a special fund for that purpose, mailing it direct, preferably by post office order, to Mr. A. A. Zion, chairman of the committee on congressional action, Room 16, Union Station, Indianapolis, Ind., as soon as possible.

The address of Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, which was read at the reunion, was full of interesting information.

The unveiling of the bronze tablet in the Soldiers and Sailors' Memorial Hall at Pittsburgh, Pa., was referred to. This tablet, which commemorates the services of forty-three members of the Military Telegraph Corps, who volunteered from Allegheny County, Pa., during the civil war, was unveiled April 28, 1911, in the presence of Mr. Andrew Carnegie and ten survivors. A plaster replica of the tablet can be seen at the new studio of Mr. Charles Keck, 40 West Tenth St., New York.

Mr. Bates touched upon the resolutions in memory of Secretary of War Edwin M. Stanton, General Anson Stager, and General Thomas T. Eckert. These resolutions were published in TELEGRAPH AND TELEPHONE AGE, and engrossed copies were sent to the surviving relatives.

Fourteen new members were added to the roll during the year, making the total membership 278. Of this number thirty-one are sons and grandsons, leaving 247 as the number of known survivors of the corps.

Thirteen Certificates of Honorable Service, under the Act of 1897, were issued during the year, making a total of 171 certificates so far issued. Those who have not yet secured their certificates are requested to write at once to the Secretary of War, Washington, D. C.

Reference was made to the James D. Reid memorial, and all comrades and friends of the corps were urged to send contributions to Col. Albert B. Chandler, treasurer, 253 Broadway, New York.

About fifty of the old timers stopped off at Savannah on their return northward and were very royally entertained by the telegraph officials and operators of both companies in that city. Mr. W. A. Boyle, manager of the Postal Telegraph-Cable Company, Messrs. W. T. Austin, manager, and Jos. Marshall, chief operator of the Western Union office, and Mr. Harry McEwen, manager of the Western Union Cotton exchange office deserve special mention in this connection.

Living Military Telegraphers.

Following is a list of living members of the United States Military Telegraph Corps so far as known:

Abernethy, John T.
Albright, George S.
Allen, John F.
Allis, Geo. B.
Allison, George
Anderson, Joseph
Andrews, M. S.
Armes, William J.
Armstrong, S. T.
Atwater, Henry H.
Atwell, J. W.
Babcock, Jasper D.
Barnes, Cassius M.
Barton, Stephen E.
Bashford, Philip
Bassett, W. F.
Bates, David Homer
Beckwith, Samuel H.
Bender, Robert W.
Benner, Frank
Bliss, Abel H.
Bliss, J. E.
Bohle, R. H.
Boyd, Jos. W.
Brenneman, A. Thomas
Brooke, Thomas H.
Brown, Charles Exera
Brown, J. R.
Browne, Henry R.
Bruner, Philip
Brush, S. T.
Buhler, Richard E.
Bull, Henry P.
Burch, Chas. B.
Carnegie, Andrew
Cassell, J. A.
Chaddock, W. H.
Chandler, Col. A. B.
Chappell, Scott R.
Clowry, Col. Robert C.
Cochrane, Achilles P.
Cole, George
Colestock, Daniel
Conway, David T.
Cowell, Robert
Cromwell, George E.
Cronin, Daniel
Crouse, Jesse W.
Cruise, J. D.
Culbertson, Cambridge
Darlington, H. P.
David, Thomas B. A.
Davis, Frank P.
Davis, Samuel
Dealy, William J.
De Bree, Nathan
Dennis, L. B.
Denny, J. C.
Dixon, John R.
Dorchester, John C.
Dougal, William H.
Dougherty, C.
Dow, D. D.
Duell, John T.
Eitemiller, George M.
Elliott, R. H.
Evans, Frank H.
Ferris, D. V.
Fitch, Derick H.
Fitchett, Hamilton
Fonda, Ten Eyck H.
Forsey, W. S.
Fowler, J. J.
Freeland, J. W.
Frisbie, M. D.
Fuller, J. A.
Furr, R. A.
Gard, Danl. 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.
Gullihur, James K.
Hammond, Chas. D.
Hatton, O. C.
Hauxhurst, H. C.
Henderson, George
Henderson, Harvey B.
Hoge, O. E.
Holmes, George S.
Homan, Charles A.
Hood, Oliver P.
Hoover, R. B.
Hotchkiss, Z. P.
Howe, G. W.
Hull, A. K. V.
Hull, Henry P.
Huyck, Maynard
Ingram, S. E.
Ives, William L.
Jaques, Charles W.
Johnstone, W. F.
Jones, George E.
Kanode, A. H.
Kenny, Edwin
Kerbey, Joseph Orton
Kerner, Marion H.
Kettles, William E.
Knapp, Stewart W.
Knight, Frank B.
Korty, L. H.
Laird, Thomas A.
Lamb, Frank H.
Lewis, W. T.
Lindauer, A. C.
Lonergan, John
Long, F. C.
Loomis, Charles Fred
Low, George A.
Lowe, James
Ludwig, J. F.
Lyons, William J.
McCloskey, I. T.
McClure, J. P.
McIlvaine, J. F.
McKelvey, A. T.
McKenna, E. W.
McMurtry, B.
Magehan, W. H.
Maize, Isaiah D.
Martin, Henry S.
Martin, Robert W.
Mason, J. Q.
Mathews, John
Maynard, George C.
Meagher, James
Mixer, Charles H.
Moore, Charles W.
Moore, John F.
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.
Osborne, B. F. L.
Palmer, Charles H.
Parsons, James K.
Parsons, John W.
Paxson, Charles A.
Pearson, C. W.
Peel, Edwin
Perkins, George W.
Peterson, Joseph H.
Plum, Henry W.
Plum, William R.
Pope, J. William
Pritchard, John W.
Purcell, P. Jos. A.
Purnell, John H.
Railton, G. W.
Rand, D. E.
Rawlings, T. E.
Reese, Samuel
Reeves, J. E.
Reid, Douglas
Robinson, Byron L.
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.
Scanlan, John
Schnell, Joseph
Sheldon, Irvin B.
Shoch, W. W.
Sholes, Cass G.
Shrigley, James A.
Shuman, W. A.
Sloat, Harry D.
Smith, Charles W.
Smith, George K.
Smith, J. Elliott
Smith, Robert H.
Smith, Thos. H.
Smith, Walter
Snow, H. N.
Spencer, Harry B.
Sprague, Henry C.
Stewart, D. N.
Stewart, John N.
Stone, Ellis
Stumm, Frank A.
Sullivan, Daniel
Talmage, George J.
Taylor, Periander A.
Taylor, W. S.
Thode, George F.
Thode, John
Tinker, Charles A.
Tompkins, E. P.
Tyler, James D.
Van Valkenburgh, F. S.
Vincent, O. B.
Von Eye, Edward
Waddell, F. G.
Waddell, Orin J.
Walsh, Arthur
Ward, Edward T.
Watts, H. M.
Watts, John C.
Ways, Chas. E.
Webster, Geo. C.
Weitbrec, R. F.
West, H. W.
White, W. N.
Wickard, J. W.
Williams, D. A.
Williams, Rees D.
Wilson, Ellis J.
Wilson, Col. Wm. B.
Winder, Alfred
Wintrup, John
Wolffe, C.
Wood, William B.
Woodring, W. H.
Wortsman, L. W.
Zion, A. A.

Total original members of the Corps, 248.

The following military telegraphers died during the year: Bassett, W. F., Burhans, W. W., Chapman, Wilson S., Child, Hubert, Felton, G. C., Guthridge, John F., Hancock, A. G., Hatter, John C., Huntington, Geo. M., Joyce, J. F., Kiley, John K., King, Thomas M., Lantz, Jesse, McCoy, D. B., Matlock, Henry H., Phelps, Ransom, Pond, Chester H:, Power, Richard, Talbot. Robert M., and Hogan, Daniel.

H. J. Kinnucan, President Old Time Telegraphers' and Historical Association.

Mr. Henry J. Kinnucan who was elected president of the Old Time Telegrapher's and Historical Association at the Jacksonville, Fla., reunion, October 22-24, is division general agent for the Western Union Telegraph Company at Detroit, Mich. He is a native of that city and after his graduation from the public schools he entered the Western Union service in 1875 as a messenger. He was promoted to various positions until he finally became chief clerk to the superintendent. When the Postal Telegraph-Cable Company opened its Detroit office in 1891, Mr. Kinnucan was appointed manager. He afterwards became assistant superintendent of the first district and later, when the district was divided, he was appointed superintendent. He held this position until the end of 1910 when he returned to the

H. J. KINNUCAN,
President Old Time Telegraphers' and Historical Association.

Western Union service as division general agent, which position he now occupies.

Mr. Kinnucan is a man of ability and with progressive ideas, and his leadership of the old timers association bespeaks a successful and interesting meeting next year in Detroit.

Echoes of the Old Timer's Convention.

The "old salts" among the members of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps who attended the Jacksonville reunion returned to New York by steamer from Savannah. The steamer was practically turned over to them by the general agent of the line before leaving Savannah and they had the full run of the ship. The trip up the coast was an extremely enjoyable one, and all regretted that it was not longer. The old timers and their families thus brought together resolved themselves into a family gathering, and an atmosphere of harmony and enjoyment prevailed all through the voyage.

There was plenty of entertainment for all. One evening a fast-sending tournament was held, the sending being done on snapper sounders generously provided by Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York. Messrs. John McRobie of New York and J. B. Cotson of Boston acted as judges. There were several contestants, and the first prize—a miniature sounder—was won by Mr. J. B. Bertholf of Jersey City, N. J. The second prize went to Mr. H. C. Wildner of the Standard Oil Company, New York. Among the contestants were Messrs. J. J. Ghegan, J. B. Taltavall, C. A. Kilfoyle, M. H. Kerner and others.

Progressive euchre and other games were participated in during the three days' trip and the time passed very rapidly. Many of the party were made the victims of practical jokes and considerable fun was thus provoked.

Maver and Davis' Quadruplex.

"The Quadruplex," by William Maver, Jr., and Minor M. Davis, is, without doubt, the best book on this subject which has ever been produced. Being written by two operators who made an exhaustive study of quadruplex apparatus, both from the theoretical and the practical standpoint, it is strictly accurate in its details as well as being written in language which is comprehensible to any operator. Among other points which the book contains are: a chapter upon the development of the quadruplex, beginning with Edison's device of 1874; a chapter explaining the fundamental principles upon which the operation of the quadruplex depends; descriptions of transmitters, rheostats and condensers used; full explanations of the operation of the Stearns and polar duplex systems; the modifications of the duplex principles which enter into quadruplex working; the relation of the dynamo to the quadruplex system; hints regarding the care and operation of the apparatus; a chapter upon the various types of repeaters and a description of the Wheatstone automatic telegraph system. The 128 pages of this book are brimful of valuable information for the practical telegraph operator or engineer. It contains sixty-three illustrations which enable the reader to see at a glance the application of the matter set forth in the text. The price of this valuable work is $1.50, carrying charges prepaid, and orders should be addressed to J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Telephone Cable.—The Pacific Telephone and Telegraph Company recently laid a new cable across San Francisco Bay which is said to be probably the largest cable of its type ever constructed. It has 153 pairs, is 23,000 feet long, and weighs approximately 184 tons.

Long Distance Wireless Messages.—D. M. Walters and C. R. Parker, of Los Angeles, Cal., operators on the Pacific Navigation Company's steamer "Yale" recently, while the steamer was at San Pedro, Cal., heard messages transmitted from the government station at Key West, Fla., to the stations at Norfolk, Va., and Washington, D. C.

Dean M. E. Cooley, of the University of Michigan, Ann Arbor, Mich., recently received letters acknowledging the receipt of wireless messages at points distant from the wireless station at the university. One letter was received from admiral H. I. Cone at the Washington Navy Yard and another from chief operator Charles Hahne on the steamer "Matapan," who received the messages while on a recent voyage between New York and Central American ports. In each case it is stated that the signals were good.

Annual Entertainment New York Telegraphers' Aid Society.—The annual entertainment of The New York Telegraphers' Aid Society will take place Tuesday evening, November 19, at the Lexington Avenue Opera House and Terrace Garden, Fifty-eighth Street and Third Avenue, New York. This year's entertainment promises to be more enjoyable and better attended than any of the previous affairs. An excellent programme has been arranged including high-class vaudeville, followed by dancing. Mr. R. J. Marrin is chairman of the entertainment for this season. The officers of the society are: A. M. Lewis, president; J. F. Zeiss, vice-president; T. M. Brennan, treasurer; C. A. Kilfoyle, financial secretary; Mary E. Saunders, recording secretary.

Telegraph School.—The Brooklyn Telegraph School, 313 Fulton Street, Brooklyn, N. Y., is offering a course of instruction in telegraphy to young men and women. All branches of the service are taught, including wireless, commercial, railroad and stock-broker telegraphy. The school is equipped with a complete wireless station, and instruction is thoroughly practical, the aim being to fit the students to take positions of responsibility and to advance as rapidly and as far as their powers and ambitions permit.

LETTERS FROM OUR AGENTS.

WASHINGTON, D. C., WESTERN UNION.

Mr. Frank Cole of this office has accepted a position with the Baltimore and Ohio Railroad at Cumberland, Md.

Mr. Albert Hurley has been appointed a quadruplex chief in this office.

A certificate of membership in the Telegrapher's Mutual Benefit Association, 195 Broadway, New York, affording protection for the family and dependents in the amounts 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.

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

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

How to Become an Expert Electrician, Varied and Peculiar Actions of Electricity. The Art of Studying the Subject.

When you first attempted to install a burglar alarm, bell, buzzer, or other electrical device in your house you no doubt had much trouble before you finally got it to work properly. You rearranged the wire connections, changed the location of the battery, and did many other useless things before eventually seeking aid from some one better informed than yourself.

And later, having become familiar with the circuit and connections, when you attempted to construct a home-made burglar alarm it would not work notwithstanding your circuit and the connections were properly made.

Then after the faulty construction of your apparatus had been pointed out and explained to you how very simple the whole affair seemed and how easily you could thereafter construct both the apparatus and arrange the circuit whenever you desired. The trouble was, you attempted to operate an apparatus before you understood the basic principles involved in its operation, and had so vague an idea of the various effects of electricity.

The tendency of youth to miss the first step or rung in the ladder of venture and progress is only too well known, and accounts for most of the difficulties and discouragements experienced in life resulting from a false start. The secret of success lies in getting a true start and, most of all, in the development of an enthusastic spirit for carrying on the work to be done. Life's work then becomes play and it is safe to say that at least ninety per cent of young men who make enthusiasm the chief factor in their education will find it their most valuable asset. To acquire this trait is really an easy matter. It comes naturally to all who study properly, and there is an art in studying, as there is in every other undertaking.

Take, for example, the study of electricity, one of the most fascinating subjects, as well as one which opens up one of the widest fields of industry a young man could select. Electricity manifests itself in so many ways and is used for so many different purposes that the art of studying the subject lies principally in first acquiring a knowledge of the varied characteristics of electricity, instead of wasting time endeavoring to construct circuits and operate apparatus which are subject to many objectionable influences that a novice would never suspect. The study of electrical measurements and the memorizing of electrical terms should not be attempted until the early history of electricity and experiments have been read. By following this plan one learns what not to do. In other words, he acquires a knowledge of the negative side of the subject, an educational factor too frequently omitted in most text books.

It is at this point that interest should and usually does begin. As the readings progress, one soon becomes fascinated, and by the time he steps off the shoulders of the pioneers ready to take up the subject from the point where they left off, he is in a position to make rapid progress. The art of study, therefore, is really based on first acquiring sufficient preliminary knowledge of a subject to make the brain receptive and able to grasp the true significance of rules and formulas—in other words, to be able to anticipate much that is coming.

To show how fascinating the subject is, we will mention a few interesting things that preparatory reading will disclose.

First you will learn that no one knows the nature of electricity, but that we do know how to generate, measure and control it; that it is without weight or substance; that the sun is the source of all electricity and the earth the common reservoir thereof; that it is an invisible force caused by the agitation of the ether in the form of waves, the different degrees of agitation resulting in different actions and manifestations of its presence.

When the degree of agitation is greater at one point than at another, and a wire connects the two points, what is called a current of electricity will flow from the higher to the lower potential. No matter what means are employed to create such difference, chemical or mechanical, the resulting electricity developed will always be of one and the same kind, but the volume which flows through the wire is governed by the degree of potential difference between the two terminal points.

Second, you will learn that all electric currents are invariably accompanied by another form of force popularly known as magnetism, or magnetic energy; in the form of little rings of rapidly rotating ether which encircle the wire carrying the current at right angle thereto. The density of these rings is governed by the volume of current. These rotating rings constitute the active property of electricity expended in generating magnetism in iron and steel. They will not magnetize brass, copper, nickel or any other metal to any practical degree, nor will any of these metals attract or divert the normal course of the rings. The rings will pass through or around them as the case may be, but the current itself will flow through each, more freely in some than in others.

This knowledge enables one at once to recognize the purpose and fitness of the different kinds of metal used in the construction of magnetic apparatus, and tells you in advance that they are not selected haphazard for ornamental purposes, as many suppose, but from necessity, one kind to generate magnetic energy and another to prevent its waste in useless channels.

You will also learn something about magnets that many text books fail to mention. One thing is that the attractive power of a magnet is not really a manifestation of the energy of the magnetic rings themselves which flow through the iron when an electric current encircles the latter, but that the magnetic force is always present in iron, whether effective or latent. The rings are simply the agents that line up magnetic force in sufficient abundance to exhibit its presence. As a matter of fact, you cannot create a magnet, but you can combine the forces already existing, and the combination so obtained is what we usually term a magnet. The explanation is that each molecule comprising a piece of iron is a perfect magnet in itself, but owing to the irregularity and promiscuous manner in which the positions of the molecules are arranged in their natural state, their respective magnetic forces are exerted in as many different directions as there are different positions, hence the total effect is nothing.

Now when these rings encircle an iron bar the energy they exert in forcing their way through that metal aligns the molecules lengthwise in one common position, and thus enables each tiny natural magnet to exert its feeble strength in one and the same direction. The stronger the current, the more perfect the alignment, and consequently the stronger the attraction becomes. That this is what actually occurs is proven by the fact that every wire or conductor carrying an electric current becomes longer while the current flows, and shorter when it ceases.

Another curious thing is that soft iron retains magnetism only during the actual time the current flows, and loses all trace of it the instant the current ceases.

Hard iron or steel, on the contrary, develops magnetism quickly, but the magnetism does not disappear when the current is broken. Hence permanent magnets, such as the horse-shoe types, are made of fine steel, while those used for making signals, such as those for telegraph relays, bells, buzzers, etc., must be made of soft iron in order to repeat or duplicate an effect.

After this we would suggest that you learn all you can about the different kinds of batteries; why some are available for one purpose and others are not, and be particular to ascertain why. The "whys" are the most important part of the study.

Then take up electrical measurements and learn how to control electricity.

Your final success depends entirely upon how thoroughly you understand this subject.

When you have followed this line of study to the extent suggested you will then be in a position to experiment with household and other simple electrical apparatus in an intelligent and useful manner. Otherwise you will waste time and energy, and gain little or nothing by your efforts.

Telegraph and Telephone Patents.

ISSUED NOVEMBER 5.

1,043,272. Tuning Device for Wireless Telegraphy and Telephony. To W. E. D. Stokes, Jr., and G. W. Davis, New York, N. Y., and Galilee, N. J.

1,043,299, 1,043,300 and 1,043,301. Telephone System. To H. P. Clausen, Chicago, Ill.

1,043,306. Trunking Telephone System. To A. H. Dyson, Chicago, Ill.

1,043,307. Switching Key. To E. G. Eidam, Rochester, N. Y.

1,043,314. Telephone System. To C. L. Goodrum, Atlantic City, N. J.

1,043,449. Electric Telegraphic Apparatus. To H. G. Martin, East Rutherford, N. J.

1,043,526. Telephone. To R. H. Lindal, Gloucester City, N. J.

ISSUED NOVEMBER 12.

1,043,818. Non-Interference Signal Box. To G. L. Foote, Brooklyn, N. Y.

1,043,865. Telegraph Apparatus. To E. Pope, Quebec, Canada.

1,044,117. Telephone Receiver. To C. Adams-Randall, Boston, Mass.

1,044,189. Cable Telegraphy. To I. Kitsie, Philadelphia, Pa.

1,044,229. Automatic Telephone System. To E. Newhold, Friedenau, Germany.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange, November 25:

American Telephone and Telegraph Co....	142
Mackay Companies	85
Mackay Companies, preferred...........	68
Western Union Telegraph Co............	78¼

Mr. J. L. Laney, of Dallas, Tex., who has been a subscriber to this publication for thirty years, writes: "We progressives can't afford to be without our journal."

What Can Chief Operators and Operators Do to Increase the Amount of Business Handled on the Circuits of the Company?*

BY MINOR M. DAVIS, ELECTRICAL ENGINEER AND CHIEF ENGINEER OF TELEPHONES, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

Your president has asked me to say a few words about "What can chief operators and operators do to increase the amount of business handled on the circuits of the company?" Walt Mason tells us that:

"Sir Walter Raleigh sat in jail removed from strife and flurry. The light was dim his bread was stale and yet he did not worry. He knew the headsman grim and dour with sleeves uprolled and frock off might come to him at any hour and cut his bloomin block off, he knew he would forevermore with dismal chains be laden till he had travelled through the door that opens into Aden, to have his name wiped off the map King James was in a hurry and yet he was a dauntless chap and he refused to worry. Serenely he pursued his work and wrote his lustrous pages, serenely as a smiling clerk who writes for weekly wages and when the Headsman came and said: 'I hate the job, Sir Walter; but I must ask you for your head,' the great man did not falter. Gadzooks, quoth he and eke odds-fish, thou art a courteous shaver. Take off my head! I only wish I might return the favor. And so the headsman swung his axe beneath the sky of Surrey, Sir Walter died beneath his whacks, but he refused to worry."

In the days when man's best implement was a stone axe and when clothing stores were, to say the least, infrequent, fear and worry (they are the same thing) were necessary emotions. Men and women had to be apprehensive or dead and they leaned toward apprehension. Today the conditions of life are changed if not improved and fear and worry should have no place. These remarks, however, are merely introductory and they serve no purpose except that of contrast. They give your speaker the chance to say that most of us don't worry overmuch about the duties of the day and that many of us in discarding worry have with it discarded the alertness that should take its place. We meet trouble quite serenely that would not have been met had we done our part to prevent it. We shall be most effective if we leave out all hysterics; but we must be alert.

No capable engineer in a stationary plant or in the engine room of a great ocean steamer waits for anything to squeak before it gets his attention. He prevents squeaks.

Years ago there were a good many visitors to the main operating room of the Western Union Telegraph Company, at New York. "Tom" Finnegan was the doorkeeper, and it was one of his duties to take visitors about the room. After making the tour many times Finnegan adopted a routine method. A group of visitors would first be taken to a table, not far from the door, which was used for the Boston quadruplex. Finnegan would halt the visitors and say "This is the Boston quad." It was usual for one of the visitors to ask: "What is a quad?" Finnegan would pleasantly reply: "I don't know; come on." The next stop would be at the tube terminals. Finnegan would say: "Them's the pneumatic tubes; you push that handle in and you pull that handle out; come on." Thus the circuit of the office would be made.

Some chief operators and operators work on Finnegan's plan. They push in and pull out without knowing just what chain of events they cause by so doing. They make no systematic preparation for the work of the day and they think the time to lubricate is always indicated by a squeak.

Once when I was a chief operator taking care of a number of quad and duplex sets I found myself very active during the busy hours of the day jumping from one case of set-trouble to another. Each jump meant delay to the service. I determined to try the effect of systematic daily inspection and overhaul of the working parts of the sets. The result was that the sets seldom failed during the busy hours and that the work was better done with much less effort on my part.

There should be no stop in the day's service of any set of instruments working under normal conditions. Now what can a chief operator do to prepare for an uninterrupted day's run? Let us illustrate by referring to the work of a repeater chief. If the repeater chief will make daily inspection of the condition of the wiring upon the tables to see that all contacts are properly made; if he will clean and adjust the points and see that every instrument is in perfect order; if he will take pains to know the position of all the rheostat coils, of the condensers and particularly of the resistances that are in series with the condensers, he will find that interruptions caused by faults in the sets will be infrequent. I hold in my hand a copy of the inspection sheet used in the engineer's department. These sheets are of very little value for purposes of record. They are intended to suggest to the user the subjects that should get his attention. If each chief operator will check himself up with some form of mental inspection sheet he will do much to improve the service.

Now, what can an operator do to increase the amount of business handled on the circuits of the company? He can keep everything on his desk in order and provide himself with all the blanks, etc., that he is likely to need. He can be careful of the condition of his typewriter and take pains to turn out good looking copies free from split letters or other defects. As the day goes on he can be watchful to prevent errors, and he can prevent lost time in relieving, and other avoidable stops. It will not hurt him to keep his instruments and typewriter clean, and it will not hurt him to study the functions of the instruments he uses. He can

*Address before the Postal Electrical Society, New York, November 12.

be patient and pleasant and he can contribute very materially to his own comfort and to the comfort of operators working with him if he curbs the ambition of his wigwag key. It has again been recently demonstrated that wigwag keys carrying two weights make better signals than keys adjusted to high dot speeds, that the double weighted keys turn out just as much work and that the work is easier for both sender and receiver.

Certainly no operator who attends these meetings is indifferent as to the quality of the work he does, and no operator here lacks interest in the business of the company, but there are operators who think that skill in their work is the only quality they need possess. I remember a very brilliant young operator who once worked near me in a small office. He took no interest in any part of the telegraph business except the sending and receiving of messages. He would receive messages, place them in the clip and let them stay there an hour if no one took them away. The manager tried many times to get this young man to take a few steps to place received messages where they would move toward their destination. One day he said: "Mr. Blank, if messages are not promptly taken from the clip and you are too tired to move them call me and I will carry them." Shortly afterward Mr. Blank sat with both feet on his desk, doing nothing. Pointing with one foot he shouted, "Mr. Duff, here are some messages that have been here a good while." Mr. Duff came wearily and carried the messages away. Certainly the movement of traffic about the office was the manager's problem; but this young operator could have given his interest and help without effort or discomfort. He was serving neither his manager, his company nor himself. He was simply indolent and fresh.

Many, if not most, young men work with their eyes on reward and advancement. This is all well enough, but many of them appear to fail to see that by cultivating their perceptions and by increasing their knowledge they broaden themselves and are sure of a reward that in and of itself is worth much effort.

In these days of industrial warfare many men do not develop their faculties because they do not wish to give their employers more or better service than their employers pay for. They forget that only by effort and struggle to get knowledge can they grow bigger and become better fitted to serve themselves and their fellows.

The Telegraph and Telephone in Honduras.—Sixty-four miles of telegraph line were built and four new offices erected in Honduras in 1911, so that Honduras now has 3,183 miles of telegraph with 236 offices. There are sixty-eight telephones in the capital, of which four are used by private concerns, the remainder being installed in Government offices.

Telegraph Rates in China.—The Chinese telegraph rate to Europe will be reduced to eighty-five cents per word January next.

Old Telegraph Relics.

BY J. C. VAIL, MORRISTOWN, N. J.

In going over some old telegraph relics I came across pieces of the old one-line embossed tape on which, under the dots and dashes, was written in pencil the following conversation, presumably between Baltimore and Washington, as one piece was marked "B" and another "W." On what date, by whom sent, or by whom the pencilling was done, I do not know. The only uncertainty in the pencilling is as to the "3" which might have been "5."

"B—They would do the fair thing—otherwise a new plan without magnet will be used—the instruments are now making.

"Well, that remains to be seen, still I do not believe it can be effectually used without the electro-magnet.

"I thought so two months ago.

"Ha ha! and it is yet to be seen and criticized by public opinion—you may use the old 'fister' stations, but I don't believe you nor they can converse as we at this moment.

"No, nor Morse could not 3 (or 5?) years ago—he then talked and wrote about a Tel. Dictionary as being necessary.

"W-Yes, ha ha! You will see what you will.

"I admit that, but seeing is believing, everything is possible."

Perhaps some of the Old Timers can locate the date and tell what "fister" stations were.

Telegraph and Telephone in Peru.—There were thirty new telegraph offices opened in Peru in 1911, making a total of 308, of which 276 belong to the State. The total length of telegraph lines in operation in 1911 was 6,500 miles, carrying 7,794 miles of wire; 326 miles were under construction and 1,072 miles were still to be built. The number of telegrams handled was 1,678,357. The total income from the telegraph service was $161,243, and the total expenditures on the service $461,602. The investment of the State in its telegraph systems amounts to $2,136,500. In 1911 a telegraph line was built from Moyobamba, capital of the Department of San Martin, to Tarapoto, a distance of about sixty-two miles. At the end of December, 1911, there were nineteen telephone systems in Peru, with 3,800 instruments and over 10,500 miles of wire. A company known as La Empresa de Teléfonos de Arequipa y Mollendo has four centrals at Arequipa, Mollendo, Tingo, and Cachando. The material used, including the instruments, is all German.

Mr. A. W. Daniels, of Amarillo, Tex., writes: "I am very glad indeed that you kept TELEGRAPH AND TELEPHONE AGE coming to me as I feel that I could not possibly get along without it."

Mr. J. B. Prudhomme, manager of the Postal Telegraph-Cable Company of Texas, at Texarkana, Tex., in remitting to cover his subscription writes: "It is better to owe this winter and pay next fall than never to owe at all."

Personal.

Mr. Andrew Carnegie celebrated his seventy-seventh birthday on November 25 at his New York home.

Mr. C. C. Keller of New York has been transferred to the Buffalo, N. Y., office of the Postal Telegraph-Cable Company, where he will have charge of the Morkrum printing instruments for that company.

Mr. J. C. Vail, of Morristown, N. J., son of Alfred Vail, who was intimately associated with professor S. F. B. Morse in the development of the telegraph, is spending the winter in Florida and the Bahamas.

Mr. C. F. Annett, of Jerome, Idaho, a well-known old timer and formerly assistant superintendent of telegraph of the Illinois Central Railroad at Chicago, was elected justice of the peace by a large majority at the recent election in Jerome.

Mr. F. L. Gilman, whose resignation as general manager of the Missouri and Kansas Telephone Company, Kansas City, Mo., was announced in our issue for November 1, has become associated with the Western Electric Company at its Hawthorne shops.

Mr. Thomas A. Edison will, it is stated, become the active head of the Thomas A. Edison, Inc., Orange, N. J., and allied Edison interests, in place of Mr. Frank L. Dyer recently resigned. Mr. Dyer was president of the principal Edison companies fo several years, also chief legal advisor.

Mr. G. A. Kositsky has been appointed superintendent of plant, Missouri and Kansas Telephone Company, Kansas City, Mo., to succeed F. C. Moody, resigned.

Mr. H. D. McBride, superintendent of traffic, Southwestern Telegraph and Telephone Company, Dallas, Tex., has been appointed special agent to the general manager and Mr. F. W. Yensen, has been appointed to succeed Mr. McBride as superintendent of traffic.

Mr. Béla Gáti, engineer-in-chief of the Hungarian telegraph system, Buda-Pest, Hungary, has published in pamphlet form his article on "Balancing Telephone Circuits," which was printed in the Annales des Postes, Télégraphes et Téléphones, September last.

Mr. J. J. Carty, chief engineer of the American Telephone and Telegraph Company, New York, has been created a member of the Order of the Sacred Treasure by the Emperor of Japan. The investiture with the insignia of the order and the presentation of a diploma for valuable service to Japan and her people recently took place, the ceremony being conducted by Y. Numano, the Consul General. Mr. Carty already wears the decoration of the Order of the Rising Sun, conferred by the late Emperor of Japan, after the close of the war between Japan and Russia. Mr. Carty's methods of telephone engineering were adopted by the Japanese government engineers after they had investigated the subject in all of the European countries and in America.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. W. I. Capen, vice-president and general superintendent of plant of this company, New York, has gone to Chicago on a business trip.

Superintendent C. F. Leonard, of New York, has just finished an official visit of the New Jersey offices recently added to his district.

Mr. F. F. Norton, traffic superintendent, has returned from Albany where he spent several days on business connected with the service.

Mr. Isaac Smith, superintendent of tariff, was in Washington, D. C., last week on company business.

Mr. R. S. Eldredge, manager of the 92 Leonard Street office, has been absent on account of illness for the past two months and it is not expected that he will be able to resume work for some time to come.

Mr. William M. Pruyn, manager of the Postal Telegraph-Cable Company's office at Albany, N. Y., addressed a meeting of the men's club of the first Lutheran Church in that city, November 16, of the history, development and operation of the telegraph and cable system. Such addresses as these help to popularize the telegraph.

Anthony Kramer of superintendent Leonard's office, sailed on the "Bermudian" for Bermuda on a two weeks' vacation. President-elect Wilson sailed on the same boat.

Mrs. H. A. Robbin has been transferred from the Hoffman House to the Vanderbilt Hotel office.

Mrs. Nettie Williams, manager of this company's office at Chelsea, Mass., has been transferred to New York as manager of the branch office at 702 Washington street. Mrs. Williams was one of the prize-winners of the *Boston Traveler* European tours last summer and made an extensive trip through Europe.

The office at 3517 Broadway and One Hundred and Forty-fourth Street, New York, will be removed on December 1 to 548 West One Hundred and Forty-fifth Street, where larger and more up-to-date quarters have been provided.

The Cable.

Tower for Weather Signals.—The Government has completed the construction of a large steel tower on the Isles of Shoals, twelve miles off the Portsmouth, N. H., harbor. The tower will be equipped for the display of weather signals. The weather reports will be transmitted to the tower station by the Shoals Cable Company, of which Mr. T. C. Leckey is the manager at Portsmouth.

Krarup System Cable for Italy.—A cable about eighteen and one-half miles in length and with continuous loading, according to the Krarup system, has been ordered by the Italian government. The cable is made in lengths of 990 feet, and has two conductors, each consisting of seven copper wires of 0.7 mm. in diameter, upon which is wound a continuous layer of soft iron wire 0.2 mm. in diameter.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, has undergone two surgical operations in the past few days. Mr. U. N. Bethell, president of the New York Telephone Company, and vice-president of the American Telephone and Telegraph Company, announced that "Mr. Vail has been suffering for some time from chronic cystitis and attendant conditions, as the result of which an operation seemed imperative. It was thought advisable to perform the operation in two steps. The first stage has been successfully accomplished. The second operation was performed November 26, and has been well sustained. If the conditions are as satisfactory as after the first, a successful outcome is assured."

Mr. Newcomb Carlton, vice-president, New York, arrived from Europe on the steamer "Adriatic," November 22, after an absence of six weeks on company business.

Mr. A. G. Saylor, general superintendent of the Eastern Division, New York, has moved his office into temporary quarters at Room 517, fifth floor, during building operations on the company's new structure on Dey Street.

Mr. W. J. Lloyd, general superintendent, Denver, Col., was a recent New York visitor on company business.

Mr. E. M. Mulford, division commercial superintendent, New York, has returned after an absence of about ten days on company business, during which time he visited Philadelphia, Washington and Boston.

Mr. C. E. McKim, in charge of the telegraph service for the Delaware and Hudson Company, Albany, N. Y., was a recent executive office visitor on company business. Mr. McKim is also secretary and treasurer of the Adirondacks, Lake George and Saratoga Telegraph Company.

Mr. George R. Shultz, manager of the Western Union Telegraph Company at Punta Rassa, Fla., was in New York a few days ago on his annual vacation. He made his visit the occasion to call on old friends. Mr. Shultz has been located at the Punta Rassa cable station as manager for forty-six years, and is well and favorably known throughout the United States. Prior to his going to Florida he was located at Newark, N. J.

Mr. Eugene L. Morris has been appointed to the newly created position of chief operator of the Pine Bluff, Ark., office.

Mr. D. F. Ingold, night chief of the Los Angeles, Cal., office, has been promoted to be chief operator of the same office. (See biographical sketch in the adjoining column.)

Mr. John Lonergan, an old-time and military telegrapher, now living in retirement at Marysville, Kan., writes: "TELEGRAPH AND TELEPHONE AGE keeps me in touch with the old boys of long ago."

D. F. Ingold Becomes Chief Operator at Los Angeles, Cal.

Mr. David F. Ingold, chief operator of the Western Union Telegraph Company, Los Angeles, Cal., whose appointment is announced in another column of this issue, was born in Springfield, Ill., November 24, 1876, and entered the

D. F. INGOLD.
Chief Operator Western Union Telegraph Company, Los Angeles, Cal.

service of the Western Union Telegraph Company in that city as messenger. He learned telegraphy and obtained a position with the Postal Telegraph-Cable Company in Springfield, Ill., in 1893, returning, however, to the Western Union service after a few months. In the fall of 1894 he obtained a position in the Chicago office of the Western Union Company and remained there until 1898, when he went West, working at various places in Idaho, Washington and British Columbia. He returned to Chicago in 1899 but remained there only a short time. His next position was as operator at Spokane, Wash., afterwards being promoted to be day wire chief and traffic chief, a few years later becoming night chief operator in that office. In October, 1909, he went to Los Angeles for the Western Union as an extra operator and later was appointed late night chief operator, which position he held at the time of his recent promotion. Mr. Ingold is well known among the telegraph fraternity from the Pacific to the Atlantic Coast and he is receiving the congratulations of his many friends on his recent promotion.

Telegraph and Telephone in the Malay States. —The Federated Malay States have at present 1,714 miles of telegraph and telephone lines and 6,199 miles of overhead wires of which 4,005 miles were telephone wires. In addition there were some five miles of underground telephone cables. During the year 1911 over 350,000 telegrams were dispatched and about the same number received. The total number of subscribers to telephone exchanges was 726, an increase of ninety-five over the year previous.

Postal Telegraph-Cable Company's Improved Multiplex Apparatus.

BY J. F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

Mr. Minor M. Davis, the chief engineer of the Postal Telegraph-Cable Company, New York, and his assistants, have recently developed important improvements in the company's multiplex circuit arrangements and apparatus. The improvements have been thoroughly tried out on many circuits throughout the service and the equipment has now been standardized.

The broad lines laid down by Mr. Davis as a base for the development work on the improvements were that with suitable ampere-turns the magnet resistances of the apparatus used should be reduced to the lowest figure that would give satisfactory results; that the protective resistances between the generators and the transmitting apparatus should be made as low as possible with due regard to safety and freedom from interruption to service by the blowing of fuses; that sparking should be eliminated at transmitting points, and that the arrangement should be such that current strengths on the line should rise quickly to their full value. Another object was to increase the mechanical and electrical efficiency of the transmitting, receiving and other apparatus. An underlying basic premise was that the improvements should all work towards the end of reduction in line pressures so that reactions between circuits in the same cables and on the same pole lines would be minimized.

With these ends in view, therefore, the Postal engineers have made the changes indicated in the accompanying diagram which shows the theory of their improved quadruplex.

By referring to the diagram it will be noticed that the changes from the standard arrangement heretofore employed consist in the main of bridge resistances between the transmitters and the relays, a condenser across the bridge resistances, condensers with resistance in series with them to bridge the relays, a high resistance leak where the line enters the apparatus, and condensers in connection with the transmitting equipment.

The condensers with resistance in series which shunt the relays and bridge resistances accelerate the flow of current to the line. The tendency of the bridges and of the relay coils with their iron cores being to choke back the transmitting current, the outgoing wave through the bridges and relays attains its maximum strength gradually. To secure the snappiest possible action of the relays at the distant terminal it is desirable that the outgoing wave shall attain its maximum strength quickly. By using condensers around the relays the first rush of current to the line, which occurs at the moment of reversal at the polechanger points, passes around the home relays. The current strength in the line, therefore, rises quickly. The current through the relays attains its maximum value shortly after the first impulse sent by way of the condenser. The resistance in series with the condenser slightly retards the primary impulse so that it will not spend its energy before the current by way of the relays reaches the line. The combination current wave reaches its full value quickly and retains practically that full value until reversed.

The condenser shunts also have value as a path for diverting incoming inductive disturbance from the relays. These condenser shunts have a still further use as a discharge path for the relays at the moment of reversal of current, the discharged current so diverted being kept from the transmitter points and sparking being thereby reduced.

The bridge resistances between the transmitters and the relays steady the balance under varying line conditions. To illustrate: Suppose a multiplex circuit is set up without the bridges indicated and that the fair weather balancing resistance is 1000 ohms. If weather changes should reduce the line resistance 500 ohms the balance would be 50% off. Assuming that the same circuit equipped as indicated with 500 ohm bridge resistances at each terminal gives a fair weather balance of about 1500 ohms, and that the weather change causes a drop in line resistance of 500 ohms as before, the ratio of the change in balance is now 33 1-3% instead of 50%. The tendency of this bridge arrangement is, therefore, to reduce the effect upon the apparatus of line resistance changes caused by weather.

There is, of course, a critical point found in very long line circuits at which the resistance of the bridges offsets their value.

The condenser across the main and artificial line circuits between the relays and the bridge resistances accelerates the reversal of the received current by its discharge.

The condenser shown around the 600-ohm added resistance in the transmitting system bridges this coil when it is in service, that is, when the short end is to line, so as to offset any retarding effect by that coil of the quick rise to full current value in the line.

The grounded condensers shown in the generator pressure-leads are for the purpose of still further reducing sparking at the polechanger points.

The high resistance leak to earth at the point where the set connects to line is for the purpose of draining the line of static charges.

Apart from the new circuit arrangements much has been done in the improvement of the equipment itself. Instead of the so-called 300-ohm polar relay heretofore employed, a relay having 2800 turns of No. 32 single silk covered wire per spool is used. Each total winding of this relay measures approximately 200 ohms. While the relay is of the same general type as heretofore the materials used and the mechanical construction have been greatly improved. This relay is now made with a short stubby armature lever so that the amplitude of motion of the armature as compared with that of the points is much greater. This means that with a very close point adjustment the change in position of the armature in its field is much more marked. This gives the relay more positive action and greater "holding" qualities with no current on the line and steadies its operation materially. The weight of the armature has been practically cut in half, and it has been accurately balanced, with the result that the relay operates well on small current margins. The points are so arranged that they can be instantaneously pulled out of line and as quickly replaced for cleaning and filing purposes. Extraordinary care is taken to secure the best iron for cores and a high grade of magnet steel for the permanent magnets. All cores are heat-treated to eliminate residual magnetism. The armature trunnions are of new design calculated to reduce friction to a minimum. They may be quickly removed and replaced. The armature pivot pins are of hardened and tempered drill rod steel. The armature point is locked into position with a set screw and can be quickly removed and replaced, as also can the entire armature, when desired. The contact point screws can be quickly removed and replaced. All parts of these new relays are interchangeable so that minor replacements may be made at stations without the need for returning the apparatus to the repair shop. The points used on the new relays are of an alloy which resists wear and reduces the amount of necessary cleaning. The magnet adjustments are quick acting rack and pinion type. The bases are of high grade slate free from iron and are mounted on sub-bases of brass. The sub-bases in turn are fitted with soft rubber feet to minimize the effect of jars or vibration from operating tables where typewriters are used. These relays are built in the Postal Company's shop, controlled and operated by the engineering department.

A recent speed test of one of the new relays with Wheatstone transmission gave good working signals with one milliampere of current at 45 words per minute on a line of 35,000 ohms with 15 m. f. capacity.

The neutral relays used are made with a relatively long core (1⅞ inches instead of 1 1-32 inches as heretofore). It has been found that this increase in length with a new proportion of windings gives improved results over the short core type of relay.

These relays are wound with 2800 turns of No. 31 single silk covered wire per spool. Each total winding measures approximately sixty ohms. These relays are also provided with slate and metal bases with rubber feet.

The polar and neutral transmitters are identical in construction. These transmitters are provided with adjustable permanent magnets in place of springs for withdrawing the armatures from the electro-magnet cores. It has been found that permanent magnets used in this way give much better results than springs. The contacts are more positive than when a spring is employed, and there is an elimination of vibration. The trunnions of these armatures are of the same improved type used in the relays, and the armature pins are also of hardened and tempered steel drill rod. The points used are of the same alloy as in the relays and are similarly removable and interchangeable.

The adjustable balancing rheostats used in the new equipment are made with radial arms and are mounted on slate and iron. The resistance coils in them are of the enameled porcelain type. These resistance boxes are entirely fireproof and practically trouble proof. They will stand practically any amount of heat, and have been deluged with water without injury. About the only thing that can happen to them is the opening of a resistance coil, and these coils can be readily replaced.

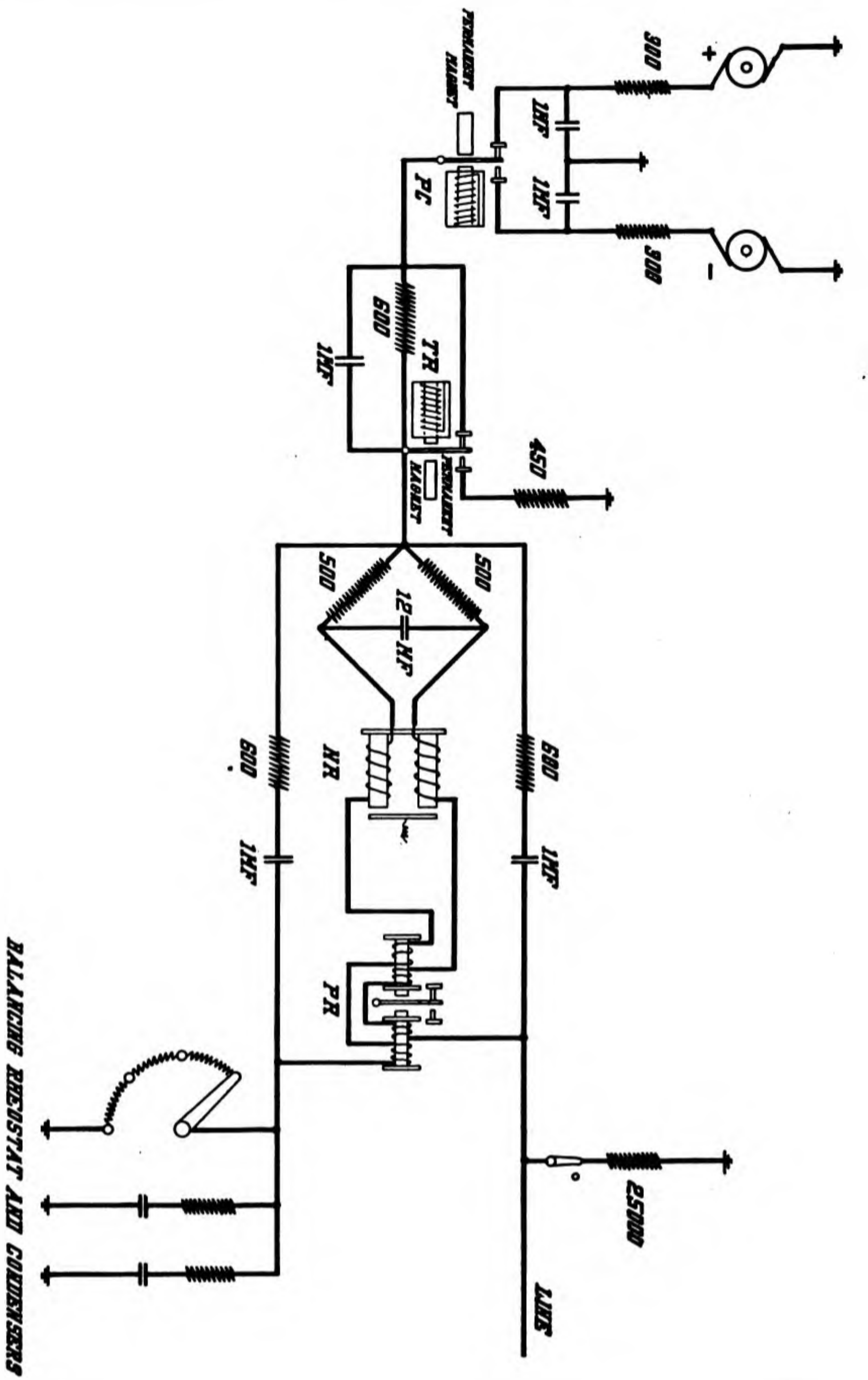
All of the condensers used are of the rolled type hermetically sealed in metal cases, the adjustable condensers being made up of 1/10 m. f. units. These units are mounted in cases so arranged that any unit may be quickly removed and replaced. A quick acting rack and pinion commutator operated by a single knob cuts capacity in and out from 1/10 to 3 m. f. in tenths of a microfarad as desired. This enables the attendant to quickly balance the capacity of the line without the need of making mathematical calculations while handling the condenser. All that is necessary to do is to turn the condenser knob until the desired capacity is obtained.

With the exception of wooden tops on the adjustable condenser cases, which are used to secure high insulation of the rack and pinion commutator, and wooden bases under the sounders to secure resonance, no wood is employed in the construction of the Postal's new equipment. Every instrument is, therefore, practically fireproof. This is an important feature in these days of high tension transmission circuits when even the momentary contact of a telegraph wire with such a circuit may start a fire at the instruments.

All of the new instruments are equipped with improved binding posts which permit of a number of wires being attached conveniently to the same post. The sets are wired up with rubber compound insulated flame proof braided wire.

The local keys used on the sets are of the so-called legless pattern with binding posts on top, in fact, every connection to the sets is made either on top of the instrument table or in the wiring cabinet at the end of the table so that all connections may be readily examined and tightened.

Upon a standard multiplex set as arranged in Postal service a sounder is placed in series with each transmitter. These sounders are mounted in resonators so that the transmitting operator may readily hear his sending without need for bending over the table. It has been found in practice that this materially increases the speed of the operator. All receiving sounders are mounted in extension arm resonators, an original Postal arrangement, which enables receiving operators to transcribe the signals without disturbance from the noise of typewriters, other equipment, etc.



THEORY OF POSTAL TELEGRAPH-CABLE COMPANY'S IMPROVED QUADRUPLEX.

The diagram of quadruplex connections indicates the Field key system as used by the Postal Company. Both the Field and Jones key systems are, however, used according to the convenience of current supply. Thus, for instance, where three wire direct current grounded neutral service is available, the short end is obtained by using current direct from the electric light feeders and the long end by boosters upon the feeders. In other cases such as where it is more economical to operate but two machines instead of four the Field arrangement, as indicated, is used.

The circuit arrangements are the subject of a patent allowed to Mr. M. M. Davis and Mr. A. J. Eaves.

Mr. J. P. O'Donohue is responsible for the improved instrument winding proportions indicated, the adoption of polar transmitters and changes in the armature proportions of the polar relays.

Mr. J. F. Skirrow worked out the structural and mechanical details of the relay and rheostat improvements and devised the new adjustable condensers.

Preservation of Poles.—The preservation of timber from decay by impregnation of the cellular tissue with various kinds of chemicals has been practiced by railroad and telegraph companies for many years, in the case of railroad ties, telegraph poles, etc., but it is only recently that public attention has been directed to the preservation of timber for general uses. The growing scarcity of timber and its consequent increase in cost, however, render recent investigations of the United States Bureau of Forestry of general interest. The expense attendant upon the erection and operation of plants for the impregnation of timber by chemicals under pressure has hitherto restrained the employment of such means to the larger corporations of the country. Investigations of the United States Forestry Bureau, however, have disclosed the fact that pressure methods are not entirely essential, although admittedly more effectual, and that an open-tank process which subjects the timber to the action of the chemical will prolong the life of the treated portion for at least several years beyond the normal life of the wood under the working conditions to which it is subjected.

The open-tank process for the treatment of poles makes possible the treatment of the base alone, and, as investigations of the government engineers have demonstrated that the height of decay extends, in the vast majority of cases, to a height of not over two feet from the ground line, it is evident that an enormous saving in material is thus accomplished.

A simple and inexpensive way of using the preservative consists in applying it to the surface of the pole with a brush. Butt treatments made in this manner with a good preservative may be expected to add two or three years to the life of the poles, and more than repay their cost, but are not as effective as the impregnation of the wood with the preservative. In the case of the open-tank process, the impregnation of many pole timbers, especially the sapwood of round timbers, may be successfully accomplished without the use of artificial pressure, by immersions in hot and cold preservative, the cold following the hot.

Preservative treatment makes possible the use of poles of smaller butt circumference, since allowances for deterioration by decay need not be made, and by the application of preservative treatment, many species of timber not naturally durable and otherwise not considered available may be used, thus opening new sources of supply, and greatly relieving the pole situation from the threatened exhaustion of those woods now commonly used.

The Submarine Signal.*

There is a method of signaling in which the telephone has an important part, but which is not like ordinary telephony, either with or without wires. It is the submarine signal. In this system the sound of a bell is carried through the water to telephone apparatus in the station, usually a ship, which is to receive it.

Sound ordinarily comes to the ear through the air, but all sorts of bodies conduct sound, solids and liquids generally much better than air. The submarine signal takes advantage of the transmission of sound through water.

The sending apparatus is a bell which is struck under water. On small boats the bells are struck by hand, while on land this is done pneumatically or electrically. To receive the signals ships are equipped with two special carbon transmitters. These transmitters are water-tight and are hung in tanks of sea water, the outer steel armor of the ship forming one wall of the tanks. They are placed one on each side of the vessel, near the prow and several feet below the water line. The transmitters are connected to receivers in the pilot house. When a submarine bell is sounded in the neighborhood of a vessel so equipped the sound is picked up by the transmitters and heard by an operator in the pilot house. If the source of the sound is well astern it will be heard very faintly, if at all. If on one side it will be much louder from the transmitter on that side of the ship. If directly ahead it will be distinct and equally loud from both sides. The direction of the bell can thus be found very easily.

Submarine signals can be heard for distances of fifteen miles. This system is a very useful adjunct to the wireless telegraph, as it is much cheaper to install and simpler to operate. The fact that the direction from which a signal comes can be found so easily is also very important. Dangerous points equipped with submarine bells rung automatically will thus warn vessels many miles off.

Many of the most important vessels on the Atlantic Ocean and the Great Lakes are equipped with submarine signal apparatus.

*From Bell Telephone News.

Telegraph and Telephone Age

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CHANGES OF ADDRESS.—In ordering a change of address the old as well as the new address must be given.

REMITTANCES to Telegraph and Telephone Age should be made invariably by draft on New York, postal or express money-order, and never by cash loosely enclosed in an envelope. By the latter method money is liable to be lost, and if so remitted is at the risk of the sender.

New York, December 1, 1912.

The Telephone Pioneers' Convention.

To say that the convention of the Telephone Pioneers of America, held in New York, November 14, 15 and 16, was the largest and most successful ever held by the association is telling the truth, but when it is remembered that only two such conventions have been held it will be seen that there is not a very wide field for comparison. But comparing this convention with similar gatherings of other associations it does not lose any lustre.

One not familiar with the facts might have assumed, as an onlooker, that it was a convention of telephone officials only, rather than officials and subordinate employes together. But in this instance they were neither; all lines of distinction were for the time being obliterated; they were all pioneers. There are no official distinctions in the membership of the association—all members are on equality. Thus it is that we find the president, vice-presidents, engineers, superintendents, linemen, clerks, etc., all mingling as brothers, bound by the bonds of fellowship in one common cause.

It is said that the character of a nation is reflected in the character of its people. And so the character of a telephone company is reflected in the character of its people; and when one looks upon a gathering of telephone pioneers it is easy to understand why the telephone industry stands so high as a model of organization and progress.

It was a delight to hear Mr. Watson's simple narrative of the early struggles of the new-born telephone for existence and a foot-hold in the skeptical world, and his story forms an appropriate supplement to the classic address of Dr. Bell at the organization meeting in Boston a year ago.

The character of such an organization as that of the pioneers must, logically, take on an historical aspect, and this fact was recognized by Mr. J. J. Carty in his address when he suggested that the words "and American Telephone Historical Society," be added to the title of the association. There are many priceless telephone relics and records scattered throughout the country. These should be collected and cared for by an authoritative body such as the pioneers' organization, so that any one interested might study the visible record of the progress of the art.

Essentially, therefore, the Telephone Pioneers' organization is historical in character, and it is interesting to note the likeness between it and the Old Time Telegraphers' and Historical Association. The telegraph and telephone interests are so closely related that it is not surprising to find them touch each other at so many points, in matters relating to the past, and to the present. The future, of course, is another affair.

The telephone pioneers are to be congratulated on their splendid and useful organization. It is useful to the members individually because it brings them into social intercourse and widens their knowledge and lives, and to the telephone interests at large because it perpetuates the achievements of the past in which every member can justly take pride.

Telegraphic Activity.

It used to be the fashion a few years ago, and is now, to a much lesser degree, however, to speak of the telegraph as an art having reached the limit of development. The fallacy of this statement in these days of greater enlightenment is so evident that a denial and proof hardly seems necessary. The telegraph is now in step with the march of progress and to assert that it is dormant and incapable of further development would be stating an untruth. It is safe to state that no art or industry has a limit of development. Expansion in any enterprise depends upon the men who manage its affairs, and upon the adoption of new ideas.

The telegraphs in this country are today in a more advanced state of development than ever before, and there is no reason why the development cannot be maintained indefinitely. An interesting feature of the expansion is the advantage gained by the public. It is enjoying greater and cheaper telegraphic facilities than ever before, and as time goes on no doubt the benefits to the people will increase. Competition is largely responsible for the existing activity, and it is gratifying to know that both companies are reaping the benefits thereof, as well as the public. The competition is along constructive lines and not destructive, which is of the healthiest kind. So long as it consists in educating the public as to the advantages of the telegraph, and providing improved means to handle the increased business no one can reasonably complain. The only limitation on the telegraph is the danger of not using it as freely as it should be used, and it is the duty of the companies to see that the public becomes acquainted with the facilities it has to offer, in order that they may be utilized. This, however, they are doing and it is gratifying to know that the public is doing their share in a satisfactory manner. It is a campaign of education and will yield abundantly as time passes.

Telephone Diaphragm of New Design.

How incapable our physical senses are of telling us the truth concerning any subject under consideration is well known. The eyes cannot analyze what we see, nor the ears what we hear, and were it not for the power of analysis possessed by the trained human mind we would be in a state of woeful ignorance concerning the things about us.

To most people a telephone diaphragm is a piece of sheet iron which is supposed to vibrate in unison with the sound waves impinged upon it, but to the scientific mind it has a far deeper meaning. He knows that its action involves many facts that the senses are incapable of revealing, and that reasoning and experimentation alone can lead us toward the truth.

Mr. Andrew Plecher in an article printed on another page of this issue throws some light on this interesting subject. He endeavors to show not only the acoustical but the electrical necessity of the magnet of a telephone receiver to act on a tuned diaphragm, and not on a solid or drumlike diaphragm. Nevertheless, the acoustical necessity of a drumlike diphragm acting effectively upon the air stands out paramount. These apparently contradictory necessities cannot, he points out, be satisfied in the same diaphragm except by having the outer part cut and the inner part solid, necessarily sustained by a circular fulcrum and acted upon by an annular core magnet at the periphery, on the tongues and not on the solid inner portion, the latter merely acting as the sounding board for the vibrating tongues.

The correctness of Mr. Plecher's analysis of the action of the telephone diaphragm is for the telephone engineer to determine by actual experimentation, but in any event it shows that what often appears to be a simple thing is indeed very complex when we dig below the surface appearances.

Delay in Delivery of Telegraph and Telephone Age.

Complaint is made of delay in the delivery of Telegraph and Telephone Age, particularly at points far distant from New York. The fault lies entirely with the post office authorities, who now transport newspaper mail by freight instead of by passenger trains, as heretofore. Our issue dated November 16 was mailed on the afternoon of November 15. Under the new order of things copies going to points 1,000 miles or more from New York are subject to a delay of a week or ten days. All periodicals are suffering in like manner from the retrogression of the American post office department, so our subscribers are not the only ones who have reason to complain.

Wide Distribution of Corporate Earnings.

One of the most interesting facts in connection with the industrial development of the country is the increasing number and wide distribution of shareholders in large public service and other corporations, as shown by statistics recently prepared. It is a healthy condition, and will tend, more than anything else, to break down the barriers that apparently exist in some quarters, between capital and labor, or employer and employe. Employes of many large corporations are becoming shareholders in the business in which they are engaged, to the substantial benefit of themselves as well as the employing interests. These relations between employer and employe tend to promote and stimulate confidence between the two, and should be encouraged. The telegraph and telephone companies afford excellent examples of co-operation and its benefits.

Secrecy in Radio Messages.

The act of Congress to regulate radio communication, approved August 13, 1912, provides in the nineteenth regulation and in the seventh section, respectively, as follows:

Nineteenth. No person or persons engaged in or having knowledge of the operation of any station or stations, shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorized agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punishable by a fine of not more than two hundred and fifty dollars or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

* * *

Sec. 7. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than one thousand dollars or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offense.

The Department of Commerce and Labor, Washington, D. C., has issued a card containing these provisions to be posted in radio stations.

Course of Instruction in the Elements of Technical Telegraphy—XXVIII.

(*Copyrighted.*)

(*Continued from page 735, November 16.*)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

SINGLE CIRCUITS IN BAD WEATHER.

It has been previously stated that high adjustments become necessary in wet weather, but we have not as yet shown why the weather conditions should affect the working of a circuit, and the adjustments of the line relays.

Dry air and glass being insulators, as already noted, it may be assumed that under favorable weather conditions the perfect insulation of the line at the different points of support is assured, and that the line wire forms the only path for the current. If the circuit be broken at any point along the line under these conditions, the cores of each relay in the circuit will be immediately demagnetized, and so long as the insulation remains constant there will be no necessity for readjustments.

In damp, foggy or rainy weather, however, the poles and glass insulators become coated with moisture, and, water being a conductor, a new path is opened to the current at each support, as shown in Fig. 21.

The resistance of the wire itself is not affected by the weather, and the line still forms the easiest path for the current, but though the separate resistances of the paths formed by the moisture may be very high, it must be remembered that these circuits are all derived circuits, and that the current divides at each insulator inversely as the respective resistances of the line and derived circuits beyond, and the short leakage circuit down the pole to ground. The resistance of the whole circuit is greatly reduced by the large number of parallel circuits introduced, and the output of current from B and B' (Fig. 21), increased in proportion, causing a greater attractive force between the relay cores and armatures, but, while each relay will respond promptly to the opening of its own key, neither R nor R' will, on a normal dry weather adjustment, respond to the opening of the key at the distant station. The reason of this is that when K' is opened, as in the figure, the circuit of battery, B, is not broken, but is still completed through the derived circuits, and, while a break at station Z cuts off B' from the circuit and causes a still further diminution in the current in R, owing to the greater resistance of the derived circuits which now form the only paths to ground, still the magnetism excited in R by the leakage currents alone are sufficiently powerful to overcome the retractile force ordinarily exerted by the armature spring, and the relay remains closed when it ought to respond to the broken circuit at Z.

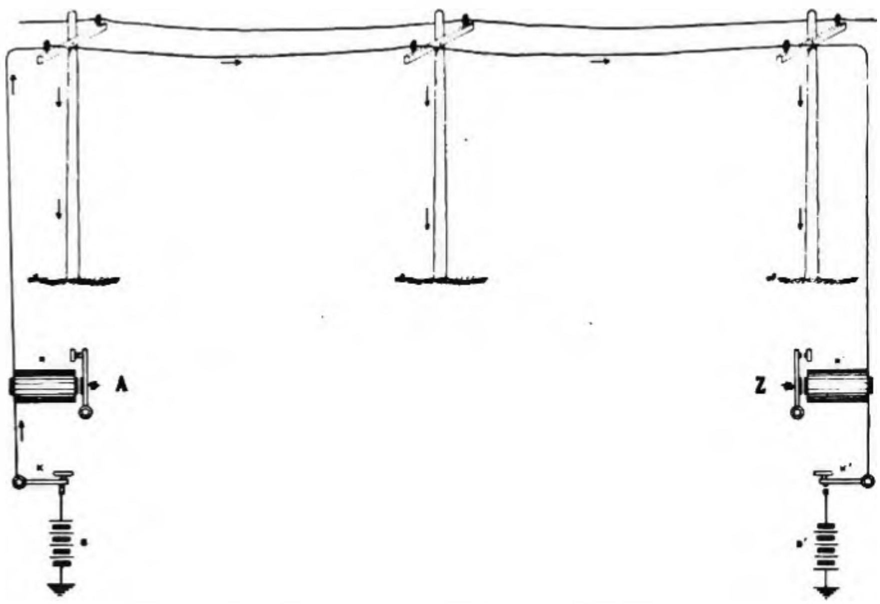

FIG. 21.—DIAGRAM SHOWING WEATHER LEAKAGE.

Unless, therefore, the sending operator is on the lookout at such times, he may be perfectly unconscious of any change, and will continue to send his business until advised via another route to see to his adjustment.

In order to get the distant station's signals under such circumstances it is necessary to withdraw the magnet poles from the armature, and to perhaps pull up a little on the armature spring until the tension of the retractile spring overcomes the pull of the magnets, and opens the relay.

On this high adjustment the relay at A responds to the closing of the distant key on account of the consequent decrease in circuit resistance and the addition of the distant battery to the circuit, whereby the current strength in R is increased, and opens because Z, by opening his key, cuts off his battery from the circuit, and forces the current from B to find ground through the higher resistance offered by the derived circuits.

These increment currents represent the only working margin for the operation of the relay, and it will be evident that when the loss on the line is considerable, they will possess but little strength, and produce comparatively small effects upon the receiving relay, which is not then so susceptible to their influence as under ordinary working adjustments.

(To be Continued.)

M. F. Robinson, of Sanford, Fla., an Active Old Timer.

Mr. Merritt Fletcher Robinson, Sanford, Fla., was one of the most active members of the Old Time Telegraphers and Historical Association and U. S. Military Telegraph Corps in attendance at the Jacksonville reunion in October. This gentleman has had a remarkably varied and successful

M. F. ROBINSON, SANFORD, FLA.

business career, starting in 1861 as a telegrapher on the Lake Shore & Michigan Southern Railway at Painesville, Ohio, and afterwards at Perry and Madison, Ohio.

Mr. Robinson was born at Harmonburg, Pa., October 10, 1843. In early life he was employed on his father's farm and afterwards clerked in a general store at Conneautville, Pa.

During the Civil War he was engaged in the military telegraph service and at the close of the war he located for a short time in Kentucky, where he leased and bought oil land. He was operator and manager of the United States Telegraph Company at Meadville and Franklin, Pa., after the Civil War, and later became manager and press operator of the Western Union Telegraph Company at Titusville, Pa.

Mr. Robinson's wide activities in other lines are briefly enumerated as follows: Member of the firm of Frederick M. Robinson and Brother, manufacturers of farm implements and saw mill machinery, besides operating a planing mill and lumber yard at Conneautville, Pa., and a lumber yard at Beaver Falls, Pa.; special agent for the Singer Sewing Machine Company in New York, Pennsylvania and Ohio; chief bookkeeper in the Exchange Bank, Franklin, Pa.; acting cashier, First National Bank, Conneautville, Pa.; city agent at Pittsburg, Pa., for the Travelers Insurance Company; state agent for the same company at Indianapolis, Ind.; cashier and afterwards president of the Bank of Seville, Seville, Fla.

Mr. Robinson during most of the time has been dealing in real estate as a side issue and at one time owned a large amount of land in Texas. He has been a large owner of orange grove property in Florida, and still owns and manages eleven orange groves, besides owning several large tracts of land in that state.

Mr. Robinson is one of the prominent citizens of Sanford, Fla. He is president of the Sanford Hospital Association and is connected with several business enterprises in Florida. He was alderman at Sanford for twelve years, and at the present time is special agent for the Travelers Insurance Company in the real estate and loan department, which position he has held for thirty-five years.

From the foregoing it can be easily seen what an active career Mr. Robinson has had. He renewed many old friendships and made many new ones during the recent reunion. When asked to what particular characteristic he attributed his uniform success? he said: "The key to success is prompt payment. I have never in my life made it necessary for any one to present a bill to me the second time."

Electrical Developments.—The Society for Electrical Development, Inc., with principal offices in New York, has been incorporated at Albany, N. Y., to establish co-operative relations among the different electrical interests in the United States, Canada and Mexico, with a view to increasing the use of electrical current by the public. Among the directors of the company are Mr. Gerard Swope, general sales agent, Western Electric Company, New York, and B. M. Downs, of East Orange, N. J.

Increase of Siberian Telegraph Business.—As a result of the reduction in telegraph rates between Vladivostok, Siberia, and European Russia, the number of telegrams transmitted has steadily increased. In 1910, it increased ten per cent; in 1911, twenty per cent, and in the first eight months of 1912, fifty per cent.

James A. Scrymser, President, Mexican Telegraph Company, Central and South American Telegraph Company.

A STORY OF THREE CABLE COMPANIES AND OTHER KINDRED MATTERS — THE INTERNATIONAL OCEAN TELEGRAPH COMPANY, MEXICAN TELEGRAPH COMPANY, CENTRAL AND SOUTH AMERICAN TELEGRAPH COMPANY.

BY JAMES A. SCRYMSER.

At the close of the Civil War in the spring of 1865, I was undecided as to what I should do to make a living. Early in May of that year I was residing at Riverdale, in Westchester County, N. Y., and with a friend, Mr. Alfred Pell, we agreed to take a vacation by tramping over the mountains of western Massachusetts, and during that time I was to decide what my future occupation should be.

On the last Monday in May, 1865, we left my father's residence at Riverdale, walked to the Century House near Fordham Bridge, with the intention of taking the Harlem River boat, the "Water Lily" to Harlem, thence by rail to Copake. From there we planned to walk over Mount Washington, in Berkshire County, thence into Vermont. We were much disappointed in finding that the "Water Lily" had broken down and would not make her usual trip that day. Consequently, we went into camp on the river bank and it may be that the Harlem River suggested ocean cables, for, in our conversation, Mr. Pell said that he had ten shares of the original Atlantic Cable Company's stock and he had received a circular from the Cable Company offering to issue to him twenty shares, provided he would subscribe for ten new shares. I advised him to accept the offer, as I felt certain it was only a question of time when the whole world would be connected up by cables.

I then suggested that a cable connecting the United States with Cuba, and other West India Islands, would be a paying undertaking, provided we could get the absolute control for the establishment of such a cable line. Mr. Pell, who had been visiting Havana in the winter of 1865, then told me that an influential concern in Havana had obtained the exclusive right for fishing in Spanish waters within fifty miles of Havana and that if a monopoly could be obtained for fishing, it naturally followed a monopoly could be obtained for operating cables within Spanish jurisdiction. I at once put on my knapsack and Mr. Pell asked me, "where are you going?" To which I replied, "I am going for that monopoly," and in less than two hours we visited the firm of Grinnell, Minturn & Co., then one of the most prominent New York-West India houses. Mr. Minturn received us very kindly and listened attentively to my proposed scheme for a Florida, Cuba, West India cable. He said he would see some of his friends and would be able to say at noon the following day what he would do in the matter.

Promptly at noon the next day I called upon Mr. Minturn, whereupon he informed me he had consulted with Moses Taylor, one of the great West India merchants at that time, and that they thought the scheme I had suggested was one of much merit, but both had grave doubts as to its success. However, they agreed to each take a third interest in establishing the proposed cable and offered Mr. Pell and me a third interest with the understanding that we were to do the work in our names as they did not wish to be associated with a failure, should it so result, they paying all expenses and cost of establishing the line. This we accepted at once. That night I went on to Washington, hoping to obtain letters of recommendation and introduction from our State Department to the American Consul in Havana, and so through him reach the Spanish Governor-General of Cuba.

Mr. Seward, then Secretary of State, was just recovering from an attempted assassination, which was part of the conspiracy which led to the death of President Lincoln. Mr. Seward, of course, could not see me, and the State Department, in

JAMES A. SCRYMSER, NEW YORK.
President of Mexican Telegraph Company, and Central and South American Telegraph Company.

charge of Mr. Henry, chief clerk, declined to assist me. Fortunately, I had a personal friend then secretary of the British Legation, to whom I applied, asking that his chief, Sir Frederick W. A. Bruce, the British Ambassador to the United States, should give me a letter to the Governor-General of Cuba. This I obtained that Wednesday afternoon and on the following Saturday I sailed for Havana with letters of introduction from Grinnell, Minturn & Co., to prominent commercial houses in Havana, through whose influence I obtained an interview within forty-eight hours after my arrival with the Governor-General of Cuba. His Excellency received me most courteously and promised to do everything in his power to aid me in my cable undertaking, realizing as he did, that if the Atlantic cable was a success, Madrid would be within an hour's communication with Havana by cable.

A formal application was prepared and endorsed by the Captain-General and forwarded by the first mail steamer to Madrid, the Captain-General informing me that it would be about the first of September before I could expect a reply from Madrid. He advised me to return to New York, as yellow fever was prevalent in Havana at that time. I thanked him and determined to remain there until I heard from my application. I watched the arrival of every Spanish mail steamer and finally, the end of August, called on the Captain-General and was received by his secretary who, to my great disappointment, told me he had received a copy of a "Diario Oficial" containing a decree granting to Messrs. Arturo Marcoartu, the Marquises of Mariano and Manzanedo, the Count of Esteban de Canongo, Michael Chevalier, Ferdinand de Lesseps and Leopold Werner, authority to establish the very cable connection I had petitioned for.

An examination of the Royal Decree showed that the language was identical with the wording of my petition. Of course, I was terribly disappointed, but I instantly realized that that Royal Decree was the key to the whole situation. The secretary kindly gave me a copy of it. I returned to New York and conferred with my associates, Messrs. Robert B. Minturn and Moses Taylor, who at once said it was useless to go further with the scheme and withdrew, offering to pay all my expenses, which up to that time amounted to $800. To this proposition I requested that they would give me letters withdrawing from the scheme and I would personally assume all expenditures.

My next step was to arrange with a Captain Starr, who had served as a gallant officer of the Army of the Potomac, then in charge of the *New York Herald* foreign news bureau. I prepared a statement for publication in the *Herald* in which I incorporated the Royal Decree of June 30, 1865, granting to Marcoartu and his associates the concession for a Cuban-American cable. The article called the attention of the United States Government and all Chambers of Commerce, by declaring that American commerce was in danger, that a Spanish-owned cable monopoly would control the sugar markets of the world and it was the duty of the United States Government to prohibit the landing of such a Spanish cable, on the United States coast, unless reciprocal rights for an American cable were granted by Spain.

The article pointed out that the "Royal Decree" was identical with my application of early June and it showed that there was just time for the arrival of my application in Madrid to have it copied and re-issued in the names of the parties above mentioned, instead of myself.

Armed with the *New York Herald* and a copy of the Royal Decree, I immediately went on to Washington and called on the Honorable William H. Seward, then Secretary of State, who I had never met before. In a few words I explained I had been robbed of an American enterprise and that as the law stood at that time there was nothing to prohibit the landing of a Spanish cable on our shores if the parties interested owned the land on which the cable was to be landed. Mr. Seward became very much interested; he left his desk, walked to and fro in his office and stopping suddenly, said, "Young man, you are mistaken, the three-mile limit off shore is to prohibit an enemy from erecting a battery which would be dangerous to the upland. A cable, being silent and secret in its operation, is many times more dangerous than an enemy's battery." He then advised me to lay my scheme before the United States Congress, and assured me that I would have his personal assistance in obtaining rights which would checkmate the Spanish concessionaires.

Acting on his advice I formed a company under the laws of the State of New York, The International Ocean Telegraph Company, the incorporators being James A. Scrymser, Alfred Pell, Alexander Hamilton, Jr., Oliver K. King, Maturin L. Delafield, Major-General William F. Smith and James M. Digges, the latter being my brother-in-law.

A bill was introduced in Congress in December, 1865, which passed the House unanimously, and after a sharp fight in the Senate was passed, granting to The International Ocean Telegraph Company the sole right for establishing cables between Florida and the West Indies, for a period of fourteen years, that being the duration of the patent right which Mr. Seward considered I was entitled to, and of which I was deprived by the action of the Spanish government.

General William F. Smith ("Baldy") had left the United States service at the close of the war. I had served as his aide-de-camp in many battles between the years 1861 and 1865. General Smith wrote me from Chicago that he had seen my name associated with a cable enterprise which he thought had much merit, and if there was any show for him in the undertaking, he would be very glad to offer his services, for as he said, if General Grant is made President, he will send me to Alaska; this owing to an unfortunate quarrel Smith had had with Grant and others in the army.

I at once called a meeting of my associates, and General William F. Smith was elected president of the company with a salary of $10,000 a year, and $100,000 of stock contributed by myself and friends. General Smith at once departed for Madrid with letters from Mr. Seward and others to the then American Minister, the Hon. John P. Hale. General Smith was successful in showing that the concession granted on the 30th of June, 1865, to Marcoartu and his associates was a fraud, for in the meantime I had obtained letters from Marcoartu's associates, the Marquises of Marianao and Manzanedo, the Count Esteban de Canongo, Ferdinand de Lesseps and others, that their names had been used without authority by Marcoartu and that they authorized me to say that they had withdrawn from Marcoartu's enterprise.

On this representation General Smith obtained a Royal Decree annulling the Marcoartu concession and granting to General Smith, as representative of The International Ocean Telegraph Company, a concession covering the rights I had originally asked for. This concession was dated Madrid, June 17, 1866. General Smith was largely aided in his negotiations with the Spanish government by Horatio J. Perry, then the United States Secretary of Legation at Madrid. The concession was subsequently made an exclusive one for forty years, expiring June, 1906.

Based on this concession, together with the exclusive rights granted by the United States Congress dated May 5, 1866, and signed by President Andrew Johnson, The International Ocean Telegraph Company was fully organized, a contract for the cable was made with The India Rubber, Gutta Percha and Telegraph Works Company, Limited, of London, and the cable was successfully laid between Punta Rassa, Fla., and Havana, via Key West, Fla.

The cable was opened to the public in December, 1866, and from the start its traffic was large and profitable, the charge being $10 a message and $1.00 per word in excess of ten words.

Unfortunately, General Smith, who was a very ambitious man, quarrelled with Cyrus W. Field and the Western Union Telegraph Company officials, which resulted in the Western Union finally obtaining control of The International Ocean Telegraph Company.

It is interesting to state that in December, 1866, the American Telegraph Company, which afterwards became the Western Union Telegraph Company, represented by Dr. Norvin Green and General E. S. Sanford, president of the American Telegraph Company, called on me demanding that we should enter into an agreement with their companies whereby our lines should not extend northward or in any way beyond Gainesville, Ga., their lines handling all the Florida and West India traffic to and from places north, The International Ocean Telegraph Company to have all the Florida-West India traffic as its own field of operation. I at once saw the value of the future Florida traffic and advised that the International Ocean Telegraph Company should at once accept the thirty years contract proposed by Dr. Norvin Green and his associates. It is needless to state that within that thirty years the Florida telegraph traffic was much more valuable than all the West India traffic.

Subsequently, William G. Fargo and General E. S. Sanford, by powers of attorney issued by The International Ocean Telegraph Company to their agent, Baron von Hipple, obtained concessions and subsidies amounting to £17,000 annually, from the more important West India Islands and on these concessions The English West India and Panama Telegraph Company was formed, which company laid its cables to Colon, Isthmus of Panama, and through the West India Islands to Demerara, with the ultimate intention of extending them to Brazil. It was then discovered that the Brazilian government had granted to the Brazilian Submarine Telegraph Company, afterwards the Western Telegraph Company, an exclusive right for the coast of Brazil for sixty years from March, 1870, which blocked in that direction. The Panama Railroad Company, then holding the transit monopoly of the Isthmus of Panama, demanded such a large share of the tolls from all telegraphic traffic crossing the Isthmus, it was found there would be little profit left for any cable extension south of Panama. That, together with the fact that the South American Spanish republics were unwilling to have their messages routed through Cuba, owing to the hostile feeling at that period between those republics and the mother country Spain, discouraged all idea of an extension south of Panama.

In 1878 The International Ocean Telegraph Company, came under the control of Mr. Jay Gould, who increased its capital from $1,500,000 to $3,000,000, the Western Union Telegraph Company leasing the company for ninety-nine years and guaranteeing six per cent on the increased capital. About this time I left the Board of The International Ocean Telegraph Company, as I saw no prospect of extensions of the West India and Panama lines.

In 1870 I had the pleasure of selling the common stock of The International Ocean Telegraph Company to Moses Taylor, one of my original associates, and then an unbeliever in Cuba cables, at $142 in gold, gold being at that time at a premium of 35.

I may here remark that I never met with any encouragement from those who were well informed as to the commercial conditions representing these enterprises when their advice was asked; in fact, I always met with discouragement, J. Pierpont Morgan being the only exception.

On leaving the Board of Directors of The International Ocean Telegraph Company, I determined, when opportunity offered, to start a new enterprise, outflanking, if possible, the obstructions the International Ocean Telegraph Company had met with regard to extensions via the Isthmus of Panama and its intended connection with Brazil. With that object, I planned what has since been established and known as the Central and South American Telegraph Company, or the "Via Galveston" route, by way of Tehuantepec, reaching Panama on the Pacific side and ultimately, I hope, Brazil via Valparaiso and Buenos Aires. I say Brazil, because within two years an exclusive right of the English Company, the Western Telegraph Company, will expire.

Owing to the fact that General Diaz had become President of Mexico, as a revolutionist, the United States Government refused for many years to recognize the Government of Mexico, which finally it did in 1879. So for seven years I kept my "Via Galveston" scheme a profound secret, hoping from day to day for the time when I could open negotiations, with a fair prospect of success, with President Diaz of Mexico.

As a preliminary step I applied to the Western Union Telegraph Company for a contract which would control all its traffic, including European, destined for Mexico and Central America. As customary I was told there was no business with Mexico worth my while to exploit, in fact, the Western Union Company rarely got any money out of its Mexican traffic. However, I was persistent and finally obtained a satisfactory contract. Armed with this, I went to Mexico in 1879 with letters from the proprietors of the Alexandre Steamship Company, then operating a line of steamers between New York and Vera Cruz. This resulted in arrangements being made with two influential Mexican gentlemen, Senor Don Ramon G. Guzman and Senor Don Sebastian Camacho, which led to a personal interview with General Diaz. At that time there was not a mile of railroad running north from the City of Mexico, but I foresaw that in a few years there would be railroad lines to El Paso and Laredo, 1,200 and 800 miles respectively. This situation necessitated a contract which would insure control of all the foreign Mexican telegraph traffic in the event of these railroads being built. In less than a week a contract was negotiated and signed by General Diaz, whereby the Mexican Telegraph Company was to establish its cables and lines and have them in operation within a year, connecting the City of Mexico via Vera Cruz, with a station in the State of Texas, and thence with Europe via the Western Union lines.

Contrary to the discouraging views of Mr. William Orton, then president of the Western Union Telegraph Company, the establishment of the "Via Galveston" route resulted in a paying business from the start, and it also became a valuable and growing feeder to the lines of the Western Union Telegraph Company.

In this connection, I may add that in the early days of the Bell telephone invention, at the request of Mr. Hilborne Roosevelt, of New York, who held an option on the Bell patents for the State of New York, subject to a royalty of $8,000 a year, I interviewed Mr. Orton with the view of having his company take an interest in it and as usual I was told that "telephony was a thing like the comet then in the heavens, magnificent, but no good," on which I told Mr. Orton the time would come when the telephone would largely supersede the Western Union.

During the recent revolution on the frontier of Mexico, the cables of the Mexican Telegraph Company, as I predicted in my first interview with General Diaz in 1879, would be beyond the reach of revolutionists, and would always serve to keep the Mexican government in communication with the outer world and particularly its frontier states, all of which has been confirmed by recent events.

The Mexican Telegraph Company was so highly successful that I determined to at once promote its extension, the Central and South American Telegraph Company. I called on Mr. J. P. Morgan with that view and intimated that I was going to London in the hope of raising the necessary capital there, on which he remarked I could do better in New York than in London. He at once invited me to meet some of his friends at dinner at the Union League Club the following evening. At this dinner I met Mr. Morgan, Mr. Edward D. Adams, Mr. Charles Lanier and Mr. John Ellis. Not a word was said about cable companies until coffee and cigars were served, whereupon Mr. Morgan asked me to explain my Central and South American Cable scheme. His first question was, how much money do you require? I replied: "Five millions of dollars." His next question was, can you not get along with less than five million? To which I replied, "not a cent less," for it was a hazardous undertaking and I wanted to be sure that I would have money enough to meet all contingencies.

In less than ten minutes I had secured an agreement whereby I was to have four millions of dollars on demand, and the banking houses of J. P. Morgan & Company, Winslow, Lanier & Company and Drexel & Company were to advance me another million if required, for which they were to have an option on one million dollars of stock at par.

In course of time the stock of the Central and South American Telegraph Company sold at $165, so it will be seen that the prompt action of my business associates was well rewarded.

The Central and South American Telegraph Company from the start was a paying undertaking and now, with a fair prospect of reaching Brazil, together with the opening of the Panama Canal, it may be safely said that the company is on the threshold of a new and valuable traffic.

When the Central and South American Telegraph Company opened its lines to the public in 1882, the rate between the United States and Buenos Aires was $7.50 per word, New York, San Francisco, etc., being counted as two words. The present rate between the Argentine Republic, Chile, Peru and the United States is 65 cents per word, the average time of transmission between Buenos Aires and New York City being about fifteen minutes.

In its early days the Central and South American Telegraph Company, like all cable enterprises, found that investors were critical, fearing South American revolutions, earthquakes, etc. I may say that during my forty-seven years' experience in dealing with twenty-one nations, I have had less trouble with all of them together than with the United States Government during the past five years.

There were only two instances in which my company met difficulty, viz., in Guatemala and Chile. As to Guatemala, the cable ship "Silvertown" was about to land our cable at San Jose, Guatemala, when on the same day I noticed in a newspaper that Guatemala, contrary to the exclusive concession granted to the Central and South American Telegraph Company, had granted a concession to an English concern for laying a cable connecting Guatemala, on the Atlantic side, with Cuba. I immediately ordered the cable ship to proceed to La Libertad, Salvador, thus leaving Guatemala dependent upon cable communication through Salvador. This caused great jealousy on the part of Guatemala, and ultimately a war, the object of which was to secure cable communication by control of the Republic of Salvador. This prolonged war bankrupted Guatemala, which prior to this time was in a most prosperous condition. Its president, Senor Barrios, in the final battle was killed and his army defeated. Year after year Guatemala sent delegations to New York City urging independent cable communication. These delegations were always told that if Guatemala would deposit $200,000 in gold and guarantee a contract which could not be violated as the first contract had been, cable communication would be established. Finally, this was agreed to, the day was fixed for the landing of the cable, and the president and his staff went by rail with a carload of champagne and other luxuries to attend the formal opening of the cable station at San Jose. Messages had been prepared and were ready for transmission to the royalties of Europe and the President of the United States, but unfortunately a decline in silver, which was the currency in which the $200,000 gold was to be provided, left a balance of about $5,000 still to be deposited in New York. I declined to open the cable until that balance was deposited, being in hourly communication with the President of Guatemala, who proposed arbitration which I, of course, declined. However, they drank their champagne, and in the course of the following week made good the balance required in New York, and the cable was opened to the public.

Our next trouble was with Chile during the Balmaceda revolution. The navy remained loyal and sailed with the headquarters of the government to Iquique, where its Congress was held aboard ship and the government carried on in the most formal way. At the Valparaiso end, then under control of the Balmaceda party, the provost marshal verbally ordered all communication by cable stopped. On being informed of this demand, I at once telegraphed our manager to require written orders and not to accept verbal orders, also to retain all official documents of that character. In course of time it was diplomatically arranged that all American claims should be settled by arbitration. The Central and South American Telegraph Company presented a claim for $40,725, being the estimated loss of traffic, etc., during the suspension of the cable service by the official order in writing of the provost marshal of Valparaiso. The board of arbitration awarded the company $28,298, which it could not have done had not the written order, above mentioned, been exhibited.

It will be observed that the United States Congress, in 1865, granted The International Ocean Telegraph Company a monopoly which was the foundation stone of an American cable system connecting Washington telegraphically with all of the Central and South American republics. I say American, because that means, in the event of war, the United States Government has a certain means of communication with its navy and ministers abroad, which, owing to neutrality laws, it could not enjoy if it had to depend upon foreign cables.

I may add that the United States Government has never contributed one penny to the establishment of the 13,846 miles of cable operated by these American companies.

The Hon. William H. Seward, Thomas F. Bayard, James G. Blaine, Elihu Root and Philander C. Knox when secretaries of state, at all times recognized the political value of independent American communications and assisted diplomatically the establishment and extension of these cables, while on the other hand some of the high officials have blindly opposed extension and the governmental support of the cables of these companies, to which they were entitled, mainly on the ground that they were "corporations," which in recent times from a political point of view, were not entitled to the encouragement and protection such as they had received from Mr. Seward and others above mentioned.

It is needless to state that if it had not been for the prompt and wise action of the then secretary of state, Mr. William H. Seward, in 1865, this American cable system, connecting all Central and South America with the United States, would today be in foreign hands, and in case of war our government, if so engaged, could not use foreign cables owned by a neutral party, as was proved in the case of the Spanish government's use of the Manila-Hong Kong cable in 1898, on the ground that it was a violation of neutrality for the English government to permit Spain to use an English cable when at war with the United States. On receiving a protest from the United States Government, England immediately ordered the cable to be sealed and that closed the incident.

I observe in the daily press that our government officials are about to investigate the telegraph and telephone companies of America. Before so doing it would be well if they would investigate the operation of telegraph and telephones abroad. They would find that every government, excepting Canada and the United States, has monopolized both as a postal telegraph system, mainly because it was found that disconnected and competing telegraph systems were inefficient and detrimental to the interests of the nation and commerce, but on the other hand;

They would find that in every instance the traffic receipts, like all government-owned undertakings, fell far short of the expenses.

They would find that over forty per cent of the cables are subsidized for strategic purposes in order to connect their naval fleets and coaling stations at home and abroad.

They would find that Germany has, for military reasons, developed a system of cables from the Straits Settlements in the East, and her South Pacific Islands, connecting them with Berlin via Shanghai and St. Petersburg. By this means Germany is independent of Great Britain, where the latter has much at stake.

They will find that the policy of compelling a well established, widespread telephone system—as a common carrier, to co-operate with a competing local system, will stimulate speculative line building—resulting, as usual, in consolidation, increased capitalization and high rates—the whole burden of which will fall upon the public.

This reminds me of a suggestive historical fact, i.e., that of the one million of men enlisted in the Confederate Army during the Civil War, only seven per cent were slaveholders—thus proving that it was "a rich man's war and a poor man's fight."

They would find that Great Britain, Germany and France encourage and aid the extension of all their telegraph properties throughout the world.

It was only a few months ago that the Republic of Panama was officially notified by the United States Government, that it prohibited Panama from granting telegraph concessions of any kind without the consent of the United States, although Secretary Root years ago wisely decided that by the terms of the United States-Panama Treaty of 1903, the United States had exclusive jurisdiction, not only over the ten-mile canal strip, but also over the whole territory of the Republic of Panama and its waters for the construction, maintenance and protection of the Panama Canal.

It is needless to explain that a modern twelve-inch gun, having a range of fifteen miles, made it necessary that the United States Government should have such exclusive control; and, further, that it would be useless to fortify the canal if foreigners operated any system of telegraphy under grant from the Republic of Panama.

They would find that owing to Mr. Root's wise decision, the Panama Canal is safe from foreign telegraph invasion and that the United States has a telegraph monopoly of the whole Isthmus.

It would be well if the officials of the United States Government gave more aid and comfort to American telegraphs and telephones, and would apply to the coasts of the United States the same governmental protection that it has provided for the Panama Canal.

They would certainly discover that if an American was to attempt to land a cable or erect a wireless station on the territory of England, France or Germany, the offender would be arrested, tried by court martial as a spy, and if not shot, put in jail for life.

The officials of the United States Government are undoubtedly aware that all along our coasts and elsewhere in the country wireless telegraphy is operated by amateurs and others without molestation. This is a dangerous condition, not allowed in any other civilized country.

Apparently American Government officials have not realized as yet that in the event of war a foreign fleet could, when a thousand miles off our shores, through the use of wireless telegraphy, locate every American war vessel on our coast and ascertain the defensive condition of every seaport.

These are matters much more vital than the investigation of American telegraph and telephone companies.

In conclusion I may add that from the Mexican frontier to the Bay of Rio de Janeiro, Brazil, it has been an incessant fight for forty years to secure the necessary rights, landing privileges, etc., for these American companies, owing to opposition at all points by European officials and European cable companies.

The next great war will be determined largely more by coal supply and cable communication than any other means, and it is fortunate that the United States Government has American cables to rely on if war should unfortunately develop in the direction of Central and South America.

It was foreseen years ago that wireless telegraphy might become a competitor to the cables, consequently the necessary concessions for wireless were obtained, which the companies will be ready to establish whenever it proves to be as successful commercially as are submarine cables.

The fact that over 40,000 miles of submarine cables have been established within ten years, is good proof that wireless is not considered a formidable rival by those best informed as to its merits.

Morse Telegraph Code Stated to be Irish.—Prof. James Money recently made the statement before the archaeological society in Washington that the Morse telegraph code was not the invention of Prof. Samuel F. B. Morse, but is of Irish origin being the old Gaelic dot and dash alphabet used as early as the year 1150. "There were seventeen letters in the Gaelic alphabet," said Prof. Money, and they began with one dash, went up to five dashes, then from five dashes down to one dash and then began the dots, very much the same as the Morse alphabet used in telegraphy."

New Wireless System in the Spring.—The National Electric Signaling Company, Pittsburgh, Pa., announces through its president, Mr. J. C. Baird, that it expects to start actively in the operating business of wireless telegraphy by early spring. This company operates under the Fessenden patents and claims that its apparatus does not infringe any other and that it will work much greater distances and with very much less interference from other stations and atmospheric conditions. A large number of Fessenden sets are in use in the United States navy including several high power sets such as Arlington, Va., Key West, Fla., and Colon.

Radio Examinations.—Radio operator examinations are held at the New York Navy Yard, Brooklyn, N. Y., each week day with the exception of Thursday and Saturday. The examining officer of the electrical class issues government licenses to those who successfully pass the examination. Successful applicants are requested to advise W. D. Terrell, radio inspector at New York, when their pass and the serial number of their license, also the grade.

Second Convention of the Telephone Pioneers of America.

The second annual convention of the Telephone Pioneers of America was held at the Hotel Astor, New York, November 14, 15 and 16, and was a highly successful event in every particular. The weather was fine and the attendance large and enthusiastic, and every member had an enjoyable time. The story of the meeting and the entertainment features follow:

Although 10 a. m., Thursday, November 14, was the time set for the convention to open it was 11 o'clock before the members present, over 600 in number, could be brought together in the grand ball room to start business. In the absence of president Theo. N. Vail, vice-president Frank H. Bethell called the meeting to order and read a letter of regret from Mr. Vail at his inability to be present and expressing his best wishes that all the pioneers present might have an enjoyable time.

THEO. N. VAIL, NEW YORK, PRESIDENT.

Secretary H. W. Pope's report (which was outlined in our issue for November 16) was listened to with deep interest and was received with applause. He referred feelingly to the deaths of pioneers during the year, and stated that it was fortunate that the association was enabled to commemorate their virtues and perpetuate their memories. He also pointed out that the membership of the association is distributed in 250 cities, towns and villages in the United States, Canada and the provinces. One member is located in Europe.

Mr. Pope's report as treasurer showed that the association was in an excellent financial condition.

Several letters of regret were read from members who were unable to be present.

Mr. Thomas D. Lockwood, chairman of the executive committee read his report covering the work of the committee during the year. He gave notice of the proposition to amend section 8 of the by-laws by striking out the words "Junior Pioneers," thus classifying all members as pioneers, or honorary members. This proposition is to be acted upon at the next convention.

On Mr. Lockwood's motion Mr. Francis Blake, the inventor of the well-known and now historic transmitter, was transferred from the grade of Pioneer to that of honorary member. There are now two honorary members of the association—Dr. Alexander Graham Bell and Francis Blake.

It was decided to hold the next annual convention in Chicago on October 16 and 17, 1913, and all of the present officers and executive committee of the association were re-elected for another year, as follows:

F. H. BETHELL, NEW YORK, VICE-PRESIDENT.

President, Theo. N. Vail; vice-presidents, F. H. Bethell, B. E. Sunny, W. T. Gentry and E. B. Field; secretary and treasurer, Henry W. Pope; Executive Committee, J. J. Carty, Thos. B. Doolittle, Thos. D. Lockwood, F. A. Houston and Charles R. Truex.

At the conclusion of the morning session all of the members repaired to the roof of the hotel where a group photograph was taken.

The afternoon session, which was presided over by vice-president W. T. Gentry, was a most enjoyable and interesting one. The time was entirely consumed by addresses by prominent telephone pioneers.

B. E. SUNNY, CHICAGO, VICE-PRESIDENT.

Mr. Thomas A. Watson, who was associated with Dr. Bell for many years in the development and public introduction of the telephone, was the first speaker. He made an eloquent and exceedingly interesting address, in an easy, conversational style, and it was remarked that it was a fitting complement to that of Dr. Alexander Graham Bell at the organization meeting in Boston last year. The story of the early struggles in the work of making the telephone a success was delivered in a whimsical style which provoked much laughter.

W. T. GENTRY, ATLANTA, GA., VICE-PRESIDENT.

"I was but twenty years old when I first met Dr. Bell, but my recollections of those days are still very vivid," said Mr. Watson. "Those lectures which Dr. Bell delivered in the summer of 1877 had a more important effect on the ultimate development of the telephone than any one supposes. They were the turning point in our fortunes.

"There was a tremendous need for cash just then among the four of us who then composed the world's telephone business, Dr. Alexander Graham Bell, Mr. Gardiner G. Hubbard, Mr. Thomas Sanders, and myself. We had just had a bitter disappointment. The Western Union Telegraph Company had just refused to purchase all our telephone patents for $100,000! And Dr. Bell needed money more than ever in his life—he wanted to get married, and to get married very, very badly at that. Some of the ladies connected with the inventors wanted us to market, to manufacture and sell telephones to raise money. That was the crisis in telephone history. Had we done so, the splendid development along lines of unity would have been prevented. Fortunately we stuck to our policy if never selling telephone instruments outright, but only leasing them.

"By good fortune, Dr. Bell was invited to deliver a lecture and demonstrate his telephone before a

HENRY W. POPE, NEW YORK, SECRETARY.

scientific society in Salem, Mass. We hired an Atlantic and Pacific telegraph wire to connect our laboratory in Boston with the lyceum in Salem, each end being equipped with one of the old box telephones. I had a cornet player, an organ, and my voice to illustrate from the Boston end what Dr. Bell had to say at the hall end. The organ came out pretty strong, though sixteen miles away, but the great feature was the short sentences I ejaculated, usually such things as 'How do you do?' which I uttered in stentorian tones and which usually came out at the other end as 'Hoo, hoo, hoo.' And then my songs! I couldn't sing, but I simply had to, because they couldn't get any one with a voice as loud as mine. I sang 'Yankee Doodle,' 'Pull for the Shore'—It was in the Moody and Sankey times —'Hold the Fort,' and for sentiment, 'Do not Trust Him, Gentle Lady.'.

"After the lectures distinguished citizens were allowed to talk to 'Mr. Watson' at the other end of the line. I never knew till then how diffident prominent citizens could be. One prominent attorney, I remember, gasped and said, 'Rig agig gig and away we go.' That was about all he could think of.

"Two thousand people came to Providence to hear the telephone talk. Doesn't that seem funny today? On the request list for three lectures in Boston I remember were the names of Oliver Wendell Holmes and of Longfellow. The lectures excited tremendous interest all over the country, and best of all brought in enough money to tide us over.

"For his first lecture in New York Dr. Bell was anxious to transmit his illustrations from Boston, so we hired a telegraph wire. Our laboratory was on the top floor of a boarding house, not an expensive one, and we had disturbed the boarders considerably by our shouting, and were not on good terms with our landlady. There was another reason, too. I knew I would have to do the shouting of my life from Boston to New York, so I made a tent of five blankets and crawled under it with my telephone instrument, and for two mortal hours I perspired and shouted. But my landlady didn't hear me fortunately.

"Sometimes our wires wouldn't work and there were no illustrations forthcoming at lecture. This gave rise to the only poem I ever had written about me, called 'Waiting for Watson.'

To the great hall we strayed,
Fairly our fee we paid,
Seven hundred there delayed.
But where was Watson?

Was he out on his beer?
Walked he off on his ear?
Something was wrong 'tis clear.
What was it, Watson?

Oh! how our ears we strained,
How our hopes waxed and waned,
Patience to dregs we drained.
Yes we did, Watson.

Give but one lusty groan,
For bread we'll take a stone;
Ring your old telephone.
Ring, Brother Watson.

Nine other verses of like character followed.

The next speaker was Mr. J. J. Carty, chief engineer of the American Telephone and Telegraph Company. Mr. Carty spoke chiefly of the association and its good work, and suggested that the title of the association be changed to "Telephone Pioneers of America and American Telephone Historical Society."

"Such priceless relics as the piece of wire over which the first telephone conversation took place, and now in the possession of Mr. Watson," he said, "should be placed in the society's growing collection."

Mr. Union N. Bethell, president of the New York Telephone Company, followed Mr. Carty, and delivered an eloquent address on the universality of the telephone, which was listened to with the deepest interest. Mr. Bethell's address is printed in full elsewhere in this issue.

Interesting remarks were also made by Mr. Emile Berliner, of Washington, D. C., the inventor of the Berliner transmitter; Mr. Samuel G. McMeen, of Chicago, the well-known telephone authority and inventor, and Mr. J. E. Kingsbury, director of the Western Electric Company, London, England.

After a vote of thanks to the speakers the convention adjourned.

Entertainment.

In the evening of Thursday, November 14, the pioneers and their wives and lady friends were the guests of the Telephone Society of New York at a unique entertainment in the grand ball room of the hotel. The principal feature was the presentation of an act entitled, "A Cataclysm of One Spasm, Entitled Examinations," written for the occasion by Mr. Angus S. Hibbard, telegraph relations, American Telephone and Telegraph Company, New York. Mr. Hibbard proved to be a histrionic genius, and he received an ovation when the "Spasm" was over. The theme of the play was explained at the opening by Mr. Cox, president of the "examining board."

"We might in light and frivolous mood," he said, "offer you entertainment for the evening, but it has seemed more fitting that we should endeavor to show by formal action of our Examining Board the aspiring talent which, joining our ranks from day to day, is manning and womanning our good ship 'Telephonia,' while breasting the wave, she scales the highest peaks and you, our forbears, shout your encouraging peans, with hunter's horn and cry: 'Good boy, go to it!' I am informed that Mr. Vail and Mr. Hall are to be here to-night to take notes of our improved methods, but we shall conceal nothing."

The Examining Board consisted of characters representing "Miss" Lydia Pinkham Dr. Munyon, Mr. W. L. Douglas and Oscar Hammerstein—all made famous through newspaper advertising.

Upon being introduced to the audience the Examining Board expressed its joy by singing, "Oh, When I Die, Don't Bury Me At All." Applicants for positions in the engineering, plant, legal, accounting, commercial and traffic departments and with the Western Electric Company were admitted to the presence of the Board for examination as to their fitness. "Claudine," a stenographer (Mr. G. V. W. Pelz) was the first to be examined. She was independent and saucy. Her principal demands were for two matinees and one day off a week. She was immediately engaged to report the proceedings of the Examinations, and as a prelude sang some songs in a rich baritone voice.

Mr. Douglas examined the applicant for the engineering department, who displayed a roll of blue prints in addition to his knowledge of engineering.

"What is a telephone engineer?" inquired Mr. Douglas.

"The man who makes all the mistakes," was the reply.

Mr. Douglas—"Who put the pie in Pioneer?"

Applicant—"They won't tell."

Mr. D.—"Who told you how to be an engineer?"

A.—"A great Frenchman."

Mr. D.—"What's his name?"

A.—"His name is Carty."

It was the plant-department applicant's turn next, Miss Pinkham being the examiner.

Miss Pinkham—"Are you a Pioneer?"

Applicant—"No, ma'am, I'm a Democrat."

Miss P.—"What is a phantom circuit?"

A.—"Just now?"

Miss P.—"Yes, just now."

A.—"Why, just now a phantom circuit is the path to the payroll."

Miss P.—"Why is the Plant Department?"

A.—"To tear up the streets and spend the money."

Miss P.—"Have you any general suggestions for the benefit of the plant?"

A.—"Yes, ma'am, I have. I would sprinkle telephone plants freely with your incomparable vegetable compound, and they would bloom with such a conservation of energy as would raise salaries and double dividends."

Miss P.—"A brilliant and flattering idea. We accept you at once, with my congratulations."

The ponderous colored janitor, weighing 300 pounds or thereabouts, and dressed in immaculate white, broke in on the proceedings. He was in a talkative mood and in the midst of his prattling he let out that he smoked "the same cigars as Mr. Vail—leastwise, I did smoke 'em, but I dunno where he t'rows his stubs now."

The applicant for a position in the legal department was very demonstrative and let the examiners know that he knew law. "I'll join the ranks with Leverett and Alphabet Cole, and the others," he said, "and I'll show such law as you never saw yet, for I'm that kind of a lawyer."

He was told to "sit down."

Dr. Munyon examined the applicant for an accounting position. "Now, sir, what have you to say for yourself?" began the examiner.

A.—"For myself I have nothing to say, but on behalf of Mr. DuBois and his Wiley-mate I have come to explain in a nutshell, sir, the real meaning of Accounting Circular No. 6. Here in this first volume of 1847 pages, with footnotes and correlations from Sanskrit, we have the fundamentals of the plan; in the seventeen volumes next following (at this point the janitor wheeled in a truck load of books) we show the simple formulæ. Then come the routines. The routines, sir, beginning Chapter I, Vol. XVIII, are in a five-ton truck at the stage-door."

The next applicant was a commercial man, who said a good deal about the "most important" of the departments, the "beginning and the ending of the business" (the president interrupted to say that no one was wanted to represent the ending of it), which is the "whole cheese" (the president remarked that this was not a dairyman's convention) and brings "comfort to the home, peace and quiet in the turmoils of business, and balm to the troubled spirit" ("Do you think this is a theological seminary?" asked the president). The young man finally came to the point, and the president announced that he would be considered for the "hot air branch."

The Western Electric applicant was the latest product from the Hawthorne works. It was a very clever automaton, which gesticulated and moved its lips in unison with the spoken words uttered through a loud-speaking telephone. "Know-it-all," as he was named, through the innocence of youth, was inclined to tell secrets. When asked how many hands the Western Electric Company employed he replied: "I don't know, but not one in ten works."

He sang the following song to the tune of "O Promise Me."

I'll promise you most anything you say,
You know I'm working for you night and day;
I rush the stuff till all the buildings throb,—
The rushing every order makes a darn poor job.
Those switchboards promised for the first of June
I hope you may be getting pretty soon;
And you may bank on what the double-u-e (W. E.)
Has promised me, has promised me.

He failed to obtain a position, and was relegated to a back seat.

Half a dozen telephone operators—"lady" traffic demonstrators—entered. They sang and danced, and performed antics that hardly comport with the public idea of a telephone operator. The representative of the traffic department who had them in charge could learn nothing from the latest instruction book. When they sang "Oh's" and "Ah's" for Mr. Hammerstein, he cried, "How melodiously delicious," and wept for the shades of the lost Manhattan (not cocktail, he explained).

The performance closed with the singing, by the Blue Bell Glee Club, of various songs arranged by Mr. A. S. Hibbard. Mr. J. L. Turner was director of the club. The music was furnished by the Blue Bell Orchestra, L. A. Scott, leader, and was up to professional standards in quality and technique, although it was made up entirely of "home talent," as were also the Glee Club and the cast of the performance. It was a surprise to most of those present to know that there was so much high class talent among the telephone ranks, and the performers, singers and musicians were the recipients of many complimentary remarks for the excellence of their work. The entertainment was well organized, and was carried

(Continued on page 783)


KERITE
NW
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DAYS
KERITE
BE
GUIDED
by facts, not theories
by performance records, not claims
by experience, not prophecy. Every
consideration points straight to KERITE
for permanently satisfactory and economical service.
KERITE INSULATED WIRE & CABLE COMPANY
General Offices, 30 Church Street, New York
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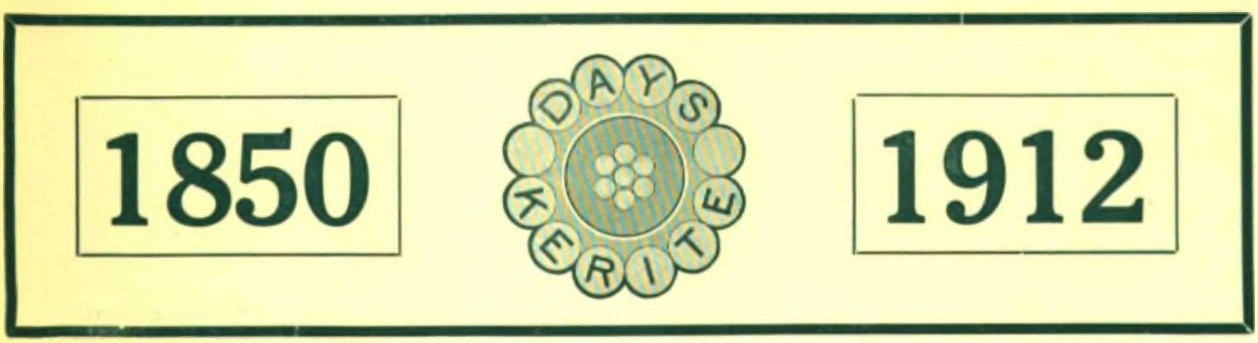

1850
DAYS
KERITE
1912


KERITE
POLICY OF INSURANCE
KERITE is the best policy. Its use insures against those interruptions to service, so costly in the end, that are due to a small saving in initial installation outlay.
KERITE is specified wherever the *best* is recognized as the *cheapest*
DAYS KERITE

(Continued from page 778)

out with a precision of action rarely found outside of professional circles.

The play was produced under the general direction of R. S. Scarburgh, with the following aides: Business manager, H. W. Casler; assistant business manager, R. Hawkey; stage manager, P. W. Eldridge; assistant stage manager, G. V. W. Pelz; musical directors, J. G. Orr and J. L. Turner. Mr. George Spink was stage director. All of these gentlemen are to be congratulated on the excellent manner in which they performed their respective functions.

President Theo. N. Vail and Mrs. Vail occupied seats near the stage and Mr. Vail entered into the spirit of the occasion and enjoyed the jokes and hits as much as the rest of the audience.

A general reception was held after the performance and Mr. Vail met many old friends and made many new acquaintances, among the members of his big industrial family. Following the reception a buffet lunch was served, and as the festivities were brought to a close all those present expressed their delight with the evening's entertainment. There were over 2,000 persons present; the galleries were filled, and many of those who arrived late were compelled to stand.

Friday's programme included an automobile ride to Briarcliff Lodge, thirty-three miles up the Hudson River, and the banquet at the Hotel Astor in the evening. It required 103 automobiles to convey the 460 pioneers and their wives to Briarcliff Lodge. The start was made from the hotel shortly after 10 o'clock, and the swift ride along the magnificent roads, in the crisp autumn air, was most exhilarating and enjoyable, and when the party reached the Lodge they had a keen appetite for the excellent lunch that was soon afterwards served. After the meal athletic contests were held for prizes of silver loving cups. Mrs. E. B. Rogers, of Albany, and Mrs. E. W. Bigeler, of Newburg, won the women's first and second prizes in the putting contest, and the men's prizes were captured by A. S. Hibbard, of New York, and E. B. McDonald, of Boston. In baseball throwing at dog targets, H. S. Brooks, general commercial superintendent of the American Telephone and Telegraph Company and an old-time Yale athlete, was easily first, with Henry G. Bates, transfer agent of the Western Union Telegraph Company, New York, second.

The return to New York was made in quick time in the afternoon, and all were highly pleased with the interesting ride and entertainment.

In the evening over 600 pioneers sat down to the banquet tendered by the American Telephone and Telegraph Company, in the grand ball room, while the ladies, about 150 in number, were entertained separately at a banquet in the "Laurel" room across the corridor.

As each guest located his seat at the round tables, decorated with chrysanthemums and Fall foliage, he found a unique favor, a boutonniere of bluebells, clematis, edelweiss or roses made of copper telephone wire taken from an underground cable, and of the paper used in insulating the wire. Each pioneer, too, found a facsimile telegram from Mr. Theo. N. Vail, president of the Western Union Telegraph Company, reading:

"The Western Union Telegraph Company extends a greeting to the Telephone Pioneers of America and expresses the hope that co-operation in the use of the facilities and forces of the telephone and telegraph throughout the country may afford the public a universal service hitherto unequaled, the accomplishment of which may well be an inspiration to us all."

There was continuous entertainment during the dinner. Between courses there was juggling, singing and fancy dancing on the platform, which was beautifully adorned with palms, and during courses an orchestra in the gallery rendered delightful music.

When coffee was served the ladies were admitted to the galleries to enjoy the festivities on the floor below. They cast loose toy rubber balloons and as these settled down on the tables and upon the heads of the men they were seized and tossed about and exploded to the merriment of all.

In accordance with the custom established by Mr. Vail at Boston last year, there was no special order of exercises after the dinner. The time was given up to singing, telling stories, and general social intercourse, and it was agreed that freedom of action and the absence of speech-making was a delightful innovation. The result was every one had a good time; presidents, general managers, superintendents, etc., of the great telephone and telegraph companies losing official distinction for the time being, all mingling together as brothers in a common cause.

Everybody joined in the singing of the telephone songs. The Blue Bell song, set to the tune of America, was sung with great enthusiasm.

The first verse ran:

Blue Bell, it is of thee,
Symbol of unity,
  Of thee we sing.
Let's all co-operate
In each United State
To make our service great—
  Let Blue Bells ring.

Another much-appreciated number was the "Get-Together Song," in the course of which, at certain periodic intervals, all hands roared out "Ha! Ha! Yell! Yell! Boom! Boom!"

"Everybody Telephones, Telephones, Telephones" to a popular tune, was another song that attracted the fancy of those present, the singing of which made the four walls echo. Thus the festivities were brought to a close, and by 11 o'clock the crowd of merrymakers had dissolved and retired for rest and sleep.

Notes.

Much regret was expressed at the inability of president Theo. N. Vail to be present at the banquet.

The Western Electric Company issued printed invitations to the pioneers to visit its general offices, laboratories and factory at 463 West Street, New York. A map of the lower part of New York City accompanied the invitation, showing the location, and full directions were given as to how to reach the building.

The New York Telephone Company and the American Telephone and Telegraph Company extended the courtesy of free use of the local and long distance service to the members during the convention.

Many of the members and their wives and daughters remained over Saturday and visited places of interest, including the Metropolitan and the Singer towers, from each of which magnificent views of the city and surrounding country are obtained.

A beautifully illustrated booklet was distributed among those who took the automobile ride to Briarcliff Lodge of November 15. It gave a description of the towns and points of historic interest along the route. An excellent map of the route was also included.

The cover of the boxes containing the ice cream served at the banquet represented a desk top, on which was a miniature desk telephone. It was a perfect reproduction of the real instrument, cords and all. This unique box was highly prized as a souvenir.

The general committee deserve great credit for their faithful work. Each member labored hard and late to make sure that everything was done that could be done to make a success of the convention. The committee consisted of: Howard F. Thurber, Gerard Swope, Henry S. Brooks, Angus S. Hibbard, Henry W. Pope.

PIONEERS IN ATTENDANCE.

W. R. Abbott, Ellis W. Abbott, Daniel M. Adee, William H. Aglward, S. H. Agnew, T. Ahearn, Walter E. Ainsworth, Herbert C. Aldrich, A. P. Allen, G. C. Allen, Harry E. Allen, James F. Anderson, James A. Ayles.

Charles Robert Bangs, E. H. Bangs, E. B. Baker, Jr., D. H. Bates, Henry G. Bates, Harry D. Bauer, James A. Baylis, John E. Belcher, Edward W. Bell, Geo. M. Benjamin, Chas. W. Berry, W. J. Berry, Victor M. Berthold, F. H. Bethell, U. N. Bethell, George E. Betts, G. Lawrence Betts, Eugene W. Bigler, John T. Blake, Richard Bogue, H. Boutillette, T. D. Bowen, W. R. Bowman, Charles L. Boyce, John E. Boyle, Fred J. Boynton, Henry E. E. Boynton, Thomas N. Bradshaw, Belvidere Brooks, Henry Stanford Brooks, Carrie L. Brounell, N. Warren Brown, Walter Brown, Chas. H. Brownell, M. H. Buehler, A. N. Bullens, E. M. Burgess, W. H. Bush, W. B. Butler.

A. C. Cameron, Arthur S. Campbell, John J. Campion, Willard L. Candee, James F. Canfield, John A. Carlton, I. B. Carpenter, G. H. Carrigan, John J. Carty, James Caverly, Fred G. Cheney, Rozalind A. Cheney, William F. Chester, Angus Chisholm, Harry C. Christian, F. R. Clark, E. N. Clarke, William H. Clausen, Chas. D. M. Cole, S. L. Collmers, F. W. Conn, Edward B. Cook, Frank B. Cook, M. J. Cook, W. W. Cook, Thos. E. Cornish, Edward Corrigan, D. C. Cox, A. A. Crain, A. P. Crenshaw, J. N. Culbertson, Albert E. Cutts.

Earl T. Dabb, S. Wesley Daniels, Fred. G. Davis, C. A. Deefendorf, C. E. Dennis, A. B. Depuy, John Desmond, Mamie Devlin, Adolph M. Dittmar, Amzi S. Dodd, W. G. Donally, John H. Donnelly, F. E. Donohoe, Thos. B. Doolittle, Charles W. Dow, Frank M. Drew, K. J. Dunstan, Charles Durant, Thomas Dusenbury, Thomas Dwyer.

H. O. Eanes, Chas. T. Earley, Daniel A. Edwards, J. S. Glen Edwards, Wm. B. Eddy, Melville Egleston, F. B. Ellis, J. D. Elsworth, Frank B. Ellis, W. P. Ellis, Howard B. Emery, Wm. W. Emmons, Herman Erlich, Edward H. Everit.

John Milton Ferry, J. B. Finnerty, Thos. P. Fitzpatrick, J. J. Fitzsimmons, James H. Flanagan, E. C. Ford, Wm. A. Ford, Hugo Forger, Walter H. Freeman, Mrs. Anna V. Freeman, Chas. H. Fuller.

E. H. Gallaher, Geo. W. Gallus, Wm. L. Gandue, W. J. Garvey, Joseph A. Gately, James L. Gaynor, W. T. Gentry, Chas. E. Geubner, John J. Ghegan, Daniel R. Gibbs, William A. Gibson, Charles J. Glidden, Steven B. Goodloe, John H. Gough, Willard Graham, Charles A. Grant, R. H. Gray, George L. Green, Samuel M. Greer, Frank W. Griffin, Eugene A. Gurnee, William T. Gurnee.

Edward J. Hall, George A. Hall, Jr., L. F. Halsted, Thos. E. Hardgrove, F. W. Harrington, William H. Hart, John F. Hathaway, Thos. Hawken, Albert S. Haynes, T. A. Hearn, W. F. Heep, John G. Hekking, Elmer Hertzler, Angus S. Hibbard, Geo. W. Hickey, Henry A. Higgins, P. Kerr Higgins, Alfred E. Holcomb, John P. Holder, Louis Holm, E. T. Holmes, H. T. Holmes, E. H. Honey, P. D. Honeyman, J. A. Honke, H. B. Hoopes, Robert B. Hopkins, Neil M. Houston, G. W. Hoyt, W. H. Hughes, H. G. Huidekoper, Leland Hume, E. J. Hunt, William F. Hunt, W. E. Huntington, M. Hutchins, Henry S. Hyde, W. D. Hanchett.

Frederick T. Iddings, S. Curtis Ingalls, T. L. Ingram.

Bertha C. Jackson, P. O. Jacobs, W. J. C. Jacobs, Chas. A. Janke, Fannie M. Jenkins, August Johnson, Minnie A. Jones, Martin J. Joyce.

Barney A. Kaiser, John Kane, Chas. F. Kelleher, Carl T. Keller, H. D. Kenyon, John Kernan, Betty E. Keys, Thos. J. Killian, L. H. Kinnard, Wall H. Kisterton, Fred. E. Kitchell, John E. Knetzer, Harry A. Knoll, Wm. J. Knowles, H. Kraft.

John W. Ladd, John F. Lane, Harold O. Larsen, E. F. Latomer, E. N. Lawrence, Clarence C. Lee, Mary F. Lee, John Lenihan, Frank E. Leonard, Edward E. Lillie, Nathaniel W. Little, Geo. F. Lillis, Thomas D. Lockwood, Wm. E. Lockwood, Thomas F. Long, Edmund W. Longley, Wm. H. Lown, Geo. A. Lufkin, Edward H. Lyon.

Frank J. McCann, Richard T. McComas, John A. McCoy, Harry G. McCully, Charles W. McDaniel, Henry McDonald, James McDonough, Hedley C. McKay, C. T. McKee, Cecil W. McKenzie, Thomas McKeon, Wm. G. McLaren, W. J. McLaughlin, Alexander McLellan, P. James McManus, S. G. McMeen, Harry A. McMullen, A. Macauley, John A. MacCrellish, Angus A. Macdonald, Geo. F. Macdonald, J. E. Macdonald, L. A. Madden, J. A. Maguire, Thomas F. Maguire, W. J. Maiden, Fred Mandeville, G. K. Manson, George T. Manson, Augustus Many, S. H. Marriott, E. S. Marsh, Howard P. Marshall, John F. Martin, J. J. Martin, Philip J. Martin, Wm. D. Martin, Carlos L. Mason, Edmund S. C. May, John P. Mayers, James J. Meany, James H. Mehaffey, C. Lyman Meixel, James Menzies, Frances Merriam, James Merrihew, S. H. Meyers, George Duncan Milne, George Mitteldorf, Wm. R. Moir, Edward W. Moister, John F. Moody, Robert J. Moody, W. J. Moore, James T. Moran, Richard J. Morgan, William J. Morgan, Jr., Elmer P. Morris, W. P. Morris, Enoch L. Murphy, John F. Murphy, John O. Murphy.

George Nast, Thomas Nesbit, Frank G. Nelson, Walter R. Newton, C. A. Nicholson, Walter W. Nicholson.

Richard O'Brien, J. F. O'Hea, Lawrence A. O'Leary, Thomas O'Neil, John O'Rourke, J. F Oderman, Henry F. Ogden.

E. Palm, J. M. Pardee, Moses Greeley Parker, W. A. Parker, M. Gertrude Paul, John Peacock, Jr., John C. Peaty, Fenner H. Peckham, G. W. Peck, W. B. Perkins, Byron Philip, F. A. Pickernell, Geo. B. Pierce, George Willis Pierce, Thomas E. Pigott, J. L. Pitcher, George S. Pond, Henry W. Pope, Dexter B. Potter, Frank Powell, Chas. W. Price, A. Proctor, John Putnam.

Robert E. Rae, T. T. Ramsdell, P. T. Reilly, James H. Reinecke, W. L. Richards, Samuel A. Richardson, J. L. Richmond, Wm. R. Ridge, James Robb, Arthur M. Robinson, John J. Roddy, C. W. Rogers, Howard C. Root, Frank C. Ross, Miss Ada M. Rouse.

Albert L. Salt, A. G. Saylor, Henry J. Schultz, P. F. Scott, John A. Seely, C. E. Shackford, Jos. A. Shaw, Lawrence J. Shay, Jacob Schoch, David Shears, Wm. A. Shears, Thomas Sherwin, E. F. Sherwood, W. A. Sherwood, John A. Sidell, A. Silverman, W. D. Sloan, Arthur S. R. Smith, A. T. Smith, Claude B. Smith, F. Eugene Smith, George Herbert Smith, Sidney H. Smith, Sterry Frederick Smith, John Soderstrom, Walter N. Sperry, George E. Stannard, Roswell H. Starrett, J. W. Stearns, S. D. Snook, H. F. Stevens, Alexander T. Stuart, Daniel J. Sullivan, P. H. Sullivan, Gerard Swope, Edwin M. Surprise, Robert F. Swayze, W. I. Sweet, Merwin D. Tuttle.

J. B. Taltavall, Thomas R. Taltavall, William F. Taylor, Frank L. Teese, Abraham T. Thompson, Chas. M. Thompson, C. T. Thompson, George K. Thompson, Philip E. Thompson, Malcolm Arthur Thompson, B. I. Throop, H. F. Thurber, Fred. B. Tillon, Wm. M. Todd, F. C. Toepleman, Miss Florence T. Toomey, W. A. Tower, F. L. Tower, Charles R. Truex, William H. Truex, Alonzo W. Tuttle.

Dora E. Ulrich.

Theo. N. Vail, Henry C. Vance, William B. Vansize, G. G. Volkmar.

Thos. H. Wadland, W. K. Wagner, Miss M. C. Wait, Clement I. Walker, James M. Walsh, James K. Wass, Thomas A. Watson, T. D. Webb, J. C. Weisert, J. J. Welch, W. T. Westbrook, W. T. Westbrook, Jr., F. P. Whitney, Charles H. Wilson, W. H. Winter, L. C. Wintermuth, James T. Woods, J. M. Woorner, R. L. Wright, Walter A. Wright, Joseph A. Wyatt.

James F. Yearsley, P. Yensen.

E. B. Zerman, Joseph F. Zipfel.

New Book.

Wireless Telegraphy and Telephony, By C. I. Hoppough, Valparaiso, Ind. This work has just come from the press and is the most up-to-date and complete treatise on these subjects. It contains about 200 pages of descriptive and illustrative matter pertaining to wireless and more than 150 illustrations. There are sixteen chapters describing in detail the development of wireless telegraphy and telephony from its inception to its present state of efficiency. The book embraces the following subjects: Matter, Motion and the Ether; Electricity and Magnetism; Quantitative Electricity; Dynamo Electric Machinery; Electro-Magnetic Induction; Capacity and the Oscillatory Discharge of Condensers; Electro-Magnetic Waves; Early Experiments in Wireless Telegraphy; Detectors; Receiving Circuit and Tuning Apparatus; Transmitters; Spark Gaps; Aerials; Wireless Equipment and Telegraph Stations; Wireless Telephony; Wireless Operating.

Mr. Hoppough, the author, has been in the wireless field for six years, having held some of the most important positions with the United Wireless Telegraph Company. This work is not only an invaluable treatise for the amateur, but a most valuable book of reference for the wireless telegrapher.

The price of the book is $1.50 per copy and copies may be obtained of Telegraph and Telephone Age, 253 Broadway, New York.

Telephone Arbitration in England.—The arbitration proceedings between the National Telephone Company and the British postmaster-general over the purchase of the English telephone system are estimated to have already cost $1,250,000. The plaintiff's inventory alone cost $1,000,000, and in addition to this are such items as about $5,000 per day in fees to counsel and $375 per week for an official stenographer.

Wireless in the German South Seas.—A wireless scheme to link up the islands of the Bismarck Archipelago and Sydney, Australia, has been arranged, and the first installment of the plant has reached Rabual, in New Britain. The wireless will be on the Telefunken system, and will be of high power.

The Telephone.

Frank J. Hahn, instructor of the plant department of the Chicago Telephone Company, Chicago, Ill., died in that city, October 22. He entered the telephone service in 1880 and was a member of the Telephone Pioneers of America.

Mr. Henry W. Pope, secretary of the Telephone Pioneers of America has moved his office temporarily from the Havemeyer building, New York, to the seventh floor Hudson Terminal building, 30 Church Street.

Mr. B. E. Sunny, president of the Chicago Telephone Company, and an old-time telegrapher, is a director of the National Citizens League recently organized for the purpose of carrying on a campaign of education for an improved banking system for the United States.

Mr. P. Kerr Higgins, of the Missouri and Kansas Telephone Company, now engaged on special work at San Antonio, Tex., accompanied by Mrs. Higgins, called on many of their New York friends, while attending the recent Telephone Pioneers convention.

C. P. Wainman, aged 66 years, vice-president of the Northwestern Telephone and Telegraph Company, died of apoplexy in Maine, Minn., on October 29 while on a hunting trip. He entered the telephone service in 1877, and was a member of the Pioneer's association.

Mr. Edgar C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company, at San Francisco, Cal., was in New York recently and called on many old friends. Prior to going to San Francisco, six years ago, Mr. Bradley was a vice-president of the Postal Telegraph-Cable Company in New York.

Dissolution of Western Telephone and Telegraph Company.—The Western Telephane and Telegraph Company has been formally dissolved under decree of the court at Boston.

Telephone Company Purchased.—The New York Telephone Company has purchased and acquired the physical property and business of the Commercial Union Telephone Company in New York State.

Telephone Returns for Nine Months.—The returns of the American Telephone and Telegraph Company for the nine months ended September 30 show an increase in gross receipts of nearly $4,000,000 and $3,100,000 net. The balance available for dividends for the nine months is about $23,600,000 an increase of over $3,000,000 as compared with the previous year.

Radio-Telegraphy.

Signor Guglielmo Marconi will leave Venice, Italy, in a few days on his way to New York where he expects to arrive early in January.

Wireless for Mexican Gunboats.—The Department of War at Mexico City, Mexico, has decided that all the Mexican gunboats shall be furnished with apparatus for transmitting wireless messages.

Wireless Patents.—The Marconi Wireless Telegraph Company of London and the Telefunken Company of Berlin, Germany, have agreed to drop all patent suits pending between these two companies.

Wireless in the Eastern War.—Practically all the wireless apparatus used on the one hand by Turkey and on the other hand by the allies, of the Balkan War, was, we are informed, furnished by the Telefunken Company of Berlin.

Wireless Equipment for Nebraska National Guard.—Efforts are being made to secure wireless telegraph and telephone equipment for the Nebraska National Guard. Provisions will be made to take care of the equipment in a proper manner in accordance with the requirements of the war department.

Wireless in Peru.—In March, 1912, the wireless telegraph offices of Callao and Lima, under the direction of the Department of Posts and Telegraphs, were opened for public use for communition to and from vessels. The direct wireless service now in operation between Iquitos and Lima is under the direction of the Department of Public Works and Development.

Long Distance Wireless at Sea.—Early in November, the steamer "Berlin" on its regular trip between New York and Genoa, Italy, distinctly received the regular press message sent each day, at 9:15 p. m., from the Atlantic Communication Company's high power station at Sayville, L. I., on the entire trip across the Atlantic, up to a distance of 3,172 miles, from Fire Island. The steamer was then just outside of Gibraltar, and the message, consisting of over one hundred words, it is stated, was received almost without an error.

A B C of the Telephone.

There are several excellent books on the telephone and its practice, but all men do not know the rudiments of the telephone. It is well, therefore, in order to gain an understanding of this instrument, as in everything else, to begin the study at the beginning. The telephone is no harder to know than any other electrical device and it becomes extremely fascinating on better acquaintance.

A B C of the Telephone is a good book for the student to start with. It explains the subject in non-technical language and the main facts connected with the telephone industry are stated in a clear and simple style. Although it is elementary in character it covers the whole subject of telephony so comprehensively and completely that after a careful study of the book the student will have a good working knowledge of the instrument and its many uses. The book is rendered particularly valuable by reason of the great many illustrations, each one of which tells a story. It has 350 pages and nearly 300 illustrations. The author of the work is Mr. James E. Homans and he is a master of the subject.

The price of this book is $1.00 per copy and copies can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

The Telephone and the Telegraph.*

BY U. N. BETHELL, PRESIDENT NEW YORK TELEPHONE COMPANY.

In St. Pauls Cathedral, near the last resting place of Sir Christopher Wren, the architect of that magnificent structure, there is a simple tablet bearing the injunction that if you demand Sir Christopher's monument, look about you. Today, if you demand the monument of the Telephone Pioneers of America, look about you.

Behold a highly developed and well organized system of communication touching human activity at every point—an essential factor in the social and industrial life of the Nation—cities, towns, villages and hamlets, though widely separated, farms, factories and firesides everywhere intimately bound together by countless avenues of speech. Through the magic of this wonderful system the hours of the day are multiplied and the work of the world is immeasurably accelerated. The incessant exchange of information and ideas which this system makes possible, puts individuals and localities on common ground—sweeps away sectional prejudices—advances civilization.

While the telephone, together with other methods of communication—the railway, the mail and the telegraph—have been the means by which the occupation and civilization of this great country have been accomplished, the telephone has provided a facility peculiar to itself, in that, over areas great and small, it has made it possible, by spoken word, to bring together—mind to mind—the vast majority of the American people. This service of the spoken word not only affords a means of communication between distant points, but attains, as nothing else has done or can do, the actual presence of one mind, one personality, with another—a practical annihilation of distance. Can we wonder that such a service, full of promise always and to which nothing now known can be compared, has been the means of developing a great national enterprise, spreading from sea to sea, and engaging the energies and commanding the devotion of a loyal army nearly 135,000 strong.

As we all know, here in the land of its birth the telephone has attained its greatest degree of usefulness. Here the broadest and best foundations were laid and here the grandest superstructure has been erected.

That America leads in the appreciation and use of the telephone is evidenced by the fact that here in our country there are more than two-thirds of all the telephones in the world. In America, too, the telephone carries nearly sixty per cent of all communications by mail, telegraph and telephone combined, while for the rest of the world the telephone can be credited with less than twenty-five per cent of the total.

In the progress of the art, also, as well as in the efficiency of the service, America leads and has always led all other countries. Here nearly every one of the important plans and appliances for exchange or long-line work has been invented and developed. The scope of the service is indicated by the fact that while in the United States there are about 25,000 telegraph offices, 60,000 railway stations and 65,000 post offices, the telephone reaches approximately 70,000 communities. By the end of this year, 1912, the total of Bell telephones scattered throughout our country will approach, and perhaps reach, the phenomenal figure of seven and a half millions.

In the operations of the Bell System, a peculiar relation to the public exists, in that, Bell representatives—Bell operators—are making direct verbal reply to the requests of Bell patrons more than twenty-five million times each day. No other service, for intimacy with its patrons, can be compared to this, but in spite of its extent and the necessary intricacy of its details, the telephone operator of America is each year, I believe, more and more appreciated for her courtesy, patience and efficiency. Today, courtesy to the public and to one another on the part of all is generally recognized in the Bell system as a *sine qua non* of success, and while perfection has not been attained, there is a cloud of witnesses to show that the general belief on the part of the public is that the nearly 135,000 Bell employes, men and women, are striving earnestly and conscientiously to render throughout the country a dependable, a courteous and an increasingly valuable service.

Moreover, this great army, working in the spirit of fairness to each other, and fairness to all, has not only carried on the telephone service of the country but has developed within itself such ideas of mutual helpfulness and such a broad recognition of responsibilities as have made possible continued welfare work of the highest order, and, finally, such carefully worked out plans for accident and sick benefits, for life insurance and pensions as will, in a multitude of cases, furnish substantial and practical relief and assistance as a just and honest due for faithful service. Through united effort this great army has made a remarkable record in social progress and achievement.

While everywhere throughout the world the telephone has attracted to its service men of high ideals and marked ability, and in numerous places splendid results have been obtained, yet, because of their unique achievement, the whole world unites in awarding the place of honor to the telephone pioneers of America.

One can scarcely conceive, however, of a well founded, comprehensive and ideal system for the electrical transmission of intelligence without bringing within the scope of his vision both the telephone and the telegraph. The binding together of these two great agencies that they may work harmoniously, hand in hand, in the public interest, is well under way, and the resulting benefits are almost universally recognized and commended. For years, in a clumsy and ineffective way, efforts were made to bring the telephone and the telegraph into complementary relations, but the results were meagre and unsatisfactory. Today, however, swift progress is being made towards complete and cordial co-operation. Wireless telegraphy, too, is taking her place as a helpful handmaid.

*Address before Convention of Telephone Pioneers of America, New York, November 14, 1912.

On Tuesday of last week the people of this nation chose a President. About 15,000,000 votes were cast, at thousands of polling places scattered from the forests of Maine to the Golden Gate, and by ten o'clock that night the net result of all this widely distributed voting was known on every city street corner and at almost every cross-road in the country. A wonderful work in which both telegraph and telephone had an honorable part!

Last Spring a mighty ship, the giant of her day, sailed on her maiden voyage. Steaming swiftly, on a starlight night, she crashed into a mountain of ice which sent her to the bottom with 1,500 souls. Intelligence of the disaster transmitted by wireless saved many lives and much suffering. And then the eyes of the civilized world, as well as its heart throbs, were concentrated on the ship of rescue. There were sorrow for the afflicted and an eager longing for definite news of those who were lost. The telephone, the telegraph and the cable enabled the peoples of many lands and many climes to stand together in sympathetic unison, to share a common grief and to join in praising a marvelous display of heroism.

And so every event of world-wide human interest—through the operations of these combined agencies—presents a vision of the Brotherhood of Man.

A very distinguished German, addressing the Society of Electrical Engineers in Berlin, recently said:

> "It is the telegraph and the telephone which has enabled us to solve the principal problems of communication, the conquest of space and time, in a manner so perfect that the very imagination could scarce surpass it. The security and rapidity of the electrical transmission of news has attained a development hitherto unknown and hardly dreamed of, and since all civilization rests upon the intercourse of individuals, and this intercourse depends on an exchange as rapid as possible of ideas and experience, we instantly recognize here the civilizing influence of electricity."

To fully appreciate what the electrical transmission of intelligence means as a factor in social and industrial progress, we must look back to a time when it did not exist. Let us confine ourselves to our own country and to the period covered by its life as an independent nation. Let us put on our seven-league boots and starting about the time when our forefathers broke away from the mother country, come bounding down the years, stopping at only half a dozen points or less to glance about us.

When Lord Cornwallis surrendered his sword to Washington at Yorktown, in 1781, a ship was dispatched to carry the news to England. The ship—so history tells us—compared with other ships of its day, was a "swift ship." The news was bad news—and bad news, we all know, travels as fast as it is possible for news to travel. And yet 37 days elapsed before the evil tidings reached Lord North in Downing Street and caused him to wildly walk the floor crying: "My God, it is all over—all over!"

A third of a century later, in 1814, at the close of the war of 1812, a treaty of peace was concluded at Ghent, but the means of communication between distant points were still so limited that two weeks later the bloody battle of New Orleans was fought—and the news of Jackson's victory and that of the conclusion of peace reached Washington, some two or three weeks later, at about the same moment.

Throughout the next thirty years intelligence continued to be transmitted between distant points only by the hand of man. During this long period of sixty years or more our country had grown to immense proportions, particularly by the acquisition in 1803 of the Louisiana Territory—then a wilderness, now a mighty empire. Statesmen here and in England strongly felt that so vast a country could not be governed or held together, and yet in 1843 some bold and courageous spirits seriously proposed the acquisition of the far-away Oregon Territory. This proposal aroused strenuous opposition, particularly in the United States Senate. Senators asked what interest could we have in a country so remote, so far away that its representatives would consume their entire time in going to and from the national seat of government? What interest could we have in a country to communicate with which it was difficult and dangerous and almost impossible? And then, in the very next year, 1844, there came across the electric wires those thrilling words: "What hath God wrought?"

There was the dawn of a new era—and those now historic words are linked forever with the name of that benefactor of his race who gave to the world the telegraph—Samuel F. B. Morse.

Let us hurry on. Another third of a century is spanned and we stop to look about. In passing we may have observed that during the early part of this period disconnected telegraph lines were built here and there, and that at length they were gathered together to form a connected system and that cables were laid from continent to continent.

The world was moving along quite merrily in an era of progress and development unlike anything that had gone before—the era of the electrical transmission of intelligence—but we stand now upon the threshold of greater things, for our third-of-a-century leap has brought us to 1876.

A young Scotchman of rare ability and pleasing personality had been working diligently to ameliorate the condition of the deaf. In the course of his work he invented an instrument which was carried to Philadelphia to be exhibited at the Centennial Exposition. He himself has told you in his simple and fascinating way the wonderful story! At length, you know, when this little instrument was being examined by certain learned men—by certain great men—one of them, amazed and astonished, exclaimed: "My God, it talks!"

Who can name the day when mankind will forget to honor him who gave to the world this priceless boon—the telephone—forget to honor the name of Alexander Graham Bell.

One more stride of thirty years, or thereabouts, brings us to the end of our journey. And what a fascinating and marvelous period has this last stride covered. All along the way we have seen swift changes in the art, rapid growth, tearing out old putting in new, transforming, expanding, developing, improving—training and educating men and women, training and educating ourselves, not only in the technique of our profession, but in business ethics and in our duties to the public we serve, and to one another.

But here and now I shall speak only of one important work which stands out pre-eminently as the milestone which marks the end of the journey we have made—the relation which is being brought about between the two great agencies—the telephone and the telegraph. These two are and always have been alike in this one respect—that intelligence is transmitted by them electrically over wires. The telegraph did not at first welcome the telephone. For a time there were jealousy and fear. A great telegraph company embarked upon a venture to protect itself from and to hurt what it thought was an adversary. But before long it was found that the two did not interfere, and quarreling was stopped, but they nevertheless went their separate ways, not realizing how helpful each could be to the other. In the course of time, however, one who was familiar with the problems of both, who knew both at first hand by actual and long extended experience—a man sagacious, broad-minded and courageous—saw the waste of facilities, the neglected opportunities of increasing the usefulness of both by harmonious co-operation and mutual helpfulness. He set about to accomplish the realization of a dream and now after his manner is leading us to its accomplishment.

We stand now at the threshold of an era—as we did when we stopped to note the beginnings of the telephone and as when further back we stopped to note the beginnings of the telegraph. And what commanding figure do we behold? An active and alert leader in a great undertaking—one whose name will ever be associated with those of Morse and Bell—the president of this association—Theodore N. Vail.

Glancing back over the years that have passed since the advent of the telephone, we see numerous and radical changes in types of apparatus and lines, in operating methods, and in the practices that have pertained in all branches of the industry. In the matter of physical development and improvement, consummate skill and ingenuity on the part of engineers and operating officials have solved many perplexing problems as they have arisen and continuous progress has been the result. Formidable commercial problems have always been present. In our large cities perhaps nothing has had so profound an effect on growth and expansion as the development of the message rate principle. In such cities, under flat rates, a point was early reached when growth was retarded, facilities overloaded, and the efficiency of the entire system seriously impaired. The adoption of the message as the unit of measure with charges graduated to the requirments of all classes of users afforded relief to the public, made an improved service possible, and introduced a degree of equity not previously found in any plan of rates. The solution of the whole complex problem—the working out of a complete and comprehensive plan—required the highest degree of business skill and cannot be credited to any individual, for it was the work of many minds and the result of wide experience in many quarters. The original idea, however, as applied at a very early day in Buffalo, was one of the many valuable contributions made to the development of the industry along broad lines by Mr. Edward J. Hall.

There has been no absence at any time of financial problems of considerable magnitude. To raise from time to time as needed, the enormous sum of more than $700,000,000 has been no simple task. To receive, safely keep and disburse the vast sums that have passed through our treasuries has been a work of gigantic proportions, done skillfully and with a wonderful degree of accuracy and integrity. To formulate and follow a system of accounts that would afford reliable and trustworthy sailing charts for those charged with the responsibility of management and at the same time give to the public and the constituted authorities the information they should have has been a continuous and at times difficult problem.

In dealing with public authorities, to avoid the enactment, through prejudice and lack of correct information, of hard and fast laws that might hobble a rapidly-growing and ever-changing industry, to secure fair and reasonable ordinances and other legislative enactments, diplomacy of no mean order has been required. To avoid unnecessary litigation and dangerous pitfalls of many sorts, to sail the difficult course that leads to great size and a universal service and yet involves no infraction of the law, has called for the guidance of the best legal counsellors.

In the annals of the Bell System there is material for a thousand romantic tales of individual loyalty and fidelity to duty on the part of linemen, wiremen and others, and of bravery and heroism on the part of operators.

So, as we look about us and as we look back over the past, we see that no one man and no set of men has solved all the problems or accomplished all that has been done. As the stars differ in glory, so we may differ in the value of our respective contributions to the general result, but of the general result, it is safe to say, as was said of the victory at Santiago: There is glory enough for all.

And we must not forget those who, after loyally contributing of their best to the work in which you and I are still engaged, are no longer with us. Their lives in many cases were marked by an unselfish devotion to duty and an adherence to high ideals and noble aims throughout long years of strenuous toil. We honor them all—and each of us no doubt treasures in his heart the recollection of splendid attributes possessed by some particular comrade whom we will not see here again. One of the charming characteristics of this industry is that we who are in it and of it are as members of one big family.

To secure greater uniformity in operating methods throughout the country, a more effective general administration, and greater ease in financing, the twenty or thirty operating divisions of the Bell companies which once existed have been concentrated into grand divisions with administrative headquarters located in eight or ten of our principal cities from each of which information and instructions are passed to the executives in the divisions or districts within the general area administered from such city.

We are now better able than ever before to discuss plans, consider measures and determine from the combined experiences of all what is best for the several branches of the service. Besides obtaining uniformity in practice, there has been provided a more ready means of developing ideas and suggestions for future improvements. Greater than ever before is the opportunity for individual initiative. The time never was and never will be when the stability and the progress of this vast enterprise has depended or will depend on the strength, the energy and the intellectual ability of any individual or small group of individuals. The virility and vigor of the organization as a whole has depended, and will continue to depend, on the virility and vigor existing throughout the mass and permeating all its parts. A great and successful leader among us is he who inspires and encourages, and who rightly uses the spirit which wells up to his hands from the myriad of springs whose sources are found among his loyal followers. Moreover, as has been demonstrated time and time again, especially in recent years, every soldier in this Bell army carries in his knapsack a marshal's baton.

Some of us find comfort in looking to the years that are behind us, while others find their chief delight in looking to the future. I congratulate you all—to those looking to the past because of the high and honorable nature of the work with which you have been identified—to those looking to the future because of what lies before you in its further development. The character of the work you know full well. It has made and is making the world a more cheerful and better place to live in. The transmission of intelligence by electricity is an active and effective agent in the advancement of civilization throughout the world.

To emphasize this fact, and, in conclusion, I shall read a brief extract from a speech made by Secretary Knox, in Tokio last September, upon the eve of his departure from Japan. Mr. Knox said:

"There is today a decided impulse towards social co-ordination that must become a real cosmic force. Through the marvelous modern development in the means of communication each nation promptly feels the influence of the public opinion of all nations. As nations understand each other better and the world draws closer together in the recognition of a common humanity and conscience, of common needs and purposes, there is carried into the international field the insistent demand for greater unity in enforcing everywhere the principle of a high morality, and, by restraints mutually applied and observed, all the human ameliorations without which both national and international life would soon fall into anarchy and decadence."

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "The Electric Telegraph," by F. L. Pope, is one of the most excellent books on the telegraph ever published and is a standard work of reference. It covers the entire field of telegraphy and is scientific in its treatment. For this reason and the fact that it is thoroughly exact and reliable we have chosen this work as our present text book, for the "Questions to be Answered" column. We cannot urge the student too strongly to follow the lessons from this book closely and with diligence. In order to do this and understand the subjects of the questions it will be necessary, of course, for him to have a copy of the book at hand in order to arrive at the correct answers to the questions.]

What hydrometer is generally used for testing the specific gravity of the liquids in cells?

How is the scale on the hydrometer determined?

What solution is used to determine the degrees on the hydrometer scale?

What are the dimensions of the glass jar for a gravity cell?

How much liquid is it intended to contain? Express the quantity in weight, and percentage of a gallon.

How is a gravity cell charged?

How is the zinc solution prepared?

What should be the specific gravity of the zinc solution?

When should the specific gravity of the solution in a fresh cell be first determined?

How is the copper solution prepared?

Give the chemical composition of sulphate of copper, in percentages.

Give the chemical composition of sulphate of zinc, in percentages.

What is the specific gravity of the sulphate of copper solution? What is its color?

How is a gravity cell set up?

In filling the jar with the two solutions (sulphate of zinc and sulphate of copper) which solution should be put in first?

How is the solution of sulphate of copper introduced into the jar?

Why do the two liquids remain separated?

Which solution is at the top and which at the bottom?

What precautions must be taken to prevent mixing the solutions?

What advantage does a coiled copper plate possess over the ordinary star-shaped copper plate?

Why is it necessary to insulate the connecting wire from the copper electrode through the solution?

The cell being assembled and ready for service, if the zinc and copper plates be joined in the air by a wire what action takes place in the wire?

Does the current of electricity traverse the wire only?

(To be Continued.)

The Propagation of High Frequency Electric Waves Along Wires*.

BY JOHN STONE STONE.

A new art has been born to us. The infant art of high frequency multiplex telephony and telegraphy is the latest addition to our brood of young electric arts. It is certainly a most promising youngster and should, after the manner of its kind, call lustily for its share of attention and sustenance.

More than twenty years ago the advent of this new art was definitely prophesied by the late J. W. Gibboney and the author in this country, and in France by the well-known electrical engineers Maurice Hutin and Maurice Leblanc. But though there was at that time a vigorous contest for priority which extended over a period of years, it is not with these early records, prophetic though they be, that we have to deal now. They are buried in the archives of the United States Patent Office. Our interest today is in the vital practical aspects of the new art, based upon the propagation of high frequency electric waves along wires, and certainly, although twenty years ago there seemed to be much promise of the new art, there were indeed surprisingly few practical aspects to the subject.

For the past three years or more Major Geo. O. Squier, of the signal corps of the United States army, has conducted a systematic investigation of the propagation of high frequency electric waves along wires and of the practicability of their use in the transmission of signals and of speech along actual telephone cables and air lines. His investigations have also dealt with electrical reasonance as a means of segregating, at the receiving end of the line, high frequency currents of different frequencies simultaneously propagated along the line, and the selective reception of the energies of these different currents, each in a different receiver circuit made responsive only to the variations in the amplitude or strength of the current it is reasonantly tuned to receive.

The results of his labors are to demonstrate beyond peradventure that not only Morse signals, but speech may be transmitted over the ordinary telephone cable and pole line circuits and to very considerable distances by means of high frequency electric currents or waves, and that a large number of telegraphic or telephonic messages may thus be transmitted simultaneously over a given telephone or telegraph circuit without interfering with each other through the use of electrically tuned or electrically resonant receivers. Moreover, he has shown that the new high frequency multiplex telegraph and telephone system may be superimposed on the older systems or the new high frequency apparatus added to lines equipped with the usual telegraph or telephone apparatus without interfering in any way with the operation of this older apparatus or being interfered with by it.

Major Squier has dedicated to the public his patents relating to this new art—an act which, though laudable in the spirit it displays, is nevertheless unfortunate, as it is more likely to retard the progress of the new art than to advance it, since what is everybody's business is nobody's business. Capital may hesitate to enter a new field and promote an undertaking in which it is led to believe that it will meet with unrestricted competition as the reward for its enterprise.

The frequencies of the electric waves or currents propagated along the wires in this new art are, so to speak, "above the limit of audibility of the receivers" or are ultra-sound frequencies. In other words, each of the electric currents propagated along the telegraph or telephone line is of so high a frequency that it can produce no audible effect in the telephone receiver through which it passes, as long as its strength or amplitude remains constant. In fact, the frequencies of the currents used in this new telegraphy and telephony are 20,000 or more alternations per second, and correspond, therefore, to the frequencies of the air vibrations of sounds whose pitches are above the limit of audibility of the human ear.

In the new telegraphy and telephony, the telegraphic signals and the voice are transmitted over the line wire by suitable variations in the amplitude or strength of the otherwise uniform high-frequency current. The signals and the voice are received in a magneto telephone receiver connected in a local circuit which included a device capable of rectifying the high frequency current used. The rectifier employed is preferably an audion, although a Wollaston electrode and perhaps other radio-telegraphic detectors, particularly the so-called crystal rectifiers, may also prove serviceable.

The rectifier in the local circuit at the receiver converts the high frequency current of the line wire into a pulsating current of double the frequency, or, what is the same thing, it converts the high frequency current into a normally uniform unidirectional current with a superimposed alternating current of double the frequency of the line current. The telephone receiver is mute to the alternating component of the rectified current, but responds to the most minute variations in the strength of the unidirectional component of this current. Variations in the amplitude or strength of the high frequency line current are faithfully reproduced in the strength of the unidirectional component of the local receiver current. In this way the telephone receiver is made highly sensitive to variations in the strength of the high frequency line currents, while absolutely mute to that current when its amplitude is constant.

However much the lack of definite ownership and consequent lack of definite financial backing may militate against the rapid commercial adoption and extension of the new art, there can be little doubt that the actual transmitting and receiving apparatus of either the high frequency multiplex telegraph or telephone will receive ample attention on the part of inventors and engineers. This apparatus is destined to be and is even now being perfected in its every detail, for

*Journal of the Franklin Institute.

the reason that the transmitting and receiving apparatus of the new multiplex telegraph and telephone is identical with that of the new continuous wave train radio-telegraph and radio-telephone respectively. We have here no mere analogy or similarity; it is an identity. Thus a number of continuous wave train radio-telegraphic transmitters connected to a telegraph line and an equal number of radio-telegraphic receivers similarly connected to the line, actually constitute one of the new high frequency multiplex telegraph systems. Correspondingly one of the new multiplex telephone systems may be constructed by attaching a number of radio-telephonic transmitters and an equal number of radio-telephonic receivers to a telephone circuit.

Of course, the perfection of the transmitter and receiver is by no means all or even the most important practical desideratum in the evolution of the new art. For the realization of the great economies this art seems destined to effect in the cost of telegraph and telephone circuits, much will have to be done in the way of adapting the new system to the complex existing and future telephonic exchanges, their mechanisms and networks of circuits. In its application to the existing telegraph systems, less difficult problems will in general have to be met. But even in the application of the new multiplex telegraph to one of the simplest existing telegraph installations, it is more than probable that some unforeseen conditions will arise to meet which will require the exercise of some ingenuity and skill.

The relation of the new high frequency telegraph and telephone to radio-telegraphy and radio-telephony is shown to be, in fact, two radio-telegraph or radio-telephone stations with a connecting wire between them to guide the waves from the transmitter to the receiver.

The current is supplied by a high-frequency alternating current dynamo which must be capable of supplying twenty watts at ten volts and at not less than 20,000 cycles per second. In the case of high-frequency telephony, this dynamo has to meet a further requirement which is not demanded of it by high-frequency telegraphy, and this requirement is perhaps the most difficult one to satisfy. It is that the amplitude of the current the dynamo supplies must be absolutely smooth and can have no variations or ripples on it of periods corresponding to the periods of audible tones.

Owing to the small amount of energy required of the dynamo, there is no particular difficulty in constructing machines to meet the demands, very unusual though they be, particularly in the case of high-frequency telephony. It is not likely, however, that high-frequency dynamos will long be used in this connection, because oscillators giving sustained oscillations or continuous trains of waves of ultra-sound frequencies, constructed on the general principle of the Elihu Thomson oscillator, are very much cheaper and less cumbersome than the dynamo, while requiring less care and skill in their operation. The early Thomson oscillator has been considerably improved, particularly through the use, for uniform cooling of the spark or arc gap, of various devices, such as massive and water-cooled electrodes. Working in this direction, Poulsen has immersed the arc or spark in a gaseous atmosphere of higher heat conductivity than air, while De Forest has gone so far as to immerse the arc or spark in running water.

In the new telephone system, when the transmitter is spoken to, it modifies the amplitude of the high-frequency current in the primary circuit of the induction coil in exactly the same way that it modifies the strength of the battery current in the primary circuit of the induction coil in the old telephone system, and, as already described, the telephone receiver at the receiving station responds, owing to the fact that exactly corresponding fluctuations result in the unidirectional component of the rectified current in the local circuit at that station.

In the new telegraph system, the operation of the telegraph key to send Morse signals alternately throws the high-frequency current on the line and cuts off the supply of this current from the line. The result of this would be only to make successive faint clicks in the telephone receiver as the current is thrown on and off, except for the periodic interrupter, which may be of the nature of a revolving commutator or a mere buzzer. This interrupter serves to break the incoming wave trains constituting the Morse signal elements up into a succession of much shorter wave trains having a frequency of about 450 impulses per second, which, when rectified, give rise in the telephone receiver to a high-pitched musical tone of great audibility. The Morse signals now are audible as a succession of long and short intervals of a high-pitched musical sound, as in radio-telegraphy.

The function of the variable condensers at the transmitting and receiving stations is to electrically "tune" these stations. In the transmitting station of the system, the so-called tuning is quite different in the case of the telephone and telegraph systems. In the case of the telegraph, the coupling of the coil and the capacities of both condensers at the transmitter are adjusted with reference to the production of a maximum current in the line wire, as indicated by a hot wire ammeter connected in the secondary circuit. In the case of the telephone system, the coupling of the coil is made very small. Each of the condensers at the transmitting station is then independently adjusted to make the current in the circuit in which it is included a maximum, as indicated by hot wire ammeters connected in each circuit. The coupling of the transmitter coil is then increased until the tuning adjustment of one circuit interferes with the tuning adjustment of the other, and the circuits are readjusted, each by its own condenser, for a maximum of current in itself.

The reason for the radical difference in the tuning of the transmitter station in the telephone and telegraph systems may not be obvious. It is due to the fact that in the telegraph it is the actual amplitude of the high-frequency waves propagated along the line that determines the strength or loudness of the signals heard in the receiver, while in the telephone system it is the magnitude of the variations in amplitude of the high-frequency waves propagated along the line that determines the loudness of the received speech. Moreover, in the case of the telegraph the loudness of the received signal is the sole object, while in the case of the telephone a still more important requirement is excellence in the quality or articulation of the transmitted speech. In the case of the telegraph, therefore, the adjustment of the transmitter station is such as to produce the maximum amplitude of the transmitted waves, while in the case of the telephone system the adjustment is primarily adapted to securing the best quality of the transmitted speech, and, incidentally, to produce the maximum variation in amplitude of the transmitted waves.

Thus, by loosely coupling the primary and secondary circuits at the transmitter and then adjusting the primary circuit for a maximum of current, the reactance of the primary is made zero and the impedance of the primary is reduced to practically the mere resistance of that circuit, so that the resistance of the telephone transmitter becomes practically the sole factor in determining the primary current. Obviously this makes the variations in the amplitude of the high-frequency current due to variations in the resistance of the telephone transmitter a maximum. On the other hand, telephone engineers will realize that the elimination so far as possible, of all reactance and resistance except that of the telephone transmitter from the primary circuit at the transmitter station, is a prerequisite to good quality or articulation of the transmitted speech.

At the receiving station of the system, whether it be used as a telegraph or a telephone system, the tuning of both primary and secondary is directed merely to the production of a maximum current in the secondary circuit. For this tuning the telephone receiver is used as the indicating device, since the current at the receiving station is not sufficient to permit of the use of a hot wire ammeter. A sensitive galvanometer may sometimes be used with advantage for tuning purposes in place of the telephone receiver.

Convention of American Institute of Electrical Engineers.—The mid-winter convention of the American Institute of Electrical Engineers will be held at 33 West Thirty-ninth street, New York, February 26-28, 1913, under the auspices of the Standards Committee. This meeting will be devoted to the general subject of the rating and testing of electrical machinery and apparatus. Among the miscellaneous subjects to be discussed will be installation tests, high-potential test and spark-gap standard. Mr. F. L. Hutchinson is secretary of the Institute.

Telephone Pioneers of America.

G. D. MILNE.

Mr. George D. Milne, assistant treasurer of the American Telephone and Telegraph Company, New York, entered the telephone service in Boston, April 19, 1879.

Early in 1880 he was appointed cashier and continued in that office, and as chief clerk in the

G. D. MILNE, NEW YORK (1879).

treasury department, until 1901, when he was appointed assistant treasurer.

In 1905 Mr. Milne was also appointed assistant secretary of the company.

Mr. W. Y. Ellett, superintendent fire telegraph, Elmira, N. Y., who has been a subscriber to our publication for the past twenty odd years, writes us as follows: "Yours of the ninth informing me that you had renewed my subscription, at hand, and now that that is done let me tell you that it is a good thing for you that you did it. Sometime ago I received a letter from you stating that my subscription would expire on a certain date and unless you heard from me you would short-circuit my line. I said to myself I'll show that John B. that he's not the only 'bee' that can sting. I at once went into training under the instruction of a man who can throw Muldoon a mile, whip Robert Fitzsimmons in a minute and could carry the building in which your office is located on his shoulder from the present foundation to Watkins Glen in an hour. I am such an apt scholar now that had I missed but one issue of TELEGRAPH AND TELEPHONE AGE I was going to send you a challenge to meet me in mortal combat at Okonite headquarters. Now that you have repented of your rash act and promised not to short-circuit my line I enclose some long green and hope it will keep my motive power up for several seasons."

A New Telephone Diaphragm.

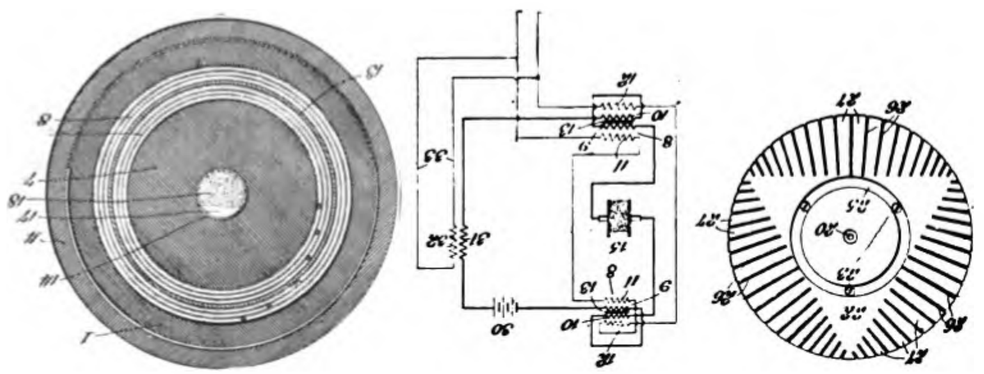
BY ANDREW PLECHER, LAS ANIMAS, COL.

The most simple of all musical instruments is the drum. A frame supports a diaphragm as in the tambourine and the kettle-drum, or there may be two diaphragms as in the snare-drum and the bass-drum. Two kettle-drums are used in an orchestra tuned to the two fundamentals of every musical progression, melody and scale. This practice shows that each diaphragm has a definite tone, which dominates all the rest. The sound of a drum is a highly complex motion, roughly illustrated by imagining the diaphragm made up of a great number of strings each vibrating in its own way.

The diaphragm of a telephone transmitter, although perhaps of different material, acts exactly in the same way, the longest and largest string, that representing the diameter of the circle, dominates all lesser ones. In all telephone transmitters in use at present, the middle string, which may not correspond to the voice, does the transmitting, since the front electrode is attached to the centre of the diaphragm and thus all other strings are unused. This bad feature, besides the inelasticity and inflexibility of a metal diaphragm, constitutes the main defect of the transmitter, leaving entirely out of consideration the slight variation of the small current that can be employed. As an apparatus, the telephone transmitter diaphragm is comparable to the cymbals used in an orchestra and has little similarity to the drum of the human ear.

Let us now consider the diaphragm of the telephone receiver. When speaking about any kind of diaphragms whatsoever, we should from the very start make a distinction between diaphragms actuated by a magnet, which I would call diaphragm-armatures and found in connection with telephone receivers, and non-magnetic diaphragms such as are used in telephone transmitters. At first glance and judging from the present state of the art, this distinction, to say the least, seems superfluous, since both have the same shape, about the same size and an expert can hardly see any difference whatsoever; nevertheless, as shall be shown, both have a strangely different function.

The diaphragm-armature is a magnet and reacts as such on the actuating magnet. As long as the actuating magnet does not impress cyclic motions upon it it makes no difference what kind of an armature the magnet attracts, whether it be in the shape of a diaphragm or in the shape of an iron block. The moment, however, the actuating magnet begins to impress a certain vibration on the diaphragm, it makes all the difference in the world whether such diaphragm responds naturally to this vibration or not, for, in case it does not respond freely its very stubbornness will induce in the magnet destructive impulses to this vibration. When the diaphragm does naturally respond to the impulses of the actuating magnet, only one string, so to speak, responds; all others most effectively oppose the impulse. Let it be remembered, however, that we are not here considering in the least the choking effect, or impedance, of a permanent magnet, but solely the destructive and choking effect of the armature reacting on the actuating magnet.


NEW TELEPHONE DIAPHRAGM.

This perversity of the diaphragm-armature was perhaps recognized by an inventor who cut the same from the center towards the periphery into strips, whereby he gained nothing, but destroyed its effectiveness on the air, which, after all is the most essential function of a diaphragm. A diaphragm-armature must not only respond freely to all electrical impulses and not react destructively on the actuating magnet, but must also be capable of forcing all vibrations upon the air, which is a gaseous and very much lighter medium. To attain this last result, the large unbroken surface of the entire diaphragm is indispensable, since the air will pass around the strips at each vibration.

As a result of these considerations we find one faction in favor of a solid diaphragm and another in favor of a cut diaphragm. Can we satisfy both? can the apparent opposites be united in a harmonious unity?

The cut shows the solution of the problem. The new diaphragm consists of a central, solid portion and of an outer, cut portion. An annular core magnet acts on the free outer ends of the variously tuned reeds, which form the armature of the magnet and when actuated by the magnet cause the solid, inner portion to vibrate in a complex manner as a whole thus effectively forcing the vibration upon the air. The support between the inner solid, and the outer cut portion acts as a circular fulcrum, increasing each vibration no matter whether it originates in the outer portion as in the new telephone receiver; or in the inner portion as may happen when the new diaphragm is applied to the phonograph.

Canadian Notes.

Mr. George Alexander Campbell Phillips, whose appointment as manager of the Calgary, Alberta, office of the Canadian Pacific Railway Company's Telegraph, was announced in our issue for November 16, was born in Toronto, Ont., May 27, 1875, and entered the telegraph service in that city on May 4, 1892. He has occupied the positions of chief clerk, cashier and assistant local manager at Toronto, finally becoming manager at Calgary.

Peculiar Wire Interruption.—On October 29 some of the wires of the Canadian Pacific Railway Company's Telegraph were interrupted in British Columbia on account of beavers felling a tree across the line.

The Marconi Company's Canadian Contract.—A contract for nineteen years has been signed by the Canadian Government with the Marconi Wireless Telegraph Company, Ltd., London, England, for the maintenance of nine additional stations on the Great Lakes of Canada. The terms involve the payment to the company of an additional subsidy of $31,500 per annum.

Obituary.

Henry Augustus Marsh, manager of the Vermont American Telegraph Company's office in Nashua, N. H., in 1860, died in that city, on November 21. He served in the Civil War as a member of Company F, Third Regiment, New Hampshire volunteers.

Miss Alice Mitchell, age 23 years, daughter of Mr. and Mrs. David B. Mitchell, of New Rochelle, N. Y., died at Redlands, Cal., on November 17, after a lingering illness. Interment was at New Rochelle, N. Y. Mr. Mitchell is one of the best known members of the telegraph profession in New York, and has the sympathy of a host of friends in his bereavement.

John B. Sabine, aged sixty-six years, a well-known New York old-time telegrapher, and a successful lawyer, died in New York, November 19, which date was also the anniversary of his birth. Mr. Sabine was born in London, England, and came to this country with his parents when he was three or four years of age, settling in Utica, N. Y. At the age of fifteen he graduated from the Utica Free Academy, and afterwards, on the suggestion of the late James D. Reid, he entered the employ of the New York, Albany and Buffalo Telegraph Company at Utica, of which company Mr. Reid was then superintendent. He came to New York in October, 1876, and entered the service of the Western Union Telegraph Company as operator, finally becoming chief operator. He later became night manager of the Atlantic and Pacific Telegraph Company's office in New York, and while in this service took the regular three-year law course at Columbia College, from which institution he was graduated in 1882 with the degree of LL.B. Since then up to the time of his death he practiced the legal profession. Mr. Sabine was one of the promoters and organizers of the Serial Building Loan and Savings Institution of New York, and was one of its attorneys for twenty-five years, and has always taken an interest in matters pertaining to the welfare of telegraphers. Deceased had a gentle, quiet nature which won for him many friends.

Miscellaneous.

New Radio Regulations Issued by Government.—A new edition of the Regulations Governing Radio Communication, dated September 28, 1912, has been issued by the Bureau of Navigation of the Department of Commerce and Labor, Washington, D. C. The new regulations conform to the rules adopted by the Berlin International Radiotelegraphic Convention of May 25, 1912, which have been issued in pamphlet form by the Bureau of Navigation.

Rehearing Denied in Telephone Case.—The Public Service Commission, second district, New York, has denied the application of the New York Telephone Company for a rehearing on the order made by the Commission, October 15, requiring the New York Telephone Company to furnish telephone service to the Metropolitan Telephone and Telegraph Company (recently incorporated), at its office in New York City. The Commission also denied the application made on behalf of the parties interested in the old Metropolitan Telephone and Telegraph Company, asking for leave to intervene in the proceeding.

Advocates Use of Telephone.—Recommendations for the more extended use of the telephone have been issued by Mr. T. Buckley, chief electrician of the New Zealand Post and Telegraph Department, Wellington, N. Z. He also recommends the installation of an automatic system for several of the chief cities of the country.

Antarctic Wireless Communication.—Faint signals from the wireless station in Adelie Land have been received at the Macquarie Island station and scientists believe that these come from the apparatus of the Dr. Mawson antarctic expedition.

Mr. R. T. Bishop, of Montgomery, Ala., for forty years chief operator of the Western Union Telegraph Company at that point, but now retired, writes: "I have been a constant reader of TELEGRAPH AND TELEPHONE AGE since its first issue and hope to have that pleasure remain with me as long as I live."

Wheatstone Working in Canada.

Commenting on the article on page 733, of our issue for November 16, on "Wheatstone Working in Canada," Mr. W. J. Camp, assistant manager Canadian Pacific Railway Company's Telegraph, Montreal, Que., writes:

"Apparently the article appearing in the *Post Office Electrical Engineer's Journal*, of London, England, must have been written some time ago. The Wheatstone circuit is worked between Montreal and Bamfield, B. C., with repeaters at Fort William, 995 miles, Calgary, 1,256 miles, Vancouver, 646 miles. Vancouver to Bamfield is 115 miles, including 80 miles of submarine cable. The circuit would work satisfactorily without repeaters at Vancouver, but it is necessary to have repeaters at that point on account of United States traffic for Australia, etc., being routed via Seattle and Vancouver.

"Leclanche batteries were only used when the repeaters were located at White River. At present there are dynamos at Montreal, storage battery at Fort William, Calgary and Vancouver. The ordinary gravity battery is used at Bamfield.

"You will notice that Mr. Lockhart bears out claims I have frequently made before the Association of Railway Telegraph Superintendents that our insulation is high."

The James D. Reid Memorial.

The Board of Trustees of the James D. Reid Memorial Fund met in the office of Mr. Charles P. Bruch, chairman, 253 Broadway, New York, November 26.

The sub-committee—consisting of Messrs D. H. Bates, Chas. A. Tinker and Edwin F. Howell—reported and showed a model of a monument to cost about $3,500, and submitted the necessary plans and specifications. The recommendations of the sub-committee will be finally acted upon at a future meeting of the board.

The following is a synopsis of the report of the sub-committee: After careful consideration of the subject the committee decided to recommend: First—As Mr. Reid was a man of social rather than civic reputation, it would not seem proper to erect a monument in his memory iln a public mart or park, but rather in some quiet, peaceful place in harmony with the gentle characteristics of his life, and his own probable preference were he known to have expressed it.

Second—That the memorial as far as practicable should be symbolic of his telegraph career, which embraced the whole of his long business life.

The model and sketch submitted with the report show a shaft mounted on a pedestal of granite, the whole standing about twenty-four feet high, to be located alongside the slab now marking the graves in Mt. Hope Cemetery, Rochester, N. Y., in which the remains of Mr. Reid and his wife are buried.

The ornamentation to consist of a bas relief facial bust of Mr. Reid within a Scotch heather wreath, beneath which is the symbol "73" under clasped hands. Below, on the principal face of the shaft, is the space to be occupied by the inscription.

The corners and tops of the four faces of the substantial granite shaft to be illustrative of the telegraph industry.

Prizes for New Subscriptions to Telegraph and Telephone Age.

TELEGRAPH AND TELEPHONE AGE offers prizes to the amount of $60 in cash to those of its regularly appointed agents who send in the greatest number of new subscriptions and renewals during the months of November, December and January. The prizes will be distributed as follows: First, $25; second, $15; third $10, and fourth and fifth, $5 each.

This contest is limited to new subscriptions and renewals only and does not include book orders, on which we make very little if any profit.

The contest is urged in the interests of our circulation, which we think ought to be very largely increased during the three months named, and we are certain that with a little effort on the part of our agents they can assist us very materially to increase our field of usefulness along educational lines. Many of our agents secure subscriptions or renewals for from two to ten years. In cases like this a five or ten years' subscription will count as five or ten yearly subscribers, as the case may be. In fact, the total amount of money received for subscriptions will decide the contest. In the event of a tie on any of the prizes, the prize will be divided equally between those entitled to share in it.

Those at points where we have no agents will find it to their advantage to secure an agency appointment to canvass their section and participate in this contest.

Many subscribers can be secured in this way and the active canvasser in a small town will fin as great an opportunity to win a prize as will a regular agent in a large city. It must be remembered that all operators are not in the cities. Many permanent agencies can thus be established to the present and future advantage of those participating in the contest.

Write to J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, for fuller particulars.

Japanese Wireless Telephone Service.—Establishment of a wireless telephone service between Yokohama and Tokio is said to be under consideration. Steady increases in the telephone subscription list of Yokohama, which have brought the total to 4,100 instruments, have resulted in plans for the establishment, next year, of a new exchange in the suburbs of that city.

Mr. S. S. Scothorn, Postal Telegraph-Cable Company of Texas, Dallas, Tex., writes: "Mr. S. M. English, our president and general manager, always encourages the employes of this company to subscribe for your paper, and there is no question but what a number of us have been greatly benefited by studying the interesting and educational articles which it contains."

Western Electric Business.—The statement of the Western Electric Company covering the ten months of the year ending October shows a gain in goods billed of approximately five per cent over the same period of 1911, and the indications are that the year as a whole will show a total of goods billed of slightly in excess of the estimate of $67,000,000 made earlier in the year.

Mr. J. C. Glade, manager Western Union Telegraph Company, at Cairo, Ill., writes: "Always renew my subscription. There is no question but that TELEGRAPH AND TELEPHONE AGE is the best paper or magazine issued today in the telegraph and telephone field. It is doing much good for both the employer and employes."

The Railroad.

Mr. F. I. Van Wagnen, wire chief and chief operator of the Michigan Central Railroad Company at Jackson, Mich., has been promoted to be night chief train dispatcher of the same system. Mr. R. J. Ramsey succeeds Mr. Van Wagnen as wire chief and chief operator.

Mr. F. E. Whitcomb, signal engineer of the Boston & Albany Railroad, has had added to his duties the supervision of all telephone service, vice Mr. S. L. VanAkin, Jr., assistant superintendent telegraph. The consolidation of the signal and telephone departments under Mr. Whitcomb was arranged to bring about economy of the maintenance forces, it being thought that signal maintainers could also take care of the telephone service and is an experiment. Mr. Van Akin being relieved of the Boston and Albany work will be able to devote his entire time to his duties as assistant superintendent of telegraph of the New York Central & Hudson River Railroad Company.

Meeting of Railway Telegraph Superintendents.

A joint meeting of the Eastern and Western divisions of the Association of Railway Telegraph Superintendents was held, through the courtesy of Mr. William Bennett, superintendent of telegraph, in the conference room of the Chicago and Northwestern Railway Company, Chicago, Ill., November 20. There was a large attendance and a general discussion of the subject of train dispatching by telephone was held.

Mr. E. C. Keenan, general superintendent of the New York Central Lines, West of Buffalo, brought up the subject of misuse of and delay in handling mailgrams, which was freely discussed.

After a short executive session adjournment was taken for lunch.

Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railroad, St. Louis, Mo., chairman of the Western Division, acted as chairman of the joint meeting, and Mr. Wm. Bentley, of the Chicago and North Western, secretary.

Mr. Charles Selden, superintendent of telegraph, Baltimore and Ohio Railroad Co., Baltimore, Md., and Mr. E. A. Chenery, of the Missouri Pacific, St. Louis, were re-elected chairmen of the Eastern and Western Divisions respectively.

At 2 p. m. all those present took automobiles and proceeded to the plant of the Automatic Electric Company, where they listened to a short illustrated lecture by Professor Arthur Bessy Smith on automatic switchboards. After this the party was divided into groups and taken through the factory by representatives of the company and shown the process of manufacture and operation of automatic telephone switchboards. At 4 p. m. the party was taken in automobiles to the Illinois tunnel and spent about an hour in inspecting it.

The following superintendents and associate members were present: Superintendents—E. A. Chenery, Missouri Pacific Railroad, St. Louis, Mo.; William Bennett, Chicago and Northwestern Railway, Chicago; F. T. Wilbur, Illinois Central Railroad, Chicago; G. A. Cellar and G. A. Dornberg (general foreman), Pennsylvania Railroad Lines West, Pittsburgh, Pa.; E. D. Hubbard (general foreman), Grand Trunk Railroad, Battle Creek, Mich.; U. J. Fry, Chicago, Milwaukee and St. Paul, Milwaukee, Wis.; G. O. Perkins, Chicago Great Western, Chicago; J. P. Church, Wabash, Decatur, Ill.; E. C. Keenan, New York Central Lines west of Buffalo, Chicago; R. F. Finley (engineer general telegraph department), Lake Shore Railway, Cleveland, Ohio; C. S. Rhoads, Cleveland, Cincinnati, Chicago and St. Louis, Indianapolis, Ind.; Geo. Boyce, Chicago, St. Paul, Minneapolis and Omaha, St. Paul, Minn.; F. E. Bentley, St. Louis Terminal Association, St. Louis, Mo.; E. J. Parrish, New York, Chicago and St. Louis; L. M. Jones, Atchison, Topeka and Santa Fe, Topeka, Kan.; J. H. Brennan (assistant superintendent), St. Louis and San Francisco, Springfield, Mo.; C. E. Marsh (Chief Clerk to general superintendent), Kansas City Terminal, Kansas City, Mo.; R. L. Logan, Kansas City Southern, Kansas City, Mo.; F. F. Riefel, Lake Shore and Michigan Southern, Cleveland, Ohio; F. H. Van Etten, Chicago, Terre Haute and Southeastern, Chicago; A. Wray, Chicago, Rock Island and Pacific, Chicago, Ill.; M. H. Clapp, Northern Pacific, St. Paul, Minn.; L. A. Lee, Pittsburgh and Lake Erie, Pittsburgh, Pa.; T. M. Haston, Toledo, St. Louis and Western, Bloomington, Ill.; V. T. Kissinger, Chicago, Burlington and Quincy, Chicago, Ill.; W. P. McFarlane (assistant superintendent), Chicago and Northwestern, Omaha, Neb.; J. J. Ross, Michigan Central, Detroit, Mich.; W. L. Connelly, Chicago, Indiana and Southern, Gibson, Ind.; P. W. Drew, Milwaukee, St. Paul and Sault Ste. Marie, Chicago, Ill.; J. C. Johnson, Pennsylvania Lines East, Philadelphia, Pa.; W. P. Cline, Atlantic Coast Line, Wilmington, N. C.; S. L. Van Akin (assistant superintendent), New York Central and Hudson River Railroad, Syracuse, N. Y.

Associate members—J. H. Finley, Automatic Electric Company, Chicago; J. A. Kick, Western Electric Company, Chicago; G. K. Heyer, railway sales engineer, Western Electric Company, New York; W. E. Harkness, assistant general manager; W. L. Cook, sales engineer, E. E. Backus and H. O. Rugh, of the General Railway Equipment Company; Henry Homer, Railroad agent, American Telephone and Telegraph Company, New York; A. G. Francis, railroad agent, Chicago Telephone Company, Chicago, Ill.; A. F. Eyerman, Bell Telephone Company of Missouri, St. Louis, Mo.; George A. Graher, Kerite Insulated Wire and Cable Company, Chicago.

Mr. J. B. Yeakle, superintendent fire telegraph, Baltimore, Md., writes: "There are lots of good things in TELEGRAPH AND TELEPHONE AGE. Thanks for keeping me on the list."

Western Union Bridge Duplex.

Specifications for the installation and operation of the bridge duplex have just been issued by the engineer of the Western Union Telegraph Company, New York. These specifications are as follows:

Elementary Theory. The use of duplex telegraph apparatus makes possible the simultaneous transmission of two sendings, one in each direction, over one wire.

To accomplish this the apparatus should fulfil the following conditions:

(1) The receiving instruments at both stations must remain in the circuit all the time, ready to respond to signals from the distant station.

(2) The receiving instrument at each station must not respond to any signals made on the sending key at that station.

A thorough understanding of the circuit arrangements by which these conditions are established may best be obtained by first studying the simplest form of the bridge duplex, as follows:

A plan for sending signals from one station to another without affecting a receiving instrument at the sending station may be built up as per Figs. 1, 2 and 3.

Fig. 1 shows a simple one-way telegraph circuit, in which ML is a line wire of 1,900 ohms resistance, connected to the ground at the distant station through a relay or other receiving instrument RI, of 600 ohms resistance. At the home station the line wire ML is connected, through a 500-ohm resistance BC, to the 3-point transmitting key K. When the key is depressed, as shown in Fig. 1, the circuit is completed to ground via the 300-ohm resistance L_1 and the 160-volt dynamo D. If the key K be released, it will come to rest on its back contact and connect the circuit directly to the ground through the 300-ohm resistance L_2. Obviously, any signals made on the key K will be received by the instrument RI, as the current from the dynamo D will flow through the resistances and line wire to RI and return via the ground whenever the key is depressed; but no current will flow when the key is released, because no dynamo or battery is then in the circuit, although both ends are grounded. The strength of the current which flows when the key K is depressed will be 49 milliamperes (49/1000 of an ampere), which is the number obtained by dividing 160 volts by 3,300 ohms (the total resistance of the circuit), in accordance with Ohm's law.

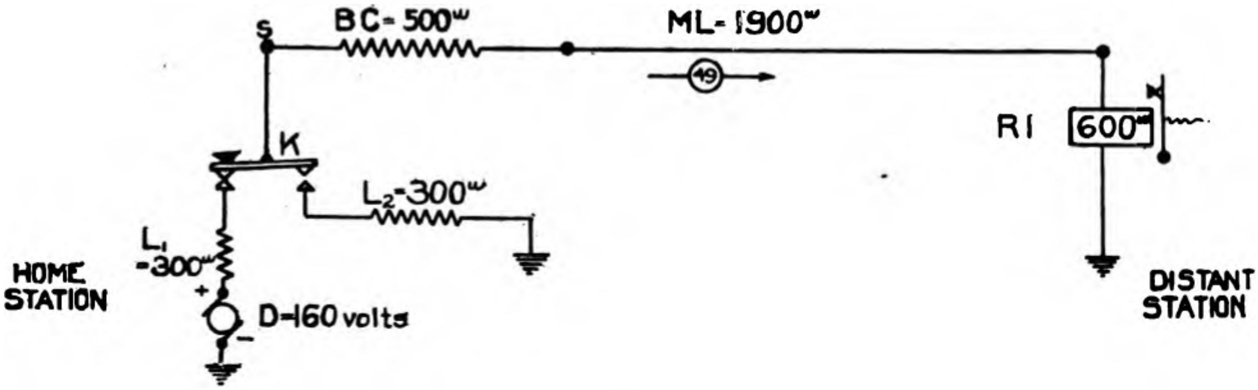


FIG. 1.

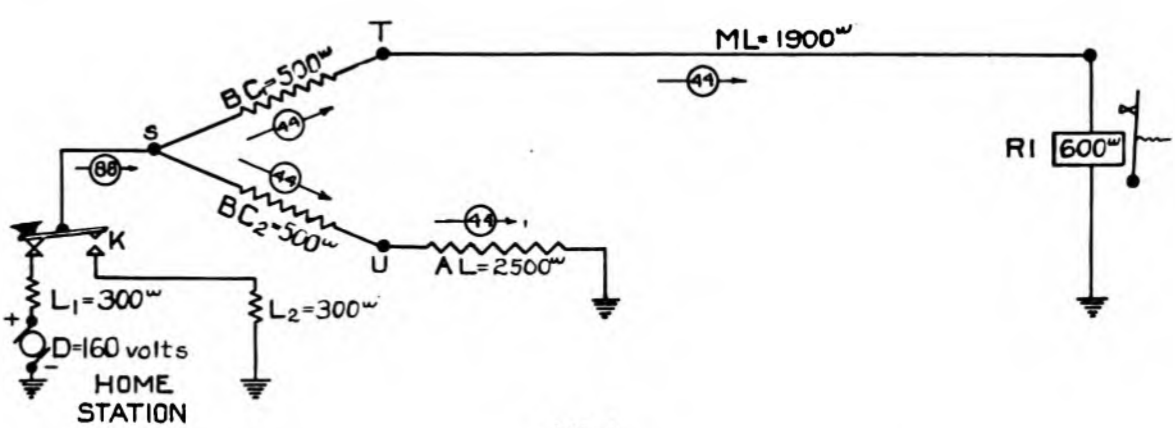


FIG. 2.

Now, suppose there is connected to the point S, as shown in Fig. 2, a branch circuit to ground composed of a second 500-ohm resistance coil BC_2, and a rheostat or adjustable resistance AL of 2,500 ohms. It is evident that the receiving instrument RI will still respond to any signals made on the key K, for the only effect of adding the branch circuit is to draw almost twice as much current from the dynamo D as under the conditions shown in Fig. 1. As the two branches between the point S and the ground are of equal resistance (3,000 ohms each), the current, which now amounts to 88 milliamperes as it leaves the dynamo D, divides equally between these two branches, with the result that the instrument RI independent of the resistance of the relay HR; no current will flow through it, whether its resistance is high or low. The means by which this result has been obtained must be clearly kept in mind; we have caused the outgoing current to divide equally between the two 500-ohm "bridge" arms, BC_1 and BC_2, by making the extensions of these arms of equal resistance, that is, by making the resistance of the branch AL exactly the same as that of the line wire ML and the distant

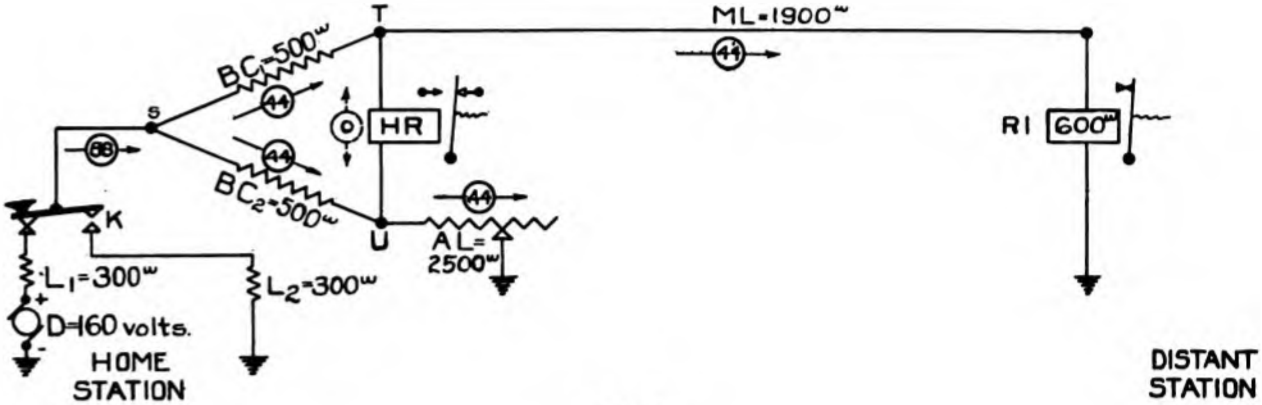


FIG. 3.

will be operated by a current of 44 milliamperes, almost as much as it received in Fig. 1.

A relay HR may be connected between the points T and U at the home station, as illustrated by Fig. 3, and no change will be made in the current distribution, as no current whatever will flow through that relay. The reason for this is that any tendency of the current in the coil BC_1 to flow downward through the relay HR is exactly counterbalanced by an equal tendency of the current in the coil BC_2 to flow upward through that relay, for the resistance in the path going downward to ground from T is the same as that in the path going upward to ground from U. Therefore, signals may be sent from the home station key K to the distant station instrument RI without affecting, in any way, the home relay HR. It may be remarked that this condition is

apparatus RI. If the branch AL were of lower resistance than that of ML and RI, a part of the current would flow downward through the relay HR; if the resistance of AL were higher than that of ML and RI, part of the current would flow upward through the relay.

Now, let us see what happens when we arrange the apparatus at the distant station in the same way as that described for the home station. This condition is shown in Fig. 4. With the key at the home station depressed, and the key at the distant station at rest, as shown in Fig. 4, the current leaving the dynamo D_1 is the same as in Fig. 3, for the joint resistance of the apparatus at the distant station between the point V and the ground, is 600 ohms, the same value as that heretofore assigned to the receiving instrument there. The relay HR is therefore subjected to the same

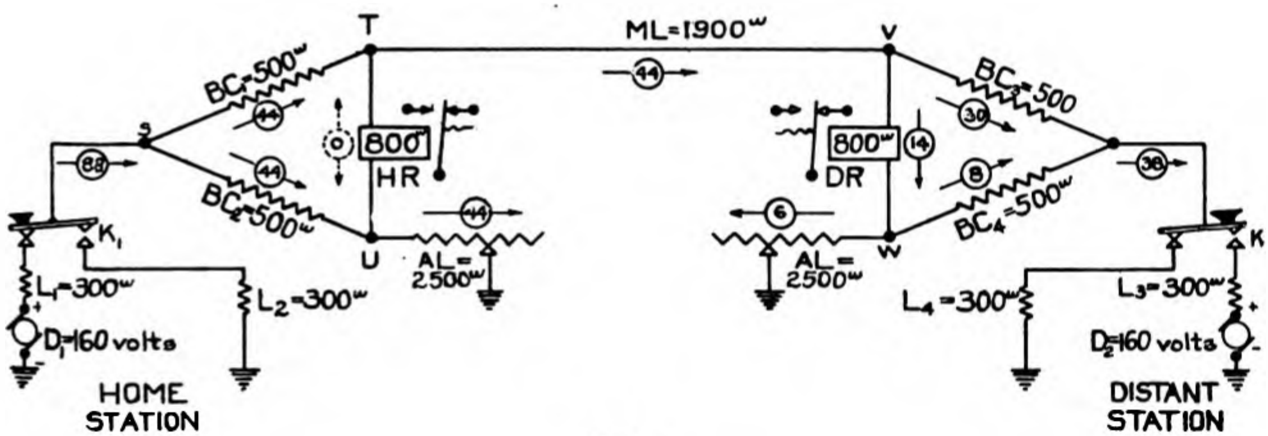


FIG. 4.

condition of balance as before, and no current passes through it. The current which reaches the distant station is 44 milliamperes, as before, but now only 14 milliamperes passes through the relay DR there, the remainder going through the other branches as shown. The current of 14 milliamperes, however, is more than enough to operate the relay, which therefore responds to the depression of the key K_1. If the key K_1 is now released, the circuit will be disconnected from the dynamo D_1, and will be connected instead direct to ground through the resistance L_2. The current from the dynamo D_1 will accordingly cease, and the armature of the relay DR will be released.

Fig. 5 shows the conditions when the keys at both stations are depressed at the same time. As the voltages of the two dynamos D_1 and D_2 are equal, and their polarities alike, and as the resistances in the circuit are equal at both ends, the tendencies of the currents to flow out over the line from the points T and V are exactly the same, and counterbalance each other, with the result that no current flows in the line wire ML. A current of 14 milliamperes will, however, flow through each relay, as shown; this current in the relay at each station being drawn from its own dynamo.

It may appear at first sight that this condition is not in accordance with the fundamental principle enunciated at the beginning of this article, viz., that the receiving instrument at a station must not respond to any signals made on the sending key at that station. A little reflection will, however, show that, although no part of this current in either relay actually comes over the line wire, the current operating the relay, in each case, is produced by the dynamo at that station in response to the signal which is being made on the key at the other end of the circuit. That this is so can be proved by releasing either key, when the current through the distant relay will immediately cease, and the circuit conditions will then be similar to those shown in Fig. 4. The release of the key will not affect the relay at its own station, and therefore, the second condition stated at the beginning is fulfilled.

It is, therefore, apparent that with the above arrangement, two messages may be simultaneously transmitted, in opposite directions, over one wire. In fact, the "Single Current Bridge Duplex," as this scheme of connections is termed, is capable of giving fairly good duplex service under favorable conditions.

In actual practice, however, there are many conditions under which the efficiency of the single-current duplex is greatly reduced. Very much better results can be obtained by the double-current system, which is therefore almost exclusively used. In this system each marking signal (a dot or a dash) is made by sending out a negative current, and each spacing signal by sending out a positive current. It is evident that the receiving instrument in this case must be one in which the movements of the armature depend on the direction of the current passing through the coils. Such an instrument is the polar relay, which is so constructed that a current flowing through it in one direction will tend to move the armature to the right, and when the current is reversed the armature will tend to move to the left. If the armature is already on the side toward which a current of a certain direction tends to move it, there is, of course, no actual movement of the armature, which remains banked tightly against the stop at that side.

The balancing scheme of the double-current duplex is the same as that of the single-current duplex, that is, an artificial line at each station is adjusted to equal the resistance of the real line and the apparatus at the distant station. By the same arrangement of bridge arms and other connections already described,

(To be continued.)

Electric Vacuum Cleaner.

Removing dirt and dust thoroughly and expeditiously from the articles to be cleaned, though one of the prime requisites of a good vacuum cleaner, is not the only one which merits investigation when a purchase is contemplated. Three other factors must be considered: The manner in which the apparatus cleans; the effect upon the article cleaned; and the design and construction of the machine itself.

The Western Electric-Sturtevant vacuum cleaner is stated to be one of the most simple outfits of this kind, and is for this reason less liable to get out of order and cause trouble and annoyance. It possesses all the elements of a good cleaner—simplicity of construction, large volume, high velocity and good steady suction.

ELECTRIC VACUUM CLEANER.

Two types of cleaner are furnished. One is the stationary type which may be installed in the basement of a building and connected by piping to the various rooms. The other is the portable which may be wheeled from room to room and is operated by attaching a flexible lead to any electric light fixture.

CATALOG OF BOOKS ON THE TELEGRAPH, TELEPHONE, WIRELESS, ETC.

ABERNETHY, J. P.—The Modern Service of Commercial and Railway Telegraphy, in Theory and Practice, including the Railway Station and Express Service; arranged in Questions and Answers; $2.00.

BATES, DAVID HOMER.—Lincoln in the Telegraph Office; Recollections of the United States Military Telegraph Corps during the Civil War; 432 pages; illustrated; $2.17.

BELL, JAMES, A.I.E.E.—Submarine Cable Telegraphy; 63 pages, 39 illustrations; $1.00.

BRIGHT, CHAS., F.R.S.E., M. Inst. C.E., M.I.E.E.—Submarine Telegraphs; 800 pages; $25.

BRIGHT, CHAS., F.R.S.E., M. Inst. C.E., M.I.E.E.—Story of the Atlantic Cable; 220 pages; $1.00.

BRIGHT, CHAS., F.R.S.E., M. Inst. C.E., M.I.E.E.—Life Story of Sir Charles Tilston Bright; $5.00.

CROCKER, F. B., AND WHEELER, S. S.—The Management of Electrical Machinery. Fully illustrated; $1.00.

CROTCH, ARTHUR.—Hughes and Baudot Telegraphs; 83 pages, 41 illustrations; $1.00.

DODGE, G. M.—The Telegraph Instructor. This volume, now in its fourth edition, is admirably designed for the student and beginner, for in explanation and illustration it is clear and profuse; 260 pages; $1.00.

DYER, FRANK LEWIS, AND MARTIN, THOMAS COMMERFORD.—Edison: His Life and Inventions. Two Volumes; $4.00 net; sent prepaid for $4.28.

HERBERT, T. E.—Electricity in its Application to Telegraphy. Adopted by the English Post Office Telegraph Department. Fourth edition, 48 illustrations; $3.00.

HOUSTON, E. J.—A Dictionary of Electrical Words, Terms and Phrases; 980 pages; 582 illustrations; $7.00.

HOUSTON, E. J.—A Pocket Dictionary of Electrical Words; cloth, $2.50.

JONES, WILLIS H.—Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students. This standard work was in 1904 carefully revised and 74 pages and 30 diagrams added, including full descriptions of the newest apparatus adopted by the Western Union and Postal telegraph companies. It presents the finest study of the telegraph ever published; it explains clearly the equipment of a modern telegraph office, and is a text-book that no student, operator, engineer or official can afford to be without; 334 pages, 52 chapters, 160 illustrations; $1.50.

LOCKWOOD, T. D.—Electrical Measurement and the Galvanometer and its Uses; 144 pages, fully illustrated with diagrams of connections, engravings of apparatus, etc. $1.50.

LOCKWOOD, T. D.—Electricity, Magnetism and Electric Telegraphy; A Practical Guide and Handbook of General Information for Electrical Students, Operators and Inspectors; 376 pages; 152 illustrations; $2.50.

MARSHALL, PERCIVAL.—Small Accumulators; How Made and Used; an Elementary Handbook for the Use of Amateurs and Students; 50 cents.

MAVER, WM., JR.—American Telegraphy and Encyclopedia of the Telegraph. This fine work, revised and enlarged, treats of the systems, apparatus and operation of telegraphy; 668 pages; 492 illustrations; $5.00.

MAVER, WM., AND DAVIS, M. M.—The Quadruplex; 128 pages; 63 illustrations; $1.50.

MEADOWCROFT, WM. H.—A B C of Electricity. This book begins at the very root of electrical science, and contains a vast amount of useful information; 50 cents.

MEYER, FRED L.—Twentieth Century Manual of Railway and Commercial Telegraphy. This work embraces all kinds of commercial messages, train orders, phrases, etc.; 269 pages; illustrated; $1.00.

MEYER, FRED L.—Railway Station Service. A text-book for those who wish to become properly equipped as station, baggage, freight or ticket agents; 216 pages; fully illustrated; $1.25.

MONELL, DR. S. H.—The Cure of Writers' Cramp, and the Arm Troubles of Telegraphers. This valuable treatise should be in the possession of every telegrapher suffering from this common annoyance; 50 cents.

OFFICIAL DIAGRAMS of the Postal Telegraph-Cable Company's Apparatus, and Rules Governing the Construction and Repair of Lines. This book has been produced by authority of the Postal Telegraph-Cable Company, and under the personal supervision of John F. Skirrow, associate electrical engineer. All of the engravings are made from the official blue-prints of the Postal Company, and are therefore absolutely correct; 134 pages; 105 full-page illustrations; 50 cents.

PHILLIPS, WALTER P.—Phillips Code. A popular, generally used and thoroughly tested method of shorthand arranged for telegraphic purposes, and contemplating the rapid transmission of press reports; also for general newspaper and court reporting; flexible leather cover, pocket size; $1.00.

PRIME, S. IRENAEUS.—Life of S. F. B. Morse. The only work authorized by the family and executors of the great inventor, compiled from original data. This is the finest, most accurate and complete life of Prof. Morse, and includes the history of the invention of the telegraph and the many important business connections with those who were interested with Prof. Morse in the development of the telegraph, that has ever emanated in any shape or at any time from the press; sheepskin; 775 pages; illustrated; $3.00.

POPE, FRANKLIN LEONARD.—Modern Practice of the Electric Telegraph; a Technical Handbook for Electricians, Managers and Operators; 234 pages; 185 illustrations; $1.50.

PREECE, W. H., AND SIVEWRIGHT, J.—Telegraphy. A description of every telegraph system and apparatus used in the English telegraph department; ninth edition; with appendix; 504 pages; 272 illustrations; $2.50.

REID, JAMES D.—The Telegraph in America. A complete detailed history of the telegraph, including the organization of the various telegraph and cable companies; 894 pages; illustrated; full morocco binding; $5.00.

SCHNEIDER, N. H.—Electrical Instruments and Testing; with new chapters by Jesse Hargrave, of the Postal Telegraph-Cable Company, on testing wires and cables and locating faults in telegraph and telephone systems; how to use the voltmeter, ammeter, galvanometer, potentiometer, ohmmeter, the Wheatstone bridge, and the standard portable testing sets; 256 pages; 133 illustrations; cloth, $1.00; full limp leather, $2.00.

SCHNEIDER, N. H.—Model Library, comprising 4 books, viz.: Study of Electricity for Beginners; Dry Batteries; Electrical Circuits and Diagrams; Electrical Bells, Alarms, etc.; bound in one volume; cloth, $1.

TALTAVALL, JOHN B.—Telegraphers of To-Day. Biographical and historical sketches of more than 900 leading telegraphers, living and dead; published in 1894; 354 double-column pages, 11 x 14 inches; gilt edges; imitation morocco binding; only work of the kind; of much practical value to those who would keep in touch with the personnel of the profession; reduced from $5.00 to $1.00, express charges collect.

THOM, CHARLES, AND JONES, WILLIS H.—Telegraphic Connections; Embracing Methods in Quadruplex Telegraphy and other Apparatus; 20 plates with circuits distinguished by being printed in three different colors; $1.50.

WATSON, A. E.—Storage Batteries, Their Theory, Construction and Use.—An up-to-date work for the practical man; $1.50.

WEBER, W. L.—Handy Electrical Dictionary; 224 pages, 32 illustrations; cloth, 50 cents.

WILKINSON, H. D.—Submarine Cable Laying and Repairing; revised, 1909; $6.00.

TELEGRAPH SKETCH BOOKS.

LIGHTNING FLASHES AND ELECTRIC DASHES.—A book made up of bright, ably written stories and sketches, telegraphic and electrical, that should find a place in the home of every telegrapher; 160 large double-column pages; profusely illustrated; reduced from $1.50 to $1.00.

PHILLIPS, WALTER P.—Sketches, Old and New, by the author of Phillips' Code, containing a number of telegraph stories, told with all the charm of that delightful storywriter; 200 pages; illustrated; $1.00.

BOOKS ON WIRELESS TELEGRAPHY AND TELEPHONY.

ASHLEY-HAYWARD.—Wireless Telegraphy and Wireless Telephony; 140 pages, illustrated; $1.00.

BISHOP, LEON W.—Wireless Operators' Pocketbook of Information and Diagrams; 200 pages; illustrated; $1.00.

BOTTONE, S. R.—Wireless Telegraphy and Hertzian Waves; diagrams and illustrations; $1.00.

COLLINS, A. FREDERICK.—History of Wireless Telegraphy, Its Theory, Experiments and Results Obtained; 300 pages; 332 illustrations; $3.00.

COLLINS, A. FREDERICK.—Manual of Wireless Telegraphy; 232 pages; 90 illustrations; $1.50.

EICHHORN, GUSTAV.—Wireless Telegraphy; 126 pages; 79 illustrations; $2.75.

FLEMING, PROF. J. A.—Elementary Manual of Radio-Telegraphy and Radio-Telephony. 340 pages; illustrated; $2.50.

HOPPOUGH, C. I.—Wireless Telegraphy and Telephony; a well written and comprehensive treatise; 236 pages; many illustrations; $1.50.

KENNELLY, A. E.—Wireless Telegraphy and Wireless Telephony; illustrated; $1.00.

LAUGHTER, V. H.—Operators' Wireless Telegraph and Hand-Book. Complete treatise on construction and operation of wireless telegraph and telephone; 180 pages; 86 illustrations; $1.00.

LODGE, PROF. OLIVER J.—Signaling Across Space Without Wires. A description of the work of Hertz and his successors. Illustrated; $2.00.

MAVER, WM., JR.—Wireless Telegraphy; Theory and Practice; 368 pages; 258 illustrations; $3.00.

MORGAN, ALFRED POWELL.—Wireless Telegraph Construction for Amateurs; $1.50.

NAVY DEPARTMENT.—Wireless Telegraph Stations of the World. Including shore stations, merchant vessels and vessels of the United States Navy, etc.; also calls and wave lengths of stations. Corrected to January 1, 1912. Paper cover, 35 cents.

PIERCE, GEORGE W., A.M., PH. D.—Principles of Wireless Telegraphy; 350 pages; 235 illustrations; $3.00.

ROBISON, LIEUTENANT-COMMANDER S. S.—Manual of Wireless Telegraphy for the Use of Naval Electricians; 129 pages; 60 illustrations; $1.75.

STORY, A. T.—The Story of Wireless Telegraphy; 215 pages; 56 illustrations; $1.00.

TREVERT, EDWARD.—A B C of Wireless Telegraphy; 120 pages; 20 illustrations; $1.00.

VREELAND, F. K.—Maxwell's Theory and Wireless Telegraphy; 250 pages; illustrated; $2.00.

BOOKS ON THE TELEPHONE.

CUMMINGS, G. W.—Electricity and Magnetism in Telephone Maintenance; 138 pages; 45 illustrations. A very clear exposition of the underlying principles of the telephone and its care; $1.50.

DOLBEAR, A. E.—The Telephone. An account of the phenomena of electricity, magnetism and sound as involved in its action, with directions for making a speaking telephone; 50 cents.

HALL, FRANK B.—Handbook of Standard Telephone Construction Methods; illustrated with dimensional drawings; $4.00.

HOMANS, JAMES E.—A B C of the Telephone; a practical treatise for students and workers; 350 pages; 260 illustrations; $1.00.

MCMEEN AND MILLER.—Telephony; comprehensive and detailed exposition of the theory and practice of the telephone art; 948 pages; 671 illustrations; $4.00.

MILLER, KEMPSTER B.—American Telephone Practice; fourth edition; entirely rewritten and greatly extended. This comprehensive study of the subject explains in detail every piece of telephone apparatus; 904 pages; 304 illustrations; $4.00.

SMITH, ARTHUR BESSEY.—Modern American Telephony in All Its Branches; 800 pages; 470 illustrations; $2.00.

VAN DEVENTER, H. R.—Telephonology; 638 pages 736 illustrations; treats of magneto, common battery and automatic systems, composite telegraphy and telephony and describes all kinds of modern apparatus; $4.00.

CABLE CODES.

A B C CODE, fourth edition; $5.00.

A B C CODE, fifth edition. This book is entirely different from the work known as the "A B C Code, Fourth Edition," and the two should not be confounded; $7.00.

A 1 UNIVERSAL COMMERCIAL ELECTRIC TELEGRAPHIC CODE; $7.50.

MCNEILL, BEDFORD.—Code; $6.00.

MOREING, C. A., AND NEAL T.—Telegraphic Mining Code; $5.00.

OFFICIAL VOCABULARY, compiled by the International Telegraph Bureau at Berne, containing over 1,000,000 carefully selected words; four volumes, $30.00.

POSTAL TELEGRAPH CABLE CODE; $3.50.

WESTERN UNION TELEGRAPHIC CODE.—Contains 175,000 words and phrases, carefully selected from the official vocabulary; $16.00; with flexible leather cover, $18.00; Pocket edition, unabridged, $10.00.

INTERNATIONAL CABLE DIRECTORY OF THE WORLD.—Contains the names, lines of business and cable addresses of upwards of 30,000 subscribers to the Western Union Telegraphic Code; a three-year's subscription, $16.00.

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Express or carrying charges on Cable Code Books are not prepaid; these books are sent charges collect.

Any electrical book published, American or foreign, will be sent promptly to any address in the world on receipt of price, postage or express charges prepaid.

Address, and make post office money-orders, express orders, drafts and checks, etc., payable to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Confederate Military Telegraphers.

BY R. O. CAMP, WILTON, ALA.

Referring to the article in your issue of October 16 on Confederate Military Telegraphers, I give below the roster of the Confederate military operators at the immediate headquarters of the Army of Tennessee, our office being with Assistant Adjutant General Kinloch Faulkner's; Major Jack Butler, superintendent of telegraph, Shelbyville, Tenn.; Major M. W. Barr, chief operator, Louisville, Ky.; operators, William H. Cody, afterwards manager of the Western Union office at Memphis, Tenn.; William Aud and William Allen, of Kentucky, and R. O. Camp, of Georgia. This was the force at army headquarters.

I also noted Mr. E. H. Hogshead's reminiscences in your issue of November 1. Mr. Hogshead should have told of the great battle between himself and General Buford of the Kentucky Confederate Cavalry on the retreat from Nashville. One of the headquarter operators and myself struck "Ed" at a little Mobile and Ohio Railroad depot office on the line. While in Hogshead's office, General Buford came in. Each of these men weighed over two hundred and fifty pounds and both were about the shape of a good sized sugar barrel. General Buford raised a row and clinched Hogshead, and down on the floor they both went. The concussion was so great that the little office trembled, the windows rattled and the relays were thrown out of adjustment. There was not room for us all in the office so the operator and myself took to the windows. Over and over the two combatants rolled, also the tables and chairs. Some other men came to the door and we undertook to separate the two fighters. The only way was to get on each side of them and roll them over in different directions and get between them. On being thus separated they laid and glared at each other. We finally got the general out and this closed the great battle.

As far as I know I am the only one of General Bragg's headquarters staff alive today. I am now seventy years of age.

Entertainment of the New York Telegraphers' Aid Society.

The annual entertainment of the New York Telegraphers' Aid Society was held at the Lexington Avenue Opera House, New York, on the night of November 19, and was one of the most successful ever given by that organization. There were between 1500 and 2000 persons present and everyone had a most enjoyable time. The programme was arranged with excellent taste, and consisted of eight parts of vaudeville entertainment, which was of the highest class. At the conclusion of this part of the programme dancing was indulged in and the large floor presented an animated appearance with the scores of dancers moving about in time with the music. Mr. George V. Hobart, a well-known old-timer and now a dramatist of note, was the author of a farce presented at the entertainment, entitled, "Bill's Wife."

Great credit is due to president Mr. A. M. Lewis for the success of the affair, and the support given to it by the many members of the fraternity by their presence was highly appreciated by the officers of the society. Mr. R. J. Marrin was chairman of the entertainment committee and he performed his exacting duties in a most satisfactory manner. Mr. J. F. Flynn was floor director, and was assisted by Messrs. F. J. Sheridan and A. F. Kavanaugh. Mr. E. E. Brannin was chairman of the reception committee, being assisted by Messrs. J. F. E. Hopkins and W. C. Morris.

The managers of the affair have good reason to be proud of the success of this year's entertainment, and it is gratifying to note that the society is receiving very liberal moral and financial support from the telegraph fraternity in and about New York.

As a result of the entertainment it is expected that a snug sum will be added to the relief fund of the Society. This fund is to defray the expenses incident to sickness and death of those who are not qualified for membership in any of the existing organizations.

Miss Mary E. Saunders is the recording secretary, Mr. Charles A. Kilfoyle, 195 Broadway, New York, is the financial secretary of the Society, to whom all remittances should be made.

Municipal Electricians.

Mr. James B. Yeakle, superintendent of fire telegraph, Baltimore, Md., is the subject of an interesting article in the Baltimore *Sun* of November 17. The story gives an account of Mr. Yeakle's long experience as a telegrapher and superintendent of the fire alrm in Baltimore and contains an excellent portrait of him.

Mr. H. C. Bundy, superintendent of fire alarm telegraph, Watertown, N. Y., has completed the laying of fire alarm wires in conduits in several of the streets in that city. About thirty-five thousand feet of fire alarm telegraph wires will have been placed in the conduits when the work is finished.

New Talking Machine.—At the recent "Institute of the Nantucket Agricultural Society, Nantucket, Mass., one of the features was the demonstration by Mr. P. B. Delany of his new talking machine, which he has called the "Vox Humana." The clearness of reproduction of the human voice and of musical tones was favorably commented on.

Unique Representation of a Telegraph Line.—Potatoes as insulators and strings of cranberries as wires were the unique features of an exhibit of the Pennsylvania Railroad Company made at the recent Land Show in New York City, and intended to show the various means being employed by the company to assist colonists along its lines.

Wireless of the Future.—Rapid advance in wireless telegraph methods which shall render possible the transmission of messages with much less interference on the part of weather and other atmospheric conditions, is predicted by Professor M. I. Pupin, of Columbia University, New York. Powerful high-frequency electrical generators will take the place of the spark-gap method of sending out oscillations, he states. The fact which has made possible this great advance is the discovery that a much lower frequency of oscillation is required for the transmission of electrical impulses than was formerly supposed to be possible, thus permitting the introduction of generators. The low-frequency waves produced by the latter means will not be effected by sunlight to any marked degree, and it will be possible to send the impulses to a much greater distance than formerly.

Novel Telephone Equipment.—The United States Bureau of Mines is experimenting in its life-saving work with a telephone by means of which conversation may be carried on from the outside of the throat instead of from the mouth.

At the present time oxygen helmets are used in rescue work in the mines, and conversation is carried on through special attachments to these helmets. The recently adopted mouth-breathing apparatus which will soon replace these oxygen helmets will necessitate a new type of telephone. Therefore the throat communication will be adopted.

It is of course known that the vibrations of the throat and chest make conversation possible when the mouthpiece of an ordinary telephone transmitter is pressed against either. To overcome the difficulty of distinguishing between such consonants as p, m or n, a numbered code will be used.

T. M. B. A. Assessment.—Assessment No. 544 has been levied to meet the claims arising from the deaths of Anson W. Johnson at Schenevus, N. Y.; Joseph E. Stevenson at Trenton, N. J.; David R. Davies at Santa Barbara, Cal.; Josiah F. Harrell at Okolona, Miss.; Rossington Elms at St. Louis, Mo.

Plea of a Mexican Operator for an Increase of Salary.

The request of a Mexican operator in a Texas telegraph office for an increase of salary having been denied, the Mexican undertook to strengthen his claims in a letter in English, in a style all his own. Referring to the letter denying the application the Mexican says, "It seems to me not to be satisfactory, because merely it is not only a wish that carry me to do so but it is the reasonable."

His average work was evidently not up to the standard, and this was brought to his attention by his superior. "You, say," he continues, "that my averages are less than other men and that is so, but it is because, some times there is work to be done, and other times that you can stay calling and calling besides the wire troubles and all you know about it.

"You will please notice," he goes on to say, "that you take statement of the less amount of messages I made and fully forgetting the time-hours I have had work and have done the amount of messages that other telegraph operators handle and are being paid higher than me. I have been working with everybody, and if I would not fit the place they would have stopped any time. Now you will find that I make less than others, but it is not my fault."

After further argument calculated to prove his worthiness for an increase, he continues: "I understand too that you have the right to protect the Company interests, but I am after an improvement to fix my self-conditions."

LETTERS FROM OUR AGENTS.

NEW YORK WESTERN UNION.

Mr. Frank M. Smith, aged 46 years, a well-known telegrapher, lately employed at 195 Broadway, died November 16 at the Kings County Hospital, Brooklyn, N. Y.

Telegraph and Telephone Age

No. 24. NEW YORK, DECEMBER 16, 1912. Thirtieth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lesson on Electricity.

This article is intended for the young graduates of official telegraph schools who aim to rise to positions higher than that of operator, and is a reply to several requests for "something to start on."

It has always been the writer's belief that the best way to start is to obtain a general idea of what the word electricity means. Do not try to find out what it really is, for no one knows. What you should learn is how electricity is developed, manifested and controlled. But before trying to measure and control it you must first learn something about its characteristics and uses.

First, be contented with the knowledge that electricity is an invisible force, without weight or substance. A wire fully charged with electricity weighs no more than it does when uncharged. We know that this force on a wire has direction because a magnetized needle suspended above or below a charged conductor will be turned in one direction by the magnetic force of the current from one pole of a battery, and in the opposite direction when the other pole of the battery is substituted.

We also know that a current of electricity is always accompanied by another form of energy called magnetism, because if allowed to flow completely around a bar of iron the latter becomes a magnet capable of attracting another bar of iron placed near it. If the second piece of iron is not too heavy and is free to move it will be drawn toward the attracting magnet. The electric energy produces what is commonly called magnetism which constitutes the actual force that actuates the armatures and levers of all telegraph instruments.

Students should observe separately the different actions of what are known as "current," and "magnetism" so as to understand what is meant when the terms are used. You will never find one without the other in any electric circuit, although the magnetism may not manifest its presence if unfavorable conditions exist.

All telegraph relays and sounders are constructed in such a manner as to supply the necessary conditions. If you will compare the magnet and armature of your instrument with Fig. 5 in the accompanying illustrations and follow closely the actions of the current and magnetic lines of force in the other figures you will be able to obtain a fair idea of how your instrument is operated, as well as understand the manner in which magnetism performs work.

No matter what instrument you study, each possesses an armature with retractile spring, which is operated in the same manner. All such instruments come under the head of electro-magnets. Other types have permanent or polarized magnets, the operation of which is entirely different. They have no retractile springs and usually no cross-bar armature.

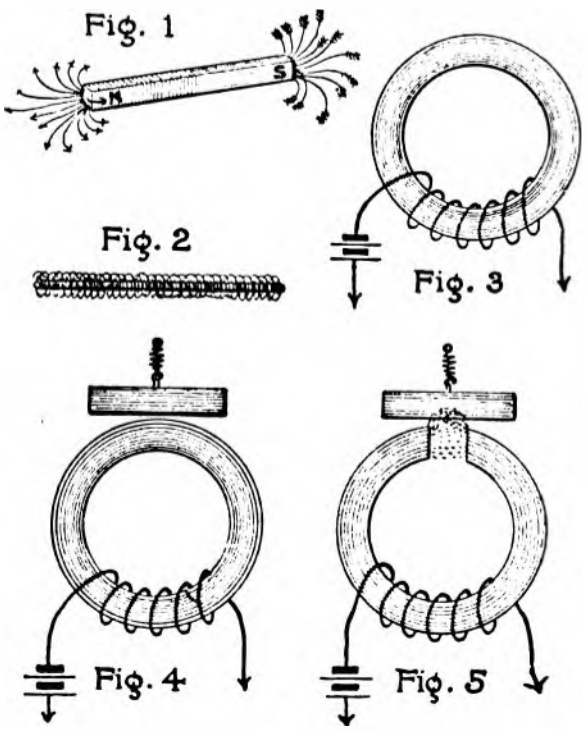
Now observe closely what happens when the conditions are as shown in Figs. 1, 2, 3, 4 and 5.

Fig. 2 represents a wire in which an electric current flows. The rings around it represent magnetic force in the form of revolving circles, the direction of which depends upon which end of the wire the current enters.

In order to make use of this force it is necessary to concentrate a great number of these rings at some useful point. In relay magnets that point is close to where the lever is situated, and to concentrate the magnetic force some medium must be found which offers an easier path than air in which to circulate. That medium is iron, the only metal that seems to offer such facilities. It has been found that when an insulated wire is wound around a bar of iron the rings or magnetic lines of force, finding that the metal offers so much less resistance to circulate in than does the surrounding air, chooses the iron path. The force they exert while traversing the bar aligns the molecules of the metal and as each molecule of iron is in itself a magnet their combined strength when so aligned, produces a magnet of the entire mass.

The next thing to learn is how the magnet exerts its power on the armature of a relay or sounder and attracts the lever towards it.

Fig. 1 shows how the rings circulate through the metal of a straight bar. They enter one end and after coming out at the other try to complete the circuit by turning back through the air, but the air path offers so much resistance that very few lines get back. Consequently such a magnet is weak. If, however, the bar is bent into the form of a closed ring as in Figs. 3 and 4 it will become strongly magnetized but will not attract an armature or other piece of iron placed near it, as shown in Fig. 4, because the lines prefer the all-iron path to travel in rather than one which includes the air gap between the main path and the bar. Such lines of force, as the rings are called, invariably choose the path which offers least resistance and, like expanded rubber bands, are continually endeavoring to contract. This contracting force is utilized in telegraph instruments by constructing a magnetic path in which part of the circuit is free to close in and shorten the path when subjected to such influences. Fig. 5 shows how such a circuit may be constructed.



MAGNETIC CIRCUITS.

It will be seen that the magnetic lines of force circulating through the iron ring are compelled to use the air gap in order to complete their circuit. If there was but one gap they would have to use it and make the best of it; but if there is more than one, the most of the lines will take the shortest cut across; that is, take the path offering the least resistance. In this illustration we find three air gaps, two of which are much narrower than the one made by cutting a slice out of the ring. Consequently a great many lines desert the iron ring on reaching the wide gap and cross the short air gap, enter the iron bar shown, and after using it as a bridge, reenter the original ring by way of the second narrow gap on the other side.

Under these conditions it is evident that the lines of force which cross over this metal bridge, in this effort to contract, exert quite a pull on the bridge. If such bridge is free to move and is not too heavy it will be pulled forward and in so doing reduce the diameter of the magnetic circuit.

Now compare the ring and iron bridge of this figure with the construction of your relay or sounder. You will find the construction of both practically alike. The core of the relay or sounder represents the iron ring and the armature the bridge which is free to move forward when the magnetic strain is greater than that of the retractile spring which holds it back.

As the magnetic rings are present only while the current flows through the coils, you draw the armature and lever towards the "closed" contact point by closing the battery key, and the spring pulls it back to the "open" stop when you open the key and cut off the current.

The strength of the magnet depends upon the quantity of current supplied; the more the current the stronger the pull. The magnets of each type of telegraph instrument are constructed and wound with a view to operating properly when the coils receive a certain prearranged quantity of current.

When you come to the study of electrical measurements, the manner in which the strength of a magnet is regulated will prove both useful and interesting. You will then understand why some instruments are marked four ohms, others fifty, one hundred and fifty, three hundred, etc.

(To be Continued.)

Telegraph and Telephone Patents.

ISSUED NOVEMBER 19.

1,044,480. Sanitary Shield for Telephone Transmitters. To R. W. Bogart, Jr., New York.

1,044,747 and 1,044,748. Telephone System. To H. P. Clausen, Chicago, Ill.

1,044,798. Wireless Telephone Transmitter. To J. P. McCarty, K. Douglas, and F. P. Herrguth, Oakland and San Francisco, Cal.

1,044,865. Telephone-Exchange System. To W. W. Dean, Elyria, Ohio.

1,044,981. Combined Telegraph and Telephone System. To C. L. Bopp, Hawkeye, Ia.

1,045,034. Telephony. To M. L. Johnson, Chicago, Ill.

ISSUED NOVEMBER 26.

1,045,306. Busy-Test System for Party-Telephone Lines. To F. R. McBerty, New Rochelle, N. Y.

1,045,310. Sanitary Device for Telephones. To I. P. Mills, San Francisco, Cal.

1,045,413. Inductive Telephone and Telegraphing Installation. To H. Von Kramer, Erdington, Birmingham, England.

1,045,515. Telephone Exchange System. To E. E. Clement, Washington, D. C.

1,045,546. Central Energy Telephone System. To C. L. Goodrum, Philadelphia, Pa.

1,045,600. Telephone Transmission System. To J. C. R. Palmer, Brooklyn, N. Y.

Personal.

Mr. Thomas J. Bishop, operator for the Baltimore *Sun*, Baltimore, Md., has been retired.

Mr. J. B. Odell has been appointed telegraph stores manager of the Western Electric Company's supply service, with headquarters at New York.

Mr. P. B. Delany, the well-known electrical engineer, has located for the winter in South Orange, N. J. Mr. Delany spends the summer months at Nantucket, Mass.

Mr. C. F. Annett, manager of the Western Union office at Jerome, Idaho, is making a record in that place for rapid delivery of telegrams by telephone, and the local papers refer in a complimentary manner to the service thus rendered.

Lena J. Brant, of New York, wife of the late John Brant, secretary of the Old Time Telegraphers and Historical Association who died in 1908, intends to spend the winter months at Montreux, Switzerland.

Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, New York, on the evening of December 5 delivered an illustrated lecture in the Parish house of St. John's Church, Passaic, N. J., on his personal reminiscences of "Lincoln in the Telegraph Office" during the Civil War.

Mr. Andrew Carnegie, in disposing of his enormous fortune to the Carnegie Foundation, of New York, as announced recently, reserved $25,000,000 for personal distribution of his United States Military Telegraph Corps pensions and Pennsylvania Railroad pensions to Pittsburgh division men and their widows, "because my old boys would dislike the change," he said.

Miss Agnes Horner, daughter of Mr. R. W. A. Horner, chief operator of the Western Union Telegraph Company at Lynchburg, Va., recently visited friends in New York City. She made it the occasion to call on many of her father's old associates. Mr. Horner has been identified with the telegraph service at Lynchburg for almost a half a century and is favorably known to telegraph officials everywhere.

Mr. J. W. Hayes of Portland, Ore., who, with his son Laddie, is travelling in the East and South in the interests of his book, "Tales of the Sierras," has been in Chicago for the past two weeks and is now working his way southward via St. Louis and Kansas City. Mr. Hayes was formerly manager of the Western Union and Postal Telegraph-Cable companies at Portland. He has been blind for many years and depends upon the sale of his book for a living.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange, December 11:

American Telephone and Telegraph Co.	137¾
Mackay Companies	80⅞
Mackay Companies, preferred	66
Western Union Telegraph Co.	72½

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. H. D. Reynolds, superintendent at Buffalo, N. Y., has returned to his office after a vacation spent at the home of his daughter at North East, Pa.

Mr. M. M. Davis, electrical engineer of the company, has returned after a brief trip of inspection of the company's offices at Albany, Utica, Syracuse and Buffalo.

Mr. James Kent, manager of the Canadian Pacific Railway Company's Telegraph, Montreal, Que., was an executive office visitor on December 10.

Mr. F. L. Stewart has been appointed manager of the McAlester, Okla., office of this company, vice Mr. Charles Clark resigned.

Mr. E. R. Auter, cashier of the Mobile, Ala., office has been appointed manager, vice W. R. Hurst, resigned. Mr. F. A. Collier succeeds Mr. Auter as cashier.

Mr. R. S. Greenwood has been appointed manager of the Grand Rapids, Mich., office, vice W. S. Sweet, transferred to the managership at Lansing, Mich.

The Kris Kringle Association, composed of employes of the executive offices and other departments, through its treasurer, Mr. Charles Shirley, paid out over $5,500 this Christmas. This sum, which was paid in monthly instalments, was saved by the individual members of the association during the ten months from February to November.

Death of Superintendent H. G. McGill.

Hiram G. McGill, superintendent Postal Telegraph-Cable Company, Chicago, Ill., died in Milwaukee, Wis., November 30, from the effects of an operation for ulceration of the stomach, the result of a sudden illness which developed while he was visiting his daughter in that city. In the hope of saving his father's life, William McGill, son of the deceased, permitted the doctors to transfuse about a pint of his blood into the arteries of his father, but without success.

Mr. McGill entered the telegraph service in 1875 as messenger for the Western Union Telegraph Company in his native town, Urbana, Ohio. He afterwards became an operator for the Atlantic and Pacific Telegraph Company at Richmond, Ind., and reentered the Western Union service at Chicago in 1878. In 1883 he accepted a position with the Postal Telegraph-Cable Company in Chicago as operator, becoming, soon afterwards, night manager, and in 1893 was appointed manager of the company's interests at the World Fair Grounds in Chicago. At the close of the exposition he became Eastern wire chief for the same company and later was appointed manager at Milwaukee, Wis. On January 1, 1904, he was appointed district superintendent, with headquarters at Milwaukee, and on January

1, 1908, his headquarters were transferred to Chicago.

Mr. McGill had a wide reputation as an efficient telegraph official and many expressions of regret at his untimely death are heard in all directions.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

The Board of Directors on December 11 authorized the following changes in the executive officials of this company to take effect January 1, 1913: Mr. Belvidere Brooks, general manager, becomes a vice-president in charge of commercial and public relations.

Mr. A. G. Saylor, general superintendent, New York, becomes general manager of the Eastern division, with headquarters at New York.

Mr. Theodore P. Cook, general superintendent, Chicago, becomes general manager of the Western Division with headquarters at Chicago.

Mr. William J. Lloyd, general superintendent, Denver, Col., becomes general manager of the Mountain Division, with headquarters at Denver.

Mr. C. H. Gaunt, general superintendent, San Francisco, Cal., becomes general manager of the Pacific Division with headquarters at San Francisco.

The general superintendents of the company, together with the executive officials held a conference in New York on December 4, 5 and 6, and discussed many subjects of interest pertaining to the service. Among those present besides the New York executive officials were: C. H. Gaunt of San Francisco, Cal.; Wm. J. Lloyd of Denver, Col.; L. McKisick of Dallas, Tex.; H. C. Worthen of Atlanta, Ga.; Theodore P. Cook of Chicago, and A. G. Saylor of New York.

Mr. T. F. Clark, vice-president of this company, returned from Europe on the steamer "Mauretania," December 14.

Mr. T. C. Harlan, of Kankakee, Ill., has been appointed manager of the Evanston, Ill., office of this company.

Mr. Clarence E. Comstock for the past twenty-seven years manager of the Watertown, N. Y., office of this company, has retired from active service on account of ill-health.

Mr. J. A. Crawford, formerly manager of the Western Union Telegraph office at St. Joseph, Mo., after a two months rest for the benefit of his health, has accepted the position of district manager of the same interests at Nashville, Tenn.

Mr. W. J. Meloney, who was for thirteen years manager of the Atlantic City, N. J., office, of this company has been appointed manager of the Trenton, N. J., office. Prior to his service in Atlantic City, Mr. Maloney was for three years manager at Altoona, Pa. He resigned as manager at Atlantic City to institute the Atlantic City Transportation Company, which operated a steamer service between that resort, New York and Philadelphia.

This company has moved its Hamilton, Ohio, office into new quarters at Second and Market Streets. The new office is modern in its furnishing and equipment. Mr. E. D. Keyes is manager and Mr. C. E. Borger chief operator. The force consists of three day operators, two night operators, two day clerks and three messengers.

The employes of the Lynchburg, Va., office of this company recently passed resolutions tendering their grateful thanks to Mr. Theo. N. Vail, president of the company for his generous acts in behalf of the company's employes throughout the land. The pension, sick benefit and insurance plan is mentioned particularly.

The usual quarterly dividend of 3/4 of one per cent was declared by the Board of Directors December 11.

Meeting of Western Union Commercial Department.

The Commercial Department of the Western Union Telegraph Company, New York, held its annual meeting and dinner at the Broadway Central Hotel, Tuesday, December 3. A luncheon was served at 1 p. m., at which all who are employed at night by the Commercial Department were present. The dinner to the day forces, at which over 300 were present, was held at 7 p. m.

Mr. J. F. Nathan, commercial superintendent, acted as toastmaster. Among those who delivered instructive and pleasing addresses were Mr. E. M. Mulford, division commercial superintendent, Mr. J. C. Willever, United States manager of cables, Mr. Belvidere Brooks, general manager, Mr. A. G. Saylor, general superintendent, Mr. Henry G. Bates, transfer agent, Mr. A. C. Kaufman, division cable manager, and Mr. P. J. Casey, special agent. Miss N. C. Loughlin, manager of the office at 172 Fifth Avenue, contributed a paper on "Canvassing."

Among the invited guests were Mr. C. H. Gaunt, general superintendent of the Pacific Division, Mr. H. C. Worthen, general superintendent of the Southern Division, Mr. John Nelson, assistant to the general manager, Mr. M. C. Allen, division plant superintendent, Mr. S. B. Haig, division traffic superintendent, Mr. Thomas E. Fleming, manager of the messenger department, Mr. Daniel Skelton, general manager of the American District Telegraph Company, Mr. M. W. Hamblin, special agent, Mr. M. W. Rayens, special agent, and Mr. John A. Hill.

The afternoon and evening sessions, aside from the addresses made by the speakers, were devoted to general discussions of the telegraph business, and object lesson illustrations were made of business-getting methods, the honors in this branch readily going to Mr. A. Simon, commercial manager, 16 Broad Street. The thought impressed upon the members present was the broad plan and scope of the Western Union system and its ability to perform quick communication to all parts of the world, and that it was the intent of the management that fairness in dealing with the public and those with whom they might come in contact, whether as a patron or as an opponent, was one of the first requirements of success.

One of the pleasing and touching events of the evening was the reception tendered to Mr. Belvidere Brooks, general manager, the ovation lasting for ten minutes, during which the ladies gave expression to their feelings by waving American flags and the gentlemen, accompanied by the orchestra, singing appropriate songs.

The Cable.

Mr. Samuel Fenn of London has been appointed traffic manager of the Western Union cable system, with headquarters in New York.

Mr. John W. Lawson, superintendent Commercial Cable Company of Cuba, Havana, Cuba, together with his family, is in New York, where he will remain during his vacation of one month.

The rates on cable press messages over the German Atlantic Cable between Germany and the United States were reduced on December 1 from 12½ cents to 8 cents a word. Mr. Oscar Moll, Cologne, Germany, is the managing director of this company.

The Western Union cable letter service will be modified to take effect on January 1. The rates from New York and Boston will be 75 cents for twelve words instead of $1.50 for twenty words as at present and delivery will be made the day after the message is sent instead of the second morning after as formerly. Week-end letters filed on Saturday will be delivered the following Monday. The rates for this service will be $1.15 for twenty-four words instead of $1.50 for thirty words. Extra words will be at the rate of five cents each.

F. M. N. Dresing, advisory director of the Imperial Chinese Telegraphs, died in Pekin, of pneumonia, November 15. Deceased was born in Denmark, in January, 1867. He entered the service of the Great Northern Telegraph Company in Denmark, afterwards going to Newcastle, England, and later to China for the same company. He was an old cable man, and had the confidence of the Chinese government officials. He was decorated by Denmark, China, Japan and many European governments for valuable services. Mr. Dresing attended the Lisbon Telegraph Conference in May, 1908, with the Chinese delegation. He was well posted on Chinese affairs, and visited New York about three years ago.

Bermuda Cable Interrupted.—The Halifax and Bermuda Cable is interrupted. Bermuda, however, is not without cable connection as the cable from that island to Jamaica via Turk's Island is in working order. President-elect Wilson is enjoying a vacation in Bermuda. Messages from office seekers and well-meaning persons who are willing to assist Mr. Wilson in running the government are now routed via the West India and Panama cables.

Futility of Codes.—Mr. Charles Bright, F. R. S. E., M. I. E. E., the well-known cable authority, of London, Eng., and consulting electrical engineer of the Commonwealth of Australia, at a meeting of the Royal Dominions Commission in London on November 15, declared his belief in the utter futility of the use of secret codes in the sending of military messages. He said that no code yet devised was proof against the ingenuity of telegraphic experts. He advocated the construction by the British Government of an independent cable connecting the British Isles with the Dominion of Canada. Should such a cable be constructed he said that he would recommend the maintenance of secrecy in regard to the exact route of the cable.

Canadian Notes.

Canadian Wireless Rates in Effect.—The new wireless rates between Canada and steamers went into effect December 2.

The Canadian Pacific Railway Company's Telegraph at Winnipeg, Man., is arranging to install a pneumatic tube system in that city to connect the main office with the branch offices.

Mr. Edwin Pope an Inventor.

The Patent Office Record printed in our issue for December 1, shows the issue of a patent to Mr. Edwin Pope, for telegraph apparatus.

Mr. Pope is probably the senior superintendent in the telegraph service in Canada, as he has served continuously in that position since 1863, when he was placed in charge of the Northern New York district of the Montreal Telegraph Company, and had charge of a small section of the Western Union wires contiguous thereto. He later removed to Quebec, and remained in the same position with the Great North Western Telegraph Company, the successor of the Montreal Telegraph Company, until two years ago, when he was retired from the service at his own request. He is still in active service as superintendent of the Dominion Government Telegraphs, whose lines extend North and East of Quebec, for a thousand miles, or more.

The patent issued is the first in connection with an Octoplex Printing Telegraph system, which Mr. Pope is now developing, and we hope to give an outline of it, when other patents now pending are allowed. Mr. Pope has some reputation as an inventor, and from his practical knowledge of all the requirements of the business, it is likely that he will succeed, where so many others have failed.

Obituary.

M. F. Stehle, aged 46 years, Associated Press operator at Minneapolis, Minn., died in that city November 24.

Isaac N. Sharpnack, aged 59 years, until recently manager of the Western Union Telegraph Company at Parkersburg, W. Va., died November 20.

Charles Bourseul, who was believed by the people of France to be the real inventor of the telephone, died in Paris, France, November 26.

E. R. Bryan, aged 35 years, formerly manager of the Postal Telegraph-Cable Company's office at Memphis, Tenn., died in that city, December 8.

The Telephone.

Reduced Telephone Rates.—The Mountain States Telephone and Telegraph Company has reduced its rates twenty per cent in Utah, Idaho, Montana and Wyoming.

New Exchange in Boston.—The New England Telephone and Telegraph Company announces that it will build a new exchange for the Back Bay district in Boston at a cost of $500,000.

New Telephone Building in Cincinnati.—The Cincinnati and Suburban Telephone Company has started the construction of a handsome new building in Cincinnati, Ohio, for its own use, at a cost of $500,000. It will have ten floors above ground and among its features will be a roof garden.

Ask Reduction of Long-Distance Tolls in Evening.—Mr. F. H. Bethell, vice-president of the New York Telephone Company, New York, has received a letter from the Merchants' Association of New York, advocating the reduction of the long-distance telephone rates at certain hours in the evening.

Increase of Stock.—The Southwestern Telegraph and Telephone Company has filed certificates at Albany, N. Y., increasing its capital stock from $20,000,000 to $40,000,000, enlarging the number of directors from seven to fifteen, making its existence perpetual and providing for business in New York, Texas, Arkansas, Missouri, Kansas, Illinois, Oklahoma and adjoining states.

Group Picture of Pioneers.—Mr. Henry W. Pope, secretary of the Telephone Pioneers of America, 30 Church St., New York, announces that copies of the group portrait of the pioneers in attendance at the recent New York convention are now ready and can be obtained from him or from the photographer direct. The price per copy is $1.53.

Settlement Effected.—The affairs of the defunct United States Independent Telephone Company of Rochester, N. Y., were wound up in Newark, N. J., December 5 by the payment of $1,500,000 by the receiver of the company to the representatives of the bond holders. This was in settlement of claims aggregating $2,100,000. The case was in litigation for six years.

A Handsome Telephone Set.—The Queen of Spain, it is stated, possesses a telephone set of solid silver, with a gold transmitter, supported by four bronze figures, between which a boy leaning against a Spanish coat-of-arms is conversing by telephone (a golden wire) with an English girl in close proximity to a British lion. The apparatus stands on Her Majesty's writing table and connects only with the royal nursery.

Consolidation in New York State.—The Public Service Commission, second district, New York, has authorized the Mountain Home Telephone Company to increase its capital stock from $150,000 to $1,000,000. The consolidation of the Bell and independent telephone companies in the counties of Clinton, Essex, Franklin and St. Lawrence in northern New York, will follow the commissions order in regard to the Mountain Home Telephone Company.

Appointments in Eastern Group.—The following changes in the Eastern Group—Bell Telephone System, took effect December 1. Mr. Ford Huntington has resigned as treasurer of the companies, and has been appointed vice-president, and Mr. Walter Brown has succeeded him as treasurer of the New York Telephone Company. Mr. W. S. Peirsol has succeeded Mr. Huntington as treasurer of The Bell Telephone Company of Pennsylvania and The Chesapeake and Potomac Telephone Company and their Associated Companies. Mr. J. S. Wiley has succeeded Mr. Walter Brown as general auditor of the companies, and Mr. John L. Swayze has been appointed attorney for the companies.

Boston Plant Chapter.—The twelfth regular meeting of the Boston Plant Chapter of the Telephone and Telegraph Society of New England was held in the Auditorium of the Edison Building, Boston, Mass., on the evening of December 10. Mr. Francis A. Houston, general manager of the New England Telephone and Telegraph Company explained the "Workingman's Compensation Act," which became effective in Massachusetts on July 1 last, and the new pension, disability and insurance plan of the Bell companies which will become effective January 1, 1913. The regular meetings of the Boston Plant Chapter are held on the second Tuesday of each month and the regular features consist of a "question box," a "suggestion box," a regular paper and a short talk on electricity. Mr. Gordon S. Wallace, 125 Milk Street, Boston, Mass., is secretary of the chapter.

Radio-Telegraphy.

Wireless in Australia.—The wireless stations at Fremantle and Port Adelaide, Australia, have been opened for public service.

Frog's Legs As Wireless Detectors.—Dr. Lefeuvre, of Rennes, France, has devised an arrangement for the use of frog's muscles as wireless detectors.

Wireless Station Destroyed in War.—During the early operations in the war between Italy and Turkey an Italian cruiser destroyed the Turkish wireless station near Smyrna, leaving Turkey without any wireless facilities on the coast.

Violation of Wireless Ship Law.—Capt. John Hall of the steamer "Numidian" was arrested in Boston, December 4, charged with violating the Act of Congress regarding wireless equipment on passenger steamers. The government alleges that the "Numidian" did not have an auxiliary equipment capable of sending a message 100 miles, when the steamer sailed from Boston on October 5. Captain Frederick Shepherd, of the English steamer "Winifredian," was also arrested in Boston, December 10, charged with failure to arrange efficient communication between the bridge of the steamer and the wireless operator.

Mr. B. S. Josselyn, President of the Portland Railway Light and Power Company, Portland, Ore.

The subject of this sketch, Mr. Benage Stockwell Josselyn, was born in Heyworth, Ill., February 5, 1858, and entered the telegraph service at Cedar Falls, Iowa, in 1868 as a messenger boy. In 1873 he became ticket clerk and by 1893 he had risen to the position of general manager of the Kansas City, Osceola and Southern Railway, which position he held until 1898. From the latter year until April, 1899, he was general superintendent of the Omaha and St. Louis and the Omaha, Kansas City and Eastern Lines. Between 1899 and 1900 he was engaged in expert

B. S. JOSSELYN,
Portland, Ore.

investigation work and made reports on various lines for eastern capitalists. From 1900 and 1906 he occupied positions on various railroad lines becoming, in the latter year, vice-president of the Union Terminal Railway Company at Sioux City, Ia. He was afterwards vice-president and general manager of the Maryland Telephone and Telegraph Company and of the Baltimore Electric Power Company, and since July 1, 1907, he has filled the position of president of the Portland Railway Company, Portland General Electric Company, Oregon Water Power and Railroad Company, Union Traction Company, Cazadero Real Estate Company, Portland and Sandy River Electric Company, Willamette Falls Company, and Portland Railway Light and Power Company.

New Western Union Office, at Richmond, Va.

The Western Union Telegraph Company on November 25 moved into its new quarters in the Travelers Building, at Richmond, Va., and the change was accomplished without the slightest interruption to the service. The cutting over from the old to the new office was done so smoothly that not a connecting office was aware of the fact.

The operating room occupies the entire thirteenth floor of the building, where some 580 wires concentrate, and the equipment is of the latest design. On the same floor is also located the branch telephone equipment in which department a number of telephone attendants are employed. The company also occupies the entire twelfth floor for the offices of the various officials. The bookkeeping department under the charge of Mr. Charles Luffsey is located in the third floor. The company also occupies one-half of the ground floor as the receiving and delivery office. The furniture and fittings of this office are the highest expressions of the craftsman's art, the room being finished in panelled oak. Lamson pneumatic tubes connect the operating room with the offices of the superintendents and the various departments. The district messenger uniform depot, in charge of Mr. H. C. Van Dien, is located in the basement, a part of which is also devoted to supplies and the files.

The officials having offices on the twelfth floor are:

John S. Calvert, superintendent, who presides over the commercial and traffic departments and is ably assisted by F. O. Nourse as commercial superintendent; J. S. C. Murphy, district cable manager; J. B. Faulkner, district plant superintendent, with a corps of clerks; J. P. Stith, district telephone agent; F. H. Muire, district traffic manager; H. L. Grant, district commercial agent; J. F. Terrell, district manager for Virginia; E. T. Moore and E. C. Canada, district managers for North Carolina, and G. O. Summers, district manager for South Carolina. In these departments are employed a large corps of clerks and others.

In the operating department some ninety-seven persons are employed, including operators, wire and repeater chiefs, besides the check and other clerks. Mr. W. M. Reveley is chief operator, Mr. W. G. Sale, manager; A. C. Stevenson, cashier, E. A. Miner, supervisor of the local office; H. H. Cramer, night chief; F. C. Browning, all-night chief; T. B. Maher, wire chief, with four assistants, and C. W. White, repeater chief, with eight assistants.

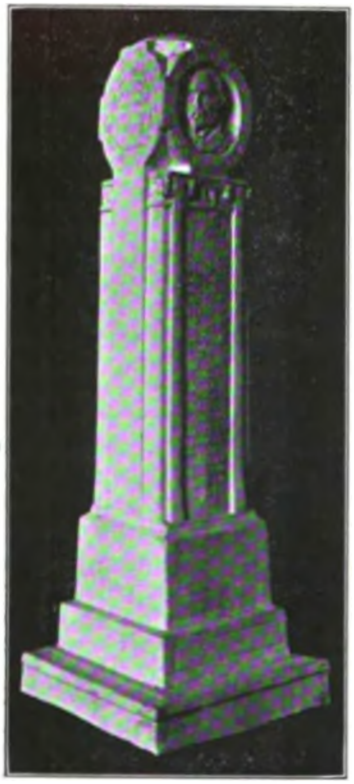
The local messenger force, consisting of some fifty boys, is in charge of a matron whose duty it is to see that the boys are neatly uniformed before starting out on their daily rounds.

Electromagnetic Voice and Ear.—A few years ago Prof. W. E. Ayrton, of London, England, prophesied that if a person wanted to call a friend, he knew not where, he would call him in a loud electromagnetic voice, heard by him who had the electromagnetic ear, silent to him who had it not. "Where are you?" he would say. A small reply would come, "I am at the bottom of a coal mine," or "Crossing the Andes," or "In the middle of the Pacific Ocean." Or, perhaps, in spite of the calling no reply would come, and the person would then know his friend was dead.

James D. Reid Memorial.

The accompanying illustration is reproduced from a photograph of a hurriedly prepared model submitted by Mr. Charles Keck, of New York, the eminent sculptor, to give a general idea of the appearance of his design for the Reid memorial. The shaft is to be made of granite, above two granite plinths, the whole resting on a suitable granite and concrete foundation.

The face of the monument will bear a bronze medallion portrait of Mr. Reid and the inscription will be of bronze letters applied to the granite. On each side of the inscription a telegraph pole, with conventional cross-arms and insulators, is to be carved in the granite and telegraph instruments are to be carved between the two poles.



PROPOSED REID MONUMENT.

The medallion is to be surrounded by sprays of Scotch thistle. On the three remaining sides of the monument Celtic crosses are to be carved in bas relief, with laurel wreaths, or other suitable devices, at the top. Mr. Keck's plans call for a shaft to stand about fourteen feet high above the ground.

In submitting the design Mr. Keck says: "The monument is designed to represent the character of Mr. Reid. I have utilized the Scotch market cross, the telegraph instrument and poles in decorating the shaft. This makes it a monument to a Scotchman, a Telegrapher and a Christian."

If the design is finally accepted by the trustees, Mr. Keck's experience and skill as a sculptor will be a guarantee that the details will be perfectly worked out and that the finished shaft will be of the highest artistic merit.

Handling Messages Written in Spanish.

BY A WESTERN MANAGER.

The chief operator in one of our principal relay offices recently made this report:

"Most of this traffic is in Spanish, and it is important that through connections be given, owing to the fact that our operators bull about one-third of it, thereby destroying the sense of the whole thing."

Every old-timer knows that the standard of service of the present day is far below that of twenty-five years ago, but why? In my humble opinion two or three reasons are responsible for most of the trouble.

Why cannot an operator of average ability copy Spanish or any other language as easily as he can English? He can if he be taught and required to copy the letters instead of the words.

It requires more than the average education, and one must be an expert speller in order to copy by words, otherwise there is a general mix-up every time a word in the least out of the ordinary is encountered. But if one's ear has received sufficient training to enable him to quickly catch the letter there is no reason why he should not, with a typewriter be able to follow any sender, at a good speed, copying the letters as they come and shutting out of his mind all thought as to what the word is to be. This, however, is a difficult matter unless the sender is reliable, free from stumbling, and a good copy reader; otherwise the receiver is kept in constant strain and his nerves soon become affected.

Another very serious matter is the "bug" fad. Most young operators think that in order to be a first-class operator they must use the "bug." They have no conception of how it should be used, but go on the principle that the more noise they make the better work they are doing, when in reality, they are causing the receiver to bull much of the business, on account of splitting dots, and dropping out.

When properly handled the bug is a great help to the sender, and a delight to the receiver, but as handled by the great majority of inexperienced operators, it is one of the greatest nuisances known to the business.

If chief operators would take the time and trouble to cut in on the different circuits, and listen, they would soon be able to locate a great deal of this trouble, and thereby be able to reduce it to a minimum.

The first-class operators all over the country should agitate this matter through your columns, and in the offices, until some steps have been taken to remedy the trouble.

Mr. J. H. Gates, manager of the Western Union Telegraph Company, Davenport, Iowa, in renewing his subscription, writes: "I appreciate your keeping me in line and trust that my subscription may never be allowed to lapse. The AGE is one of the necessities of life."

The Propagation of High Frequency Electric Waves Along Wires.*

BY JOHN STONE STONE.

(*Concluded from page 793, December 1.*)

The system previously described is obviously not of much general utility, since it provides only for one-way transmission. It is described at some length merely because of its simplicity and to bring out the analogies and the distinguishing features of the new telegraph and the new telephone systems.

A duplex system of high-frequency telephony with two-way transmission for each station is possible where each station of the system combines a transmitter and receiver identical as to apparatus with the transmitter and receiver used in the apparatus first described, and differing from the simplex system of that apparatus only in the tuning of the stations. In this duplex system the frequency to which a given receiver is adjusted to respond is as remote as it can conveniently be made from that of the current generated by the transmitter at its own station and from that of the adjacent stations.

The tuning of the apparatus in a duplex system, or even of the apparatus of a simplex system with two-way transmission, is not the same as that of the apparatus of the simplex system first described, for the reason that in the duplex system and in the two-way transmission simplex system the new element of selectivity is required of the apparatus.

It might not at first seem necessary in a duplex or multiplex system to make the transmitter circuits selective, since the frequency at a transmitter is completely determined by the generator adjustment or the dynamo speed at that station, irrespective of any tuning of its circuits, but on closer examination it will be seen that were a transmitter branch circuit not tuned in such a way as to make it receptive of the current generated at that station and exclusive of currents of other frequencies, currents of all the frequencies used on the line would flow through it, and the variations of resistance of the telephone transmitter or manipulation of the telegraph key in the local circuit at that transmitter station would modify not only the amplitude of the current generated at that station, but would also modify the amplitude of the currents of other frequencies as well, and cause "cross talk" between stations on the line not intended to communicate with each other. Each branch, whether it be a transmitter or a receiver branch circuit, is so tuned that it has *per se*, that is, when disconnected from the line and shortcircuited on itself, a minimum of impedance for currents of the frequency it is to select.

The simplest way to accomplish this tuning is to disconnect the branch and local circuit from the line, make the coupling of the coil very small and tune each circuit for a maximum of current by the adjustment of its own condenser. After this preliminary tuning, the coupling may then be increased to any desired extent and the final tuning for maximum current be easily effected. In the case of a receiving station it is in general desirable, in order to secure maximum selectivity, to employ a small coupling, and in tuning the apparatus of a receiving station the electromotive force is impressed upon the primary circuit. In a transmitter coil it is in general desirable to use a somewhat larger coupling, though maximum coupling is never advantageous, and in tuning a transmitter apparatus the electromotive force should be impressed on the primary for tuning the primary and on the secondary for tuning the secondary. The secondary branch of the transmitter is connected to the line while the primary is being tuned, and is short-circuited on the source of electromotive force and the ammeter when being tuned itself. Of course, the tuning of a primary circuit disturbs the tuning of the associated secondary circuit, and *vice versa*, and the extent of this disturbance is roughly proportional to the square of the coupling coefficient between the circuits. As a result, the proper tuning of these stations is a matter of successive approximations, but with the small couplings which it is of advantage to use in order to secure a maximum degree of selectivity, two or three successive, alternate adjustments of the condensers in the primary and secondary circuits only are necessary, particularly after one has had some experience in tuning coupled circuits. As these tunings are of the nature of calibrations and are made once for all for a given frequency, they do not appear to constitute a valid objection to the system on the ground of their complexity or on the ground that they require special skill.

A most important feature of both existing telegraphy and telephony is the centralization of the current supply, and this feature is, fortunately, most easily realized in the new high-frequency telegraphy and telephony. It brings the high-frequency generators, whether they be high-frequency dynamos or oscillators, under the constant supervision and care of a trained man at the central office. The author has devised several ways in which the centralization of the energy may be practically accomplished. In one of these, the high-frequency generators are connected in series in the circuit at the central office, and each is shunted by a number of branch resonant circuits. Each branch circuit is separately made resonant to a different one of the several frequencies of the currents used on the line other than that of the current developed by the generator it shunts. Another practical mode of centralizing the energy is where several generators, each in a local circuit tuned to its own frequency, are brought into inductive relation with a transformer secondary in series or in parallel with the telephone or telegraph circuit. The generators in the centralized energy system develop higher potentials than those designed to be used at substations, or else the voltage of the generator is stepped up to the desired voltage.

*Journal of the Franklin Institute.

There is an element of every system of transmitting intelligence, namely, the call and its allied automatic circuit control mechanisms, which has been highly elaborated, particularly in the older system of telephony. In the new high-frequency telegraphy or telephony, when used by itself, either as a simplex or multiplex, the call and automatic circuit control mechanism system generally need not be different from that in use to-day in the older systems, but in lieu of this the call may be effected by a very flexible system of selective low-frequency electric signalling over the same line. In this selective signalling system, each of a number of stations on the same line is called by the use of a low-frequency alternating current of a different frequency thrown on the line, and the selection of the signalling current at the different stations called is effected by electrically resonant local circuits or branches at these stations, each attuned to the frequecny of the particular alternating current by which it is intended to be operated.

The description of this system of selective signalling needs little amplification here, since it has long been known. There is just one new feature in the system, however, which should be mentioned, namely, that by the addition of rectifiers in the local branch signal receiving circuits the author believes that he has overcome the principal hindrance to the practical application of the system in the past. By this simple device the call at each station may be sounded by a vibrator bell of a uniform pattern.

When the high-frequency system is used in conjunction with, and on the same line as, the existing system of telegraphy and telephony, a separate high-frequency call or signalling system is preferably used. This call or signalling system is identical with the high-frequency telegraph system itself, except that it operates a local battery call device, such as a vibrator bell or buzzer, instead of operating a telephone receiver, and for this reason it is necessary that the calling current manifest more energy at a distant station than does the corresponding high-frequency telegraph or telephone current under similar conditions. To accomplish this purpose a relay of great sensibility and extreme sluggishness of action is used in conjunction with a rectifier in a tuned local circuit at the receiver station. To call the station, a high-frequency current of the same frequency as that to which the local circuit at the receiver containing the rectifier and relay is attuned is thrown upon the line and maintained thereon until the sluggish relay has time to respond and close the local battery circuit containing the vibrator bell or buzzer.

A great advantage enjoyed by the new high-frequency telephone system over the existing system is in the important particular of distortion. In the existing system of telephony, the currents as they are propagated along the line suffer a continual attenuation or a loss of amplitude, an effect to be minimized as far as possible. Still more harmful, however, in general, is the distortion of the telephone current which it engenders through the fact that the component alternating currents of different frequencies which make up the telephone current are unequally attenuated. Usually, therefore, long before a telephone current has been attenuated to a point at which it is too feeble to be of use, it has been so far distorted as to be incapable of producing intelligible speech at the receiver. In other words, considerably more attenuation than is now tolerable could be permitted in telephone systems were it not for the distortion that usually accompanies it.

In the new high-frequency system of telephony, attenuation, though greater than in the older system, brings with it no distortion whatever. There is, in fact, in the transmission of a given message, but a single frequency of current involved, and therefore no unequal attenuation of components of different frequencies and no distortion.

Another signal advantage of the new high-frequency telephone system over the existing system lies in the silent line which it enjoys. Were it not for the noisiness of the average telephone line in the existing system, telephone receivers of far greater sensibility could be used with advantage, and, furthermore, a much fainter transmitted speech would be easily understood and even prove more acceptable to the telephone subscriber than the louder transmission does on the average telephone line to-day. In the new telephone system, telephone receivers of several thousand ohms are used, having correspondingly greater sensibility than the low-resistance receivers in use in the existing telephone system. Moreover, transmitted speech which is so faint that it would be completely swamped and ineffective on even a moderately noisy line is heard and understood against a background, as it were, of absolute silence.

The most serious obstacle to the successful use of the new high-frequency telegraph and telephone is undoubtedly the excessive attenuation or progressive weakening of its current as it flows along the line, particularly in cable circuits, and unless countervailing or remedial conditions can be found, the use of these high-frequency systems must be very materially restricted through being confined to relatively short lines.

Even if no effective means be found to extend the range of the new high-frequency telephony, few will seriously contend that there is no practical gain to be realized in making use of a 450-mile circuit as it is at present used and further simultaneously employing it in two sections, each 225 miles in length, for the multiple transmission of, say, forty-two messages, twenty-one on each section.

Mr. A. A. Burr, manager, Western Union Telegraph Co., Evansville, Ind., writes: "Herewith remittance for another year's subscription to the excellent publication you are turning out for the profession. I would be lonesome without it."

Telegraph and Telephone Age

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New York, December 16, 1912.

How to Become Efficient.

We have at different times in the recent past had something to say on the subject of efficiency. In reality efficiency in some degree is a natural tendency in each individual, but to develop it to the highest degree requires thought, study and practice. So long as we have the object in view, and are sincere in our desire to attain it, it is an easy matter to direct our thoughts and shape our plans and actions along the lines of least resistance.

In our issue dated December 1 we printed an article by Mr. M. M. Davis in which that gentleman gave some simple hints as to how operators could increase the amount of business handled on telegraph circuits. His suggestions were of so simple a character that it would seem to many that it was hardly necessary to state them; yet, strange as it may seem, such advice is needed occasionally, and because it is so simple, is the very reason why a majority of operators neglect the simple duties pointed out. Big results come from attention to the little, and apparently inconsequential, things. It is as true in the telegraph business as in any other. Take, for instance, the advice to keep everything on the desk in order and provide all the blanks, etc., that will be needed in the course of the day's work. Nothing is simpler than that, yet how many operators neglect these little things. The effect of such neglect is to cause loss of time in handling papers, etc., that are out of place in order to find the particular thing desired.

Another source of delay is the failure to keep typewriters in order. These useful machines will give satisfactory results if they are properly cared for, and it does not require more than a few minutes time each day to examine the machine and put it in order before the beginning of work. Time is thus well spent, and it saves many stoppages during a day that could have been avoided. The stops may be of short duration in themselves, but in the aggregate the loss of time amounts to considerable, and when the average losses of an avoidable character per operator is multiplied by the number of operators of the same class it is easy to see how much of the company's time is wasted.

The losses all come under the classification of efficiency, because they reduce the average production per unit. It is no hardship to avoid the waste of time in the ways pointed out by Mr. Davis, and he who looks to the little things will, by reason of his training, be fitted to look after big things that may come his way.

The article in question should be carefully read and reread by those who are ambitious, and sincere in their desire to do right. By following out the suggestions laid down the operator will not only benefit the company which employs him, but himself as well.

Pay of Wireless Operators.

We print on another page of this issue a communication from a prominent ship wireless operator in regard to the low salaries paid wireless operators on steamers. We agree with him that the pay is small, considering the expert knowledge required and the long hours of duty, while the actual amount of work performed, in the aggregate, per voyage, may not always be great; the readiness to meet emergencies is the one all-important consideration and that is the main reason for maintaining the service. The work, however small or large in amount it may be, is of the most exacting kind and it is not surprising to learn of the difficulty in supplying the demand for wireless operators when it is considered how much expert knowledge an operator must possess and how little remuneration he receives for his knowledge and service. About the only effective way to bring about more satisfactory financial conditions for wireless operators is not to enter the service, as paradoxical as this may seem. When the steamship companies realize that they cannot get operators at the present rate of wages they will be compelled to pay more for the service which the law compels them to maintain.

Our correspondent makes a statement with which we do not agree. He practically asserts that it is a waste of time to take a course of study in order to pass an examination and secure a certificate and then not continue in the service on account of the low rate of pay. The training an operator receives in order to entitle him to a certificate is an extremely valuable asset, whether he remains in the wireless service or not, and the discouragement of study because the present conditions do not yield the highest reward is unfortunate. Our advice always is study, study, study. No man can know too much, and the more he knows the better he is fitted to fill positions of greater responsibility. These opportunities may not come at once, but the main thing is to be prepared for them when they do come.

The Reid Memorial.

The trustees of the Reid Memorial Fund are considering a design (described and illustrated in another column) for a monument to be erected beside the grave of the late James D. Reid in the Mount Hope Cemetery at Rochester, N. Y., for which it will be necessary to raise a fund of between $3,500 and $4,000. Although the movement was commenced nearly a year ago and has met with general approval, responses to the appeal for subscriptions have not so far been as general as the movement deserves.

The personal friends and associates of Mr. Reid are not the only ones who may properly be expected to join in this movement. In view of Mr. Reid's services in the organization and maintenance of the Telegraphers' Mutual Benefit Association, the Old Time Telegraphers' and Historical Association, the New York Telegraphers' Aid Society, the Magnetic Club and other telegraph organizations throughout the country, and also in view of his helpfulness to all employes of the telegraph, both the members of these associations and telegraphers at large owe it to themselves to see that the memory of his achievements and example is fittingly perpetuated.

The gentlemen who are acting as trustees are devoting much of their time and attention to the movement, entirely as a labor of love. It should not be necessary for them to make repeated appeals for subscriptions or to make individual personal efforts toward the collection of funds. The entire telegraph fraternity should be interested in the movement and subscriptions should be forwarded at once, in order that the amount needed may be raised and the work completed without undue delay.

Wireless Operators' Licenses.

The Act of August 13, 1912, which became effective on December 13, requires the licensing of all radio stations within the jurisdiction of the United States (excluding the Philippine Islands and excluding apparatus of the Government of the United States) if:

(a) The apparatus is a means of commercial intercourse among the several states or with foreign nations; or

(b) The apparatus transmits radiograms or signals the effect of which at any time extends beyond the state; or

(c) The apparatus interferes with the receipt of messages in any state from beyond such state.

Information regarding the licensing of all radio stations can be secured by applying to either the radio inspectors or the Commissioner of Navigation, Department of Commerce and Labor, at Washington, D. C.

The office of the radio inspector for the second district is located in the Custom House, New York.

The second radio district includes all of Long Island, Staten Island, Greater New York, and the counties bordering on the Hudson river to and including Albany and Renssalaer and the following counties in the State of New Jersey: Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Ocean and Hudson.

A license is required for the operators or owners of all stations coming under the law. Radio operators are examined at the Navy Yard, Brooklyn, N. Y., on all week-days with the exception of Thursdays and Saturdays during the month of December.

Candidates for examination should report to the Navy Yard, Building No. 31 (old number 14), between the hours of 9 and 10 a. m. Applicants who have passed the examination should notify the radio inspector that they have passed the examination, giving grade of license and serial number. Mr. W. D. Terrell is the radio inspector

Early Days of Electricity in England.

Sir William H. Preece, the eminent English electrical engineer, in an article printed in *The Electrical Review* of London, congratulating that journal on its fortieth birthday, gives some interesting facts regarding the development of electrical journalism and the electrical arts. It may not be generally known that Mr. Preece was editor for a short time of the *Telegraphic Journal* which was the original title of the *Electrical Review*.

Mr. Preece began his telegraphic career in 1852. He was married in 1863 and spent his honeymoon in the then new Grand Hotel in Paris, which was the first building fitted up with electric bells by Breguet. He wrote a series of articles describing the system, and these attracted the attention of Sir James Truscott, who had just purchased a house in London, and determined to fit it out with electric bells. There was no one in London capable of undertaking the work so apparatus and an installer had to be imported from Paris! "This was the commencement of the electrical era, which," says Mr. Preece, "has grown to such gigantic proportions and in such numerous directions, that the simple system which rang 'the tocsin of the soul, the dinner bell,' now records on the earth ethereal disturbances in the sun itself.

"The prominent electrical industries in 1872," he continues, "were electroplating and the electric telegraph. In 1846 when the first Electric Telegraph Company was inaugurated, the only electrical patents existing were those of Elkington for electroplating (1840), and Cooke and Wheatstone's telegraph (1837)."

The wonderful development of electrical application since those days is almost beyond the power of the mind to grasp, and it takes a man of the breadth and power of observation of Mr. Preece to review the early days and bring them into contrast with the present.

Course of Instruction in the Elements of Technical Telegraphy—XXIX.
(Copyrighted.)

(Continued from page 768, December 1.)

[We began in our issue for October 16, 1911, the publication of a course of instruction in technical telegraphy. The course, which was originally prepared by Mr. J. H. Penman, an eminent and well-known telegraph engineer, is published for the benefit of those of our readers who desire to fit themselves for better positions in their vocation. It is elementary throughout and is divided into chapters, following one another in logical order.

The course has received the hearty commendation of telegraph officials and experts for its scope and accuracy and its sound practicability. In each chapter examples are presented in order to illustrate the application of the rules to practical cases, and each chapter is followed by a series of questions pertaining to the subject of the chapter, to be worked out by the student in order to review his progress. Back numbers containing these valuable articles can be obtained on application, at 10 cents per copy.]

LINE LEAKAGE IN BAD WEATHER.

When there are a number of stations on the line, as in Fig. 22, the leakage effects vary with each station.

For example, A is adjusted for E, but finds that when D sends, the signals are lighter; when C sends, lighter still, and when B sends, so light that the receiving operator may be compelled to lower his adjustment to read him, and thus risk losing his adjustment for the terminal station E. One would suppose at first glance that with B or C sending, the signals at A would be stronger than with E, but a little consideration of the leakage effects will show this to be a mistake. The amount of leakage is proportional to the length of line, so that relay R, at A, will be more strongly energized when the circuit is open at E than any of the other relays, since it has the leakage of the whole line beyond it.

Relay R will also be least energized when the circuit is broken at B, since it then has the leakage of the shortest section of line beyond it. If relay R is on a nice adjustment, so that the magnetism produced by the incoming current from battery at A, via the leakage, is not quite equal to the task of overpowering the mechanical force exerted by the spring, then when E closes his key and increases the current flow through R, the latter is instantly rendered active.

When, on the other hand, E again opens the circuit, there will be some reluctance on the part of R to promptly respond thereto, because that instrument remains partially energized by the leakage current, and its opposing spring has necessarily to operate at some disadvantage in endeavoring to pull the armature back and open the relay points.

Hence the writing from station E will be more or less solid under conditions such as those described.

When, however, the operations are repeated at B, the results upon the receiving relay, under a similar adjustment, will be different; for assuming the leakage to be inconsiderable between A and B, with the line open at B, then when the latter closes his key, the magnetism in R must rise from the small amount developed by leakage to the higher value required to overcome the opposing force of the spring. This will take a longer period than when completed at E, so that the receiving sounder will not be so quickly responsive to B's signals as to those from E, although the strength of the incoming current may be precisely the same in each case. The armature will, however, be instantly released when B again opens the circuit, because there is now but little magnetic force tending to keep it closed, so that the local sounder will also immediately open. As a result of these two opposite tendencies the writing from B will be much lighter than that from E.

With the line open at C, the leakage current in R is augmented, and the increase of current necessary to close the relay when C depresses his key is lessened. The signals on R are consequently not so light as with B sending, and for similar reasons the signals from D are heavier than those from C. The best way to adjust for

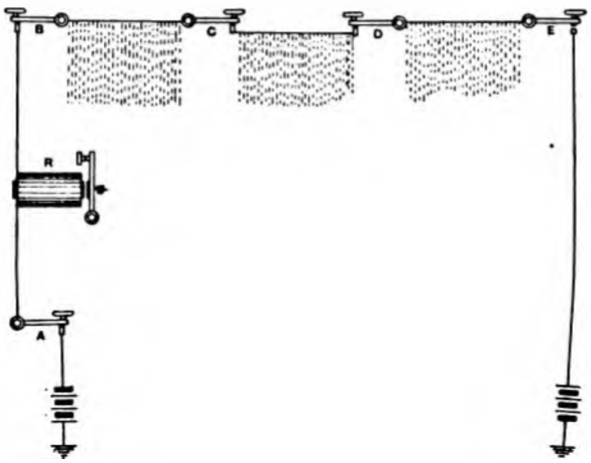

FIG. 22.—LEAKAGE ON LINES IN BAD WEATHER.

a number of stations, in wet weather, is to adjust for the terminal station by first obtaining a suitable distance between the magnets and armature, and then pulling up on the retractile spring until the slightest additional tension will open the local circuit. If the relay is adjusted for the terminal station in this manner it will also be in adjustment for intermediate offices.

The attraction between the relay cores and armature varies inversely as the square of the distance between them, or very nearly so;—that is, with a certain attractive force, at a given distance, if the distance between the magnets and armature be doubled, the attraction will be one-fourth as much as before; or, if the distance be halved, the attractive force will be quadrupled.

To render the relay armature insensible to the leakage currents when the distant key is open, the quickest and best way is, therefore, to withdraw the cores from the armature until the tension of the retractile spring overcomes the attraction of the magnets.

A rough estimate of the amount of leakage on a line may be obtained by carefully noting the adjustment on which the home relay responds to the working of the home key when the line is open at the distant station. More accurate methods of determining the loss of current, or the decrease in "Insulation Resistance" will be given later. *(To be Continued.)*

How Wave Lengths are Measured.

The perplexing problem of determining quickly the wave length and the frequency of oscillations in the case of any wireless station was solved by Dr. J. A. Fleming, F. R. S., the eminent English electrical engineer, who devised an instrument called the Cymometer, with the use of which it is possible to determine with great accuracy these two important facts in a few moments of time.

This instrument takes advantage of the fact that the gas neon, which is one of the rarer gases which have recently come to the knowledge of chemists, glows with a brilliant orange light when placed in a vacuum tube and subjected to the influence of high-frequency electrical discharges. The two essential elements of the apparatus are a sliding tube condenser and the neon vacuum tube. The latter is connected between the inner and outer surfaces of the condenser. The latter is placed in a circuit which is so placed in relation to the wireless circuit which it is desired to test that the latter becomes a primary circuit, the oscillations of whose current induce corresponding oscillations in the current of the secondary circuit in which the condenser is placed.

The manner in which these secondary oscillations are produced is accomplished only by "tuning" the secondary circuit to that of the primary, otherwise the oscillations produced in the secondary circuit will be so small as to have no effect on the neon gas in the vacuum tube. When, however, the secondary circuit is "tuned" in harmony with the primary circuit, the oscillations of the secondary are greatly amplified and produce an immediate effect on the neon gas, which glows brightly in the tube. When the two circuits are in tune, the oscillations of the one are the same as those of the other. Therefore, it follows that, if the orange light glows in the vacuum tube, the observer knows that the length of the oscillations of the two circuits are the same. If, now, the period of oscillation in the secondary circuit can be measured, the same data applies to the current of the primary circuit, and the desired measurement of the period of oscillation of the latter is secured. If the primary circuit is the antenna of a wireless station, the length of the waves may be easily ascertained from the above data by the fact that a certain definite relation exists between the wave length and the frequency, as expressed in the following equations:

Wave length (in feet) is equal to the oscillation constant multiplied by 198.6.

Wave length (in meters) is equal to the oscillation constant multiplied by 59.6.

Frequency (in millions per second) is equal to 5.033 divided by the oscillation constant.

The other equipment of the apparatus, therefore, consists of a variable inductance coil and a conversion scale which shall accomplish automatically the work of ascertaining the wave length when once the frequency is determined.

The sliding tube condenser and the variable inductance coil are so connected that one movement of a handle simultaneously and in the same proportion varies the inductance of the part of the coil in circuit and the capacity of the sliding condenser. The instrument is properly connected, and the handle moved to a point which produces the brightest glow in the neon vacuum tube, whereupon the wave length and the period of oscillation may be read from the conversion scale.

Besides the above function, the cymometer is useful for many determinations required in wireless telegraphy, one of which is the measurement of the decrement of the oscillations in an oscillatory circuit.

In our issue dated September 16 was published an illustrated description of a compact wave meter designed by Mr. R. H. Marriott, for the Marconi Wireless Telegraph Company of America.

New Book.

WIRELESS TELEGRAPHY AND TELEPHONY. By William J. White, New York: The Macmillan Company, 200 pp., 100 illus. Price $1.00.

This book is the second edition of the author's work which was first brought out in 1906, and while it is not intended to be accepted as a scientific treatise on the subject it gives an excellent account of the principles and practice of the latest forms of wireless transmission. The use of technical terms and mathematics has been avoided, and the result of the author's labors proves the possibility of describing technical subjects in English so plainly that any non-technical student or reader may readily gain an understanding of the principles and practice of the wireless art.

Much care is shown in the preparation of the descriptive matter and the general make-up of the book, and the contents bring us up to comparatively recent date.

The first two chapters are devoted to a brief account of the elementary apparatus used and the method of working of a simple telegraph system. The remainder of the book deals with wireless telegraphy proper, and describes the leading wireless systems separately. These include the Marconi, Telefunken, Lodge-Muirhead, De Forest and Fessenden systems. The final chapter deals with wireless telephony and covers the field very thoroughly and intelligently.

The author is a lecturer in telegraphy and telephony in London and understands these subjects well, as is evidenced by the make-up of the book.

Copies of this or any other book on the telegraph, the telephone, wireless, cable, and general electrical subjects may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Unsolved Problems of Wireless Telegraphy.*

The discussion upon the scientific theory and outstanding problems of wireless telegraphy, introduced before the British Association meeting at Dundee, Scotland, last summer, by Professor J. A. Fleming, gave rise to an interesting discussion. The main points in Professor Fleming's paper were the "bending" of the waves to follow the contour of the earth, and the so-called "daylight effect" which makes it possible in certain circumstances to transmit signals for a very much greater distance by night than by day, using the same power. Dr. Fleming was followed by Captain H. R. Sankey.

The next speaker was Dr. W. H. Eccles, who summarized a long communication describing some of the outstanding phenomena met with in the transmission of electric waves, artificial and natural, over great distances, and examining how far they might be explained on the hypothesis of refraction or reflection of electric waves by masses of ionized air. The favorable influence of the ionization of our atmosphere by the sun on the propagation of electric waves round the globe was first drawn attention to in a paper read in June last before the Royal Society by Dr. Eccles, in which he showed that the presence in the atmosphere of charged ions of molecular magnitude produced such alterations of the velocity of electric waves through the medium as would have appreciable effect on waves that travelled over long distances. Ions of various sizes were, no doubt, produced by solar radiation.

The concentration of the ions due to solar radiation must increase as distance from the earth increased, and it was not unreasonable to assume that practically all the ions in the middle parts of the atmosphere were due to solar radiation. A consequence of this was that the velocity of electric waves would increase as height above the earth increased. It followed that a nearly vertical wave front would tilt forward as it travelled horizontally through the middle portion of the atmosphere, or, in other words, a ray travelling nearly horizontally in the middle atmosphere would follow a trajectory curved in the same sense as the earth's surface. In the lower atmosphere, where the ionization and its rate of variation with height were small, the ray might not be bent appreciably. Thus, an electric ray starting from a point of the earth's surface in a direction inclined slightly upward, would pursue a straight path in the lower atmosphere and a slightly bent path with its concavity downward in the middle atmosphere. If its curvature here was on the average greater than that of the globe, the ray would be turned down to the lower atmosphere, and again traverse a straight line; but in the other event it went farther and farther from the earth's surface and was lost to us.

It was obvious that, at or above any particular place on the earth's surface, the ionization in the middle and lower atmosphere increased up till noon and diminished after noon. At sunset most of the ions formed by the sun would disappear rapidly by recombination, and this would leave the atmosphere un-ionized except in so far as local electromotive force might have sifted positive from negative ions during the day. At sunrise there would be great formation of ions. Thus, at the boundary of light and darkness in the atmosphere, there was a more or less abrupt change in the electrical conditions of the medium through which waves had to pass. This region of twilight might be expected to have a much greater influence on the propagation of waves coming from a great distance than on that of waves coming from distances which were not large compared with the height of the well-ionized layers.

Scarcely any of the phenomena to be described could be explained without assuming that there existed in our atmosphere some permanently ionized upper layers capable of reflecting electric waves. This hypothesis was put forward by Heaviside in 1900, but had as yet not been supported by any direct evidence.

Turning to the phenomena that had up to the present been revealed by long-distance transmission, the prime fact was the discovery by Marconi in 1902 of the difference between day and night signalling. He found that signals which were readable at night up to 2,000 miles across the Atlantic were not readable in daylight beyond 800 miles. The author explained this by supposing that at night the permanently ionized upper atmosphere acted as a reflecting surface somewhat in the manner of a whispering gallery, while in the day it was put out of action by the ionized middle atmosphere.

It was now common engineering knowledge that the evil effect of hilly country on day signals was very much less, being sometimes almost negligible on waves of, say, frequency 100,000, than those of frequency 1,000,000. How were these truths to be accounted for? It was only necessary to assume that in the night the Heaviside layer reflected waves of all frequencies equally well; that the sky was, in an electrical sense, lighted up by the radiation from the sending station and sent rays into the valleys beyond the mountains, the effectiveness of the transmission being greater when the stations were not too close under the hills. In the day the ionized middle atmosphere veiled the reflecting layer, and, to some extent, refracted the waves over the mountains. This refraction was 100 times more potent with a frequency of 100,000 than with a frequency of 1,000,000.

The transition from day to night conditions marked out a period of the greatest interest. The facts given by Marconi were as follows: Waves of length about 4,000 meters (75,000 frequency), crossing the Atlantic from west to east, yielded strong and steady signals all day at Clifden, which gradually weakened after sunset at Clifden, till a minimum strength was reached about 1½ hours after sunset. The signals at Clifden then gradually increased in intensity till after sunset at Cape Breton, when they attained a maximum which

*From the Marconigraph, London.

was occasionally very high. During the night they were very variable in strength, flickering from very weak to very strong. Slightly before sunrise at Clifden the signals grew stronger and sometimes passed quickly to a high maximum. They dwindled to a marked minimum about two hours later, and then returned to the normal day strength. The facts brought out by measurements on the Clifden signals received at the author's laboratory in London were as follows: During the day, signals were weak and not very steady; during twilight, they sank to a minimum intensity at about twenty minutes after sunset at London—that is, when the sun was setting at a place half-way between London and Clifden. After other and erratic fluctuations in strength, they kept increasing in intensity till well after sunset at Clifden. Sometimes, at about ten minutes after that sunset, there came a short interval filled with huge flutterings of signal strength, the sounds in the telephones alternating from faint to loud with great rapidity, just as if the medium conveying the signals were stirred with a vast commotion; and then the signals quickly settled to their normal night strength, which, it must be noted, was always greater than their normal day strength. Similar phenomena, less pronounced, might be witnessed at sunrise.

A New Telephone Magnet.

BY ANDREW PLECHER, LAS ANIMAS, COL.

It does not take a prophet to foretell that the electrically non-choking and acoustically tuned diaphragm is the telephone diaphragm of the future, nor that the non-choking and electrically tuned coil will be a great factor for the good of the art. It takes more than a prophet, however, to get the millions in our days of trusts, which the change of the eye from one end of the needle to the other brought the lucky inventor.

Everyone is aware of the choking or throttling effect of a soft iron core on an alternating current, but few realize that a coil, by the mere fact of being an electrical capacity, has a period of discharge.

The throttling of an alternating current by a soft iron core is due to the generating tendency which such a current exercises on the iron core, producing in the core another current, opposite in direction to the generating current, but at the same time magnetizing the iron, the magnetization of which the induced current directly opposes. It takes time to magnetize iron. The shorter the impulse the less the penetration and consequently the less extensive is the magnetization. High frequency telephone currents, the duration of the maximum intensity of which is exceedingly short, produce no appreciable magnetization, but store up so much more induced current.

This plainly indicates that any one who can increase the magnetization and thereby decrease the induced current in the core by a special design of the coil, will greatly advance the art. Some have tried to accomplish this by using strips in place of a solid core; others, by using a hollow core, but what about starting the winding on a non-magnetic spool, follow the same with a thin annular core, laminated, in strips or otherwise, and finish the winding on the outside of the annular core? Then, and only then, has the winding a double magnetic effect on the iron, leaving no room for an induced current in the core.

This new magnet has another good property. It has one uniform period of oscillation, the frequency of which depends on the size of the coil. Further, the magnet being very short allows all the turns of the winding to be placed very close to the diaphragm-armature, so that the magnetic core might possibly be dispensed with, relying entirely on the solenoid and armature. Such an arrangement would throw the non-choking or choking effect upon the responsiveness or non-responsiveness of the tuned diaphragm, making a highly selective apparatus out of the new telephone receiver.

Telephone Pioneers of America.

T. DUSENBURY, JR.

Mr. T. Dusenbury, Jr., the subject of this sketch, entered the telephone service on January 1, 1883, as clerk for the New York Telephone Company at Asbury Park, N. J., and has remained in the employ of the company ever since. In 1884 he was appointed chief operator at Jersey City and in 1888 became contract agent in Mon-

THOMAS DUSENBURY, JR.,
Adjuster, New York Telephone Co., Jersey City, N. J. (1883).

mouth County, N. J. From 1890 to 1896 he was collector at Paterson, N. J., and special collector for the state of New Jersey between 1896 and 1908. In the latter year he was appointed adjuster for Hudson County, N. J., and still retains this position, with headquarters in Jersey City.

Mr. Dusenbury is a native of New York City, where he was born July 25, 1858. He is a prominent member of the Masonic fraternity.

The Telephone Along the Panama Canal.*

BY W. F. HENKEL.

The Panama Railroad Company operates and maintains all the telephone and telegraph facilities for the United States Government in connection with the direct engineering work and the subsidiary departments upon the Isthmus of Panama.

Telephone service is used in nearly every branch of work. When the Panama Railroad Company's boats arrive in port, ten minutes after they dock a telephone will be found on the boat connected with the Colon Exchange, by which connections can be had with any point along the Isthmus.

The telephone and telegraph department is in charge of Mr. C. L. Bleakley, superintendent, a pioneer telephone man, who constructed the first trunk line across the Isthmus in 1905. At the present time there are about 2,000 miles of copper wire and some 2,000 telephones in use.

The telephone traffic is handled at six common battery exchanges, located along the line of the canal, and the maximum traffic load is about 20,000 calls per day. Ringdown circuits are used between exchanges, the subscribers passing their own calls to the distant office.

Aside from the amount of traffic originating in the offices of the several subsidiary departments, there is maintained a separate trunk line of magneto circuits, controlled by a chief dispatcher, which is used for regulating the movements of all dirt and construction trains in the excavation of the canal basin. These circuits are cut in at many small towers at which points the yardmasters are situated.

The telegraph and telephone department is divided into three divisions, each under a supervisor. The Atlantic division comprises the exchanges at Colon (Cristobal), Toro Point, Mount Hope and Gatun. There is a four position board at Colon, a three position board at Gatun and one position boards at Mount Hope and Toro Point.

The Central division comprises the towns of Gorgona, Bas Obispo, Las Cascadas, Empire, Culebra, Pedro Miguel and Miraflores. These towns extend over a territory fifteen miles in length along the Canal and all are served from the one exchange located at Empire, where there is a four position board.

The Pacific division embraces two exchanges, one at Corozal, where there is a one position board, and another at Panama, where there is a two position board.

In addition to the supervisors in charge of the three divisions, who report direct to the superintendent, there is a supervisor of traffic who is responsible for the operating department, and a supervisor of switchboards and cable construction, who likewise reports to the superintendent.

Young American girls are employed as telephone operators in these exchanges handling from one hundred and fifty to two hundred calls an hour with the thermometer registering a hundred in the shade most of the time.

Colored men are used for the outside trouble hunting, and they need no climber for all of the poles consist of railroad irons. Rails are used exclusively, since wooden poles cannot be maintained any great length of time on account of the ants that cut into a wooden pole and before long leave nothing but the shell. Creosoted crossarms are used as a protection against these pests. It is stated that in one instance even the ants discovered the value of having a telephone in the house. They had followed the twisted pair into an office building and into the bell box which was fastened to the side of an oak veneered flat-top desk. They bored through the bell box into the interior of the desk and had removed practically the entire pine wood of the interior, when the desk suddenly fell to pieces.

One of the construction difficulties encountered has been the maintaining of the pole line through some of the swampy regions. In several instances the poles of railroad iron have gradually sunk into the ground until it became necessary to splice on an additional rail, and in some places three such sections of rail have been found to sink down in the swamp while only twenty or thirty feet remained above the surface.

While the pole lines are of rails, the insulators are of Bell standard glass or porcelain, and the material and equipment throughout are of Western Electric manufacture. Besides the twenty odd physical copper circuits, extending across the Isthmus, there are operated very successfully phantom circuits between Colon and Empire, Gatun and Colon, Gatun and Empire, and Empire and Panama. There is also a double phantom in operation between Colon and Gatun, and several circuits are simplexed for telegraph purposes. Considering the climatic conditions, very little trouble is experienced in the maintenance of these phantom circuits.

Owing to the extreme dampness and continual rainfall during the rainy season, considerable difficulty is experienced in maintaining the equipment. The terminal rooms have to be kept dry by electrical heaters. Heavy grounds are prevalent upon the trunk circuits during the night hours due to the accumulation of dew upon them and the thousands of cobwebs that span the wires. These grounds disappear under the burning heat of the tropical sun.

The chief operators make daily tests that any trouble may be immediately located. On Alhajuela line two colored men employed as trouble hunters constantly patrol the line which extends through nothing but jungle for a distance of about thirty miles. Unlike our trouble hunters of the States, each one is equipped with a machette, very similar to a large butcher knife, with which he clears the way. Starting out at each end of the line, they cut their way until they meet, when they turn back and resume the same operation, as the vegetation has grown so rapidly behind them in the meantime. These men live

*Extracts from Telephone Review.

along the line and find their subsistence wherever they are able to locate a patch of sugar cane or bananas.

The commissaries and hotels are maintained along the line of the canal by the United States Government, with headquarters at Colon where the wholesale warehouses, cold storage and ice plant and bakery are located. The supplies are sent out daily by a special train which distributes them to the various hotels and commissaries along the entire length of the canal. All of the commissaries are connected by telephone, and a special circuit is provided between 8 and 9 o'clock every morning by which the commissaries place their orders for the following day. In the same manner the hotels make their requisitions for their daily needs.

Electric fire alarm stations are installed at all the principal points and a paid fire department is maintained throughout the entire Zone. The telephone is relied upon here.

Wherever it is necessary to direct the movement of trains throughout the canal cut, a tower is located, with a telephone installed. There are hundreds of them, as at switching points and all track terminals. When a dirt train, for instance, has been loaded, the conductor in charge signals his yard master—usually by means of flags—the yard master telephones the train dispatcher and is instructed as to the direction and destination of the train.

Besides the system operated for the government work, there are two independent telephone companies upon the Isthmus. The Isthmian Telephone Company operates two exchanges, one at Colon and one at Panama City. Connections can be had with the Government system by trunking through the Panama Railroad Company's offices. This traffic is handled on a message rate basis. The other company is in Panama City and gives local service only. The exchange of this company is operated by Panamaian girls, and Spanish is spoken entirely. When a Spanish gentleman answers the telephone, he says, "Quien hablar?" i. e., "Who speaks?" then conversation begins.

Telegraph Tournament.—A telegrapher's tournament was held by the Kansas City Railroad Telegrapher's Club, Kansas City, Mo., on the evening of December 13 at the Coates House, Kansas City. The tournament was open to any railroad employe working in the capacity of telegrapher, agent, lever-man, or lineman in the middle states, comprising Nebraska, Iowa, Kansas and Missouri. Prizes were awarded for the best sending with key, for the best sending with vibrating machine, for the best receiving with pen, for the best receiving with typewriter and for the best all-around telegrapher. Mr. John Hjalmer is president of the club and Mr. A. J. Jones, secretary.

QUESTIONS TO BE ANSWERED.

[One of the most effective means of imparting information is to ask and answer questions, the value and power of this method being due to the fact that the information given in an answer is specific and direct. Asking questions for the student to answer for himself has proved to be an excellent means of education, as it promotes and encourages concentration of thought and investigation in order to arrive at the correct answer. "The Electric Telegraph," by F. L. Pope, is one of the most excellent books on the telegraph ever published and is a standard work of reference. It covers the entire field of telegraphy and is scientific in its treatment. For this reason and the fact that it is thoroughly exact and reliable we have chosen this work as our present text book, for the "Questions to be Answered" column. We cannot urge the student too strongly to follow the lessons from this book closely and with diligence. In order to do this and understand the subjects of the questions it will be necessary, of course, for him to have a copy of the book at hand in order to arrive at the correct answers to the questions.]

What constitutes the internal circuit, and what the external circuit?

What are the specific names given the zinc plate and the copper plate?

What is the general name given the zinc and copper plates?

What is the name given the air terminals of the electrodes, to which the conducting wires are attached?

What are the signs used to designate the positive and negative poles of a battery, or other generator of electricity?

What is the direction of the electric current through a gravity cell?

When the external circuit is closed what are the chemical reactions within the cell?

How long will a cell generate electricity on one charge?

What happens to the zinc plate when the battery is in action?

What change takes place in the solution of sulphate of zinc and what in the sulphate of copper?

Why does the copper plate increase in weight?

Under what conditions does the zinc solution become heavier than the copper solution, and what effect has this on the operation of the battery?

How may the injurious action resulting from such a condition be prevented?

Is the quantity of material consumed by the gravity cell a fixed amount?

Where does the condition of exhaustion of a gravity cell show itself?

How can this condition be detected?

How is the copper sulphate solution replenished?

In what form should the copper sulphate be introduced?

What other attention is required?

What specific gravity should be maintained in the zinc sulphate solution?

What means are employed to prevent the zinc salt from creeping over the edge of the battery jar?

(To be Continued.)

Maintenance of Railway Telephones.*

BY L. H. OSTHOFF.

Every telephone maintainer should have, and probably most of them do have, a system or method of procedure which they follow when making an inspection of the equipment under his care. However, the telephone is young in the railway field, and many roads not yet having a sufficient amount of equipment to warrant the employing of separate telephone maintainers depend upon the division lineman for the up-keep of their telephone plant. It is for these that this article is intended, primarily and while it is not a detailed manual covering every action which may be necessary to the proper maintenance of railway telephone equipment, it gives in a general way the more important points which should be considered.

All dry batteries should, of course, be measured so that when one commences to run down the fact will be known before it gives out, and it may be replaced before it causes trouble. On the Great Northern road transmitter battery is replaced when it reaches four amperes and the local signaling or bell battery at six. That battery removed from the local signaling circuit is then used on the transmitter circuit of instruments on short local lines to yard-offices, roundhouses and the like. That removed from the transmitter circuits is discarded.

When replacing battery at way-stations and at blind-siding auxiliary sets, particularly at the latter, it is well to take the discarded cells away or make them impossible of further use by knocking the top of the carbon off. This prevents the removal and appropriation of the new cells and the replacing of them with the discarded ones by irresponsible parties.

All cords should be tested for cut-outs and noise particularly the receiver cord. A cut-out in a receiver cord, while not necessarily dangerous, is very annoying, making it necessary at times to recopy an entire order or message, it not being permissible to interline or overwrite in railway work.

A worn transmitter cord will also cause intermittent trouble making the outward transmission scratchy and blurry, and very hard to read.

The receiver should be examined for dust and dirt, both between the pole pieces and the diaphragm and the cap and diaphragm. If the cord terminal binding-posts in the receiver are screwed down too tight the receiver shell is cracked and the pole-pieces are thus moved further away from the diaphragm, thus cutting down the volume of the sound. If the receiver has become demagnetized the transmission inward will not be as good as it should, and the receiver should be replaced. If the receiver will not hold the diaphragm in place when inverted with the cap off it should be considered demagnetized and replaced. The condition of the diaphragm itself should be noted, and if rusty or bent it should be replaced. Never try to straighten out a diaphragm that has become bent, except for emergency use, as the slightest bend or buckle in it will prevent free vibration and result in a consequent cutting down of sound volume. The subset should be examined for loose connections at the binding-posts and cord terminals. This should also be done at the transmission key unless that type using soldered terminals is used. The contacts in that transmission key should be watched to see that they make firmly and are not dirty. A piece of sheet celluloid will be found convenient for cleaning these contacts, as it will not cut the platinum nor leave fibre or fuzz between the points as paper does. If the Western Electric high efficiency transmission circuit is used it is desirable to see that the contact which closes the battery through the transmitter makes before the one which closes the secondary of the induction coil across the line. If this order of closing is reversed a click will be heard in the transmitting station's receiver and those near which is quite severe at stations using a transmitter battery of four to six cells.

When requesting a test ring, if the receiver is left to the ear during the time the ringing impulses are being sent the condition of the condenser may be determined, if the receiver is in good order. Should the condenser be "short" the impulses will be heard to "crack," while they only make a rippling noise, if such a term is permissible, when the condenser is normal. If, however, the pole-pieces of the receiver are too close to the diaphragm, this same effect will be noticed when signaling battery is being used. A "short" condenser will make itself known very soon, if near the dispatcher's end of the circuit, by interfering with the ringing of stations beyond, and perhaps near it when the receiver is off the hook at the station where it is located. A simple and quick method of locating a "short" condenser is to cut a milliammeter in series with the battery supply at the dispatcher's office, and then calling each station in turn note the current consumption. After the station has answered and the receiver is off the hook at which the defective condenser is located there will be a very considerable increase in the current consumption, the amount of increase depending on the distance of the station from the battery supply.

When examining the transmitter arm all screws and binding-posts should be tightened and the condition of the hook-switch contacts noted. That the hook-switch is properly performing its function of cutting the receiver and transmitter in and out of circuit may be determined by holding the transmission key in, and with the receiver on the head operating the hook. Many times after a severe electrical storm it will be found that the hook does not operate right. This is because the high impedance of the receiver to the very high frequency current of the lighting discharge causes the current to break down the insulation between the hook-switch springs. This can be repaired temporarily, if no

*From Telephone Engineer.

rubber insulation is at hand, by the use of a piece of the paraffined paper used as a dielectric in telephone condensers. One condenser will furnish several hundred feet of this paper so it is a very cheap as well as efficient make-shift.

On the outside there is little to be done other than to see that the insulation is kept up, and all line joints made with sleeves if the circuit is of copper, and that all cable and drop joints with the line wire are soldered. If drops are used the knobs should be close enough together where the drop runs down a pole or on a building to prevent the wind swinging it and rubbing the insulation.

In closing let me say that it is well to remember that in all telephone work a loose or dirty joint or contact means trouble sooner or later, and generally sooner.

System of Call Letters in Radio Service.

Mr. Benj. S. Cable, acting secretary of the Department of Commerce and Labor, Washington, D. C., has issued a general letter describing the system of awarding distinctive calls to licensed stations of the several classes, ship and land, which will be followed and the calls will be included in the licenses by the Department of Commerce and Labor.

The calls of ship stations and coast stations open to public service will be sent, as soon after December 13, as practicable, to the International Bureau of the Telegraphic Union, at Berne, Switzerland, for publication in the International list.

The Berlin Radio-telegraphic Convention provides that each ship station and coast station open to public service shall have call letters formed of a group of three letters, which shall be distinguishable from one another.

The series of three-letter calls beginning with N and W respectively (with a few temporary exceptions), and the series KOA to KZZ inclusive have been assigned to the United States, and application has been made for 156 additional calls. The number is limited, and three-letter calls will be reserved for ship and coast public service stations (which usually communicate with stations under foreign flags). The calls will be allotted by the Bureau of Navigation, Department of Commerce and Labor.

The call letters assigned to American ship stations on July 1, 1912, by the Bureau of Navigation, beginning with K for ships on the Atlantic and W for ships on the Pacific, will be retained as far as practicable in the issue of licenses, but some changes on Atlantic and Gulf ships will be necessary. Commercial coast stations open to public service will be assigned three-letter calls beginning with W.

The series beginning with N is reserved for Government stations, ship and land, and will be arranged by the departments concerned and then forwarded to the Secretary of Commerce and Labor.

The call letters for amateur stations will be awarded by radio inspectors, each for his own district respectively, according to the following system:

(a) The call will consist of three items; number of radio district, followed by two letters of the alphabet. Thus, the call of all amateur stations in New England (which comprises the first district) will be the figure "one" in continental Morse, followed by two letters; in California (in the sixth district) the figure "six" followed by two letters; in South Carolina the figure "four" followed by two letters; in Missouri the figure "nine" followed by two letters, etc., etc. The letters X Y Z must not be used as the first of the two letters.

(b) Three items, a given figure first, followed by two letters of the alphabet, thus may be combined in 598 different calls which will probably suffice for the amateur sending stations in most districts for some time to come.

(c) Radio inspectors will insert amateur station calls in station licenses according to this system, and will keep a permanent chart, of 598 squares, lettered with the alphabet from left to right, and from top to bottom, (A to W), inserting in the appropriate square the serial license number of the station to which the call letters were awarded. Within these limitations, radio inspectors will use their discretion in the award of calls, avoiding, of course, duplications.

(d) When a station is abandoned and the license cancelled, or if a license shall be forfeited for violation of law, the call assigned to it may be allotted to another station.

(e) If the entire 598 calls have been exhausted, radio inspectors will issue additional calls, consisting of the figure of the district followed by three letters. From such combinations should be excluded the combinations SOS, and PRB, all three-letter combinations beginning with QR or QS, all combinations involving the repetition of the same letter three times, three-letter combinations beginning with K, N, W, X, Y, Z, and other combinations, which, for various reasons, international, national, local or individual, may be objectionable. With such exclusions, over 10,000 calls will remain for each district.

Calls for limited commercial land stations will be allotted by the Bureau of Navigation in a special manner to indicate, if practical, the different radio districts over which such stations usually radiate messages, as well as to identify the stations.

Calls for special classes of stations, such as experiment stations for the development of radio communication, technical and training school stations, and special amateur stations will be allotted by the Bureau of Navigation.

The call will consist of three items, the number of the radio district, followed by two letters of the alphabet. The first letter will be:

X for experiment stations;
Y technical and training schools;
Z special amateur stations.

Twenty-six different combinations for each class in each district, of course, are possible. If more should prove necessary for any class in any district, a third letter will be added to the call.

Inadequate Pay for Ship Wireless Operators.

BY ONE OF THEM.

I desire to commend TELEGRAPH AND TELEPHONE AGE for its unfailing and active interest in matters pertaining to wireless telegraphy and the art certainly owes much to your journal for the high standing and advanced stage of progress that it now enjoys. There is one matter, however, that has not been touched upon, and that is the extremely low compensation allowed wireless operators on shipboard. Considering the knowledge and experience demanded by law of ship wireless operators and the responsibilities of the position thirty dollars per month is ridiculously small pay, and it would be well to call attention to the actual situation in this regard so that those who aspire to be ship operators may know the truth of the matter.

The operator, who is supposed to be the most important man next to the captain and first officer, actually receives less pay and consideration than do the firemen, whose work is entirely physical, and not mental, and who have no other responsibility than to feed the furnaces with coal. This is all wrong. It is degrading to the telegraph profession and is largely the cause of the dearth in the supply of wireless operators for sea service. One trip is generally sufficient for many of the young fellows who are fired by an ambition to advance in their chosen profession to realize that the remuneration is vastly insufficient for the duties and qualifications required of them. The result is, they leave the service in disgust, when they realize the truth.

The United States government is compelling wireless operators to undergo a rigid examination as to their proficiency in the wireless art before a certificate is granted them. Applicants are required to prove that they are able to manage and repair wireless equipment under all conditions. They are also examined in the construction and care of storage batteries, and other apparatus, which requires such a wide knowledge and training that they would well-nigh rank as electrical engineers in land service, and for all this expert knowledge they are asked to accept the munificent compensation of thirty dollars per month!

The examination alone frightens a large percentage of applicants, but those who successfully pass are soon brought face to face with the hard fact that they are receiving inadequate pay for their services.

The ship owners are complaining of the difficulty in finding operators as required by law and the outlook for an improvement in the situation grows darker rather than brighter.

Many operators have come to the conclusion that the time devoted to study to become proficient in the work is virtually lost, when the reward is so small. Besides this, there is no opportunity for advancement, and unless a suitable salary is paid there can be no incentive to remain in the service.

It is stated that the contracts with the various steamship lines do not permit the wireless companies paying more for the operator's knowledge and services than they are now paying. If this is true it is clearly evident that the conditions will soon have to be revised and the service put on a more attractive basis for the operators.

More Data Needed on Terrestrial Magnetism.

Much additional data will be required before an intelligent understanding is possible regarding magnetic conditions which may be expected to prevail at any hypothetical time and place on the earth's surface, according to Doctor C. Chree, an English scientist who has given much attention to the subject. Dr. Chree calls attention to the relatively small daily variation in the intensity of the earth's magnetic field as a reason for believing that the difference between wireless conditions during the day and the night hours can hardly be due to this cause directly. A study of the aurora phenomena in the arctic regions should, in the opinion of Dr. Chree, yield valuable information on this subject which is so important to the radio-telegrapher.

The aurora is the only direct evidence which we possess as to the electrical condition of the atmosphere at heights greater than those attained by manned balloons. If it be admitted that aurora is an electrical discharge, a supposition which is hardly open to doubt, a condition of high conductivity must prevail in that portion of the atmosphere through which the discharge takes place. In a recent investigation conducted by Professor Stormer of Christiania, satisfactory photographs of this phenomena were obtained which furnished data warranting the statement that the heights of the aurora varied from twenty-four to 200 miles, the most common altitudes ranging from sixty to eighty miles. The so-called "auroral belt" extends from the northern part of Norway to the Southern part of Sweden. The absence of such phenomena in other parts of the world may be due to deficiency either in conductivity or electromotive force. It seems probable that the conductivity of the atmosphere is affected in various ways, and, at least in those regions where the aurora display is visible, that it varies within wide limits.

Besides the daily variation in conductivity, the latter varies at different seasons of the year, and these changes are much greater in those years in which many sun spots are observed, while, strange to say, the daily variation is decreased during such years. Observations relating to magnetic storms, and other data which has been collected, lead to the belief that the causes which produce the auroral phenomena are identical with, or closely related, to those which produce the variations in magnetic conditions on the earth's surface, and it is probable that a systematic study of the magnetic conditions prevailing in the arctic regions, together with simultaneous collection of data concerning auroral displays will be productive of much valuable information.

Reminiscences of the Confederate Military Telegraph Service.

BY R. O. CAMP, WILTON, ALA.

I have agreed to write, as best I can, my recollections of the days when the Blue and the Gray made history and made it rapidly.

At the outbreak of the Civil War, early in 1861, there were three telegraph companies whose lines ran into Chattanooga, Tenn.; namely, the American Telegraph Company, from Washington to Chattanooga, John M. Crowly, superintendent; the Southwestern Telegraph Company, from Chattanooga to Nashville, Mr. Clutz, superintendent, and the Southern Telegraph Company from Chattanooga to Atlanta, Ga., Mr. Jones, superintendent. At Chattanooga these companies connected with the express company's lines which ran to Augusta, Ga. The latter company finally became the Southern Express Company and Mr. T. Campbell was superintendent before and after the change.

Barney Hughes was manager of the three companies at Chattanooga. He was a most versatile Irishman and the wittiest I ever met. He was afterwards general passenger agent of the old Memphis and Charleston Railway with headquarters at Memphis. Barney was always on the lookout for business for his road. One day a drummer desired to go down into Mississippi on a commercial tour. He consulted Barney as to whether he should go by steamer, railroad or by buggy. Barney advised him to take the Memphis and Charleston Railroad to Grand Junction and there take the New Orleans and Great Northwestern (which afterwards became part of the Illinois Central) to his destination. The drummer, whose name was G. P. Evans, took Barney's advice and went to Grand Junction which was just a wide place in the road for a crossing. He missed connections and had to lay over all day. He sent the following telegram to Hughes at Memphis. "Grand Junction, Tenn., Barney Hughes, G. P. A., Memphis, Tenn.: I am in Grand Junction. I wish you were in ——." Signed "G. P. Evans."

Barney was not to be outdone, so he replied to Evans as follows: "G. P. Evans, Grand Junction, Tenn. Glad you are in Grand Junction, I would rather be in—— than in Grand Junction." Signed, "Barney Hughes."

Early in 1861 I joined the first Confederate Georgia Regiment at Pensacola, Fla., and we were moved up to Tennessee. In April, 1862, we were encamped at Knoxville, Tenn. While there guarding ex-governor Brownlow in the prison at that place I was detached to report to Colonel Bob Vance commanding the 39th North Carolina Regiment. Colonel Vance was a brother of Colonel Zebulon Vance who was afterwards governor of North Carolina. The troops were guarding the bridge at Loudon, Tenn., where the East Tennessee and Georgia Railway crossed, to prevent the United States troops from cutting off communication between Knoxville and Nashville. One day while in camp the scouts had near McMinnville ran into seven or eight United States cavalrymen about five miles from Loudon in the direction of Knoxville. Their horses were picketted down under the hill and the scouts just happened to come across them. Some escaped and two were captured and sent to Knoxville. We also captured a set of telegraph instruments. The captors stopped a train near Concord, Tenn., and conveyed their prisoners to Knoxville. About that time I was ordered to join my command and I lost track of them. I was informed later that they were sent to Richmond and executed as spies. I have always believed that the operator escaped and that they caught a courier instead.

Hearing on Military Telegraph Pension Bill.

Col. William Bender Wilson, Holmesburg, Philadelphia, Pa., president of the Society of the United States Military Telegraph Corps, and Mr. A. A. Zion, of Indianapolis, Ind., chairman of the congressional committee of the same society, appeared before the House and Senate Committees on Invalid Pensions at Washington, D. C., on December 9, on the Taylor military telegraph pension bill. Col. Wilson regards this hearing as a sure indication that the petitions now before Congress to have the pension laws extended to the military telegraphers who served in the United States army during the Civil War will pass at the present session of Congress.

There are two military telegraph pension measures before Congress, i. e., House Bill 2920, introduced by Congressman Edward L. Taylor, Jr., of Ohio, and referred to the Committee on Invalid Pensions of which Representative Isaac R. Sherwood, of Ohio, is chairman, and Senate Bill 4625, introduced by Senator John W. Kern, of Indiana, and referred to the Committee on Pensions of which Senator Porter A. McCumber of North Dakota is chairman. These bills are in effect the same, providing as they do that "any person who served ninety days as a military telegraph operator during the Civil War . . . shall be held and considered to have been mustered into the military service of the United States at the date of employment in said Military Telegraph Corps, and to have been honorably discharged therefrom at the date said employment ceased. Provided, That no pension shall accrue prior to the passage of this Act."

The campaign to secure pensions for the military operators who served in the Civil War has been conducted with great vigor, and it is gratifying to note that the success of the committee's work is now practically assured.

Mr. U. G. Life, district commercial superintendent, Western Union Telegraph Company, Salt Lake City, Utah, writes: "You can rest assured that wherever and whenever the opportunity presents itself for us to do anything towards the boosting of TELEGRAPH AND TELEPHONE AGE, it is our policy to do so. We believe that this is a periodical which should be in the hands of every man connected with the telegraph business."

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PRIMARY BATTERY

The Standard Closed Circuit Cell

A great many telephone talking circuits are now equipped with Edison Primary Battery, and indications point to an extensive use of the cells in this service.

Busy offices requiring a reliable battery capable of maintaining its voltage when discharged continuously for long periods, emphasize the necessity for a battery of this type.

Comparative tests speak for themselves in showing the improvement in service and economy effected; For example, a certain busy office was using up dry cells at the rate of a set every ten days when it was decided to try out the Edison Primary Battery. A set of EDISON BSCO 400 ampere hour cells was installed and this battery operated the transmitter 221 days on one charge, this being equivalent to 22 sets of the dry cells that the Edison Cells displaced.

It is logical to assume that if the Edison Cells show economy in a severe test, the same good results can be obtained where the service is not so heavy; as a matter of fact, the saving is even greater when the current requirement is small, because of the deterioration of dry cells when kept in service for any considerable period, thus not giving their full capacity, while Edison Cells are exhausted only by the discharge of current in useful work, there being no wasteful action when cells are on open circuit.

If you are not using Edison Primary Battery on your transmitters, it will pay you to investigate with the view of making a test.

Catalog and voltage curves on request.

Size over all, 6 x 9 Jar only. Inside dimension, 5 x 7. Edison-BSCO Type 208 Cell 200 A. H. Capacity with porcelain jar.

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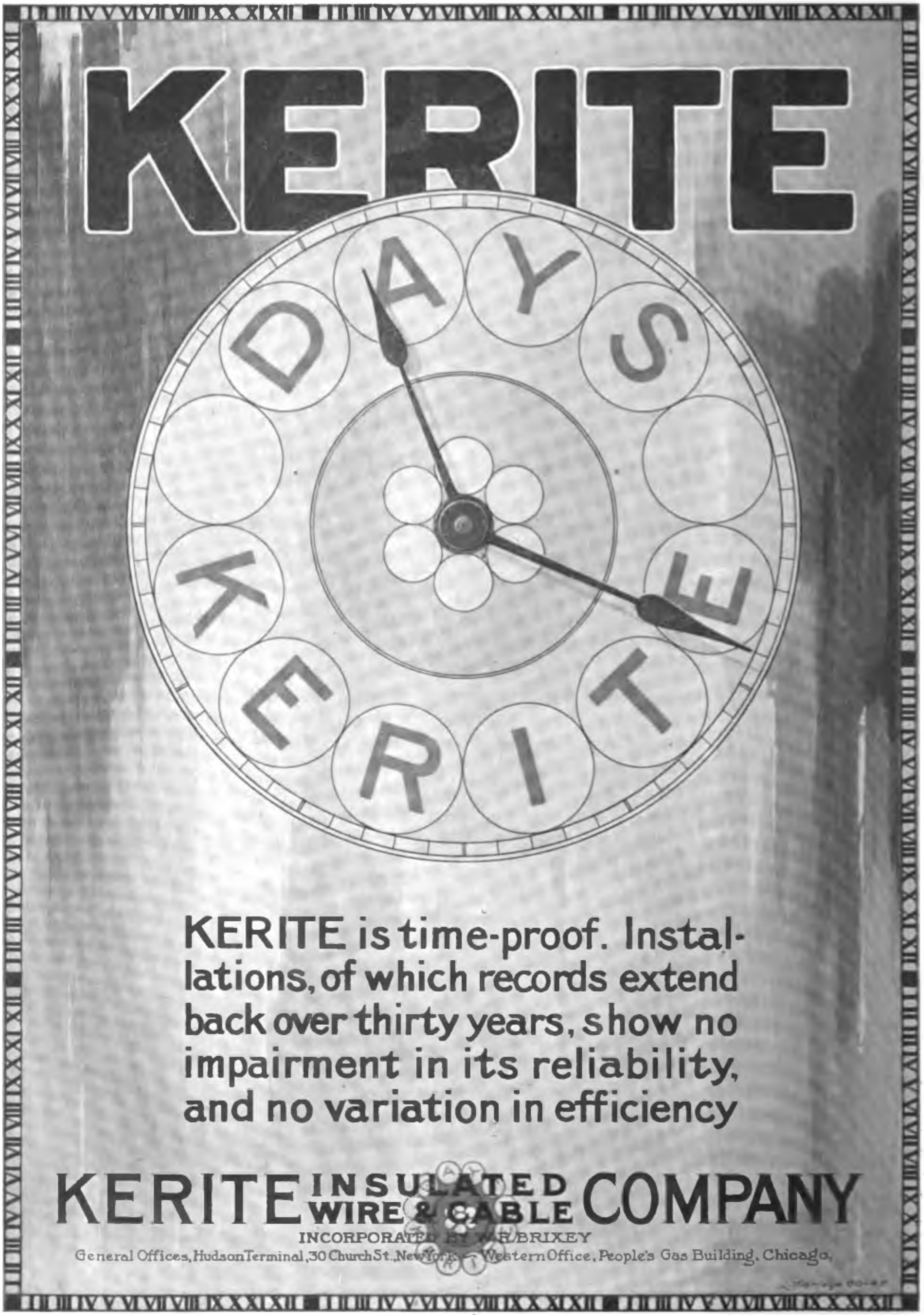
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General Offices, Hudson Terminal, 30 Church St., New York — Western Office, People's Gas Building, Chicago.

The Railroad.

Mr. R. W. Potts has been appointed assistant superintendent of telegraph of the Rock Island Lines with headquarters at Chicago.

Mr. F. G. Adams, circuit manager of the Baltimore and Ohio Railroad, Baltimore, Md., was a recent New York visitor on business connected with his service.

Mr. A. Wray has been appointed assistant superintendent of telegraph of the Rock Island Lines, and Western Union Telegraph Company, with headquarters at Chicago, vice F. S. Spafard, deceased.

Mr. Benjamin R. Pollock, general superintendent of transportation for the New York, New Haven and Hartford Railroad, New Haven, Conn., has been appointed general manager. Mr. Pollock was formerly a telegrapher, and it was he who won the championship at the fast sending tournament in New York, in 1890.

Chicago and Alton to Install Telephones for Train Dispatching.—The Chicago and Alton Railroad Company has recently placed an order with the Western Electric Company for the equipment necessary to install its first circuit for telephone train dispatching. The selective system of operation will be employed. Thirty-six way stations will also be provided with standard telephone set equipment and a complete wire chief's testing equipment will be furnished for the dispatcher's office. The circuit to be equipped extends from St. Louis, Mo., to Bloomington, Ill., a distance of approximately 160 miles, with the dispatcher located at Bloomington.

Installation of Dispatching Equipment in Way Stations.*

BY JOHN A. KICK.

The way station wiring should be standardized, placing each part of the equipment in the same relative position at all stations. Switches, fuse blocks, arresters, etc., should be numbered or otherwise designated at stations where more than one of each is installed and the wire chief provided with a blue print showing the standard mounting and wiring. Installations made under standard specifications provide means for quick testing with dependable results as anyone who will answer the telephone can carry out the instructions of the wire chief who has a print of the standard mounting and wiring.

In making the initial installation, one must keep in mind the prospects for additional circuits and so arrange the first installation as to provide space for the additional equipment, thus avoiding rearranging and re-wiring to place the second equipment later.

For the way station telephone set, many different types of arms and desk stand equipments have been devised. It is rather difficult to follow any standard assembling of the telephone set, as almost every station presents an individual problem of providing the proper table space to make a standard installation. The transmitter arm should be so mounted as to allow the transmitter to swing into a position directly over the center line of the operator's working position. Where a transmitter key is used, the containing cabinet should be mounted on the desk so as to bring the key about 17 inches from the front edge of the table and about 9 or 10 inches to the left of the center line of the operator's position. Much depends upon the proper arrangement of the transmitter position.

The local battery should be placed in a wood or metal box which will be proof against the accumulation of dust. The box should be located so the maintainers can readily inspect it. It is not good practice to place equipment under a table or desk where an inspector will have difficulty in inspecting or making repairs. Inspectors traveling on local freight trains must make quick inspections at many stations and in order that they may do successful work, the equipment must be arranged with this in mind.

Any part of the equipment which is mounted under the table will receive rough usage, be difficult to repair and will be given half-hearted inspection. The same equipment mounted on the table or wall will be safe and receive full attention. If avoidable, none of the operative equipment should be mounted on walls or partitions subject to vibration due to any cause, as many cases of trouble have been traced to this source.

Test patching panels are required where more than two circuits are used. They may be placed one at each station or at intervals of 20 to 25 miles and intermediate stations arranged by a series of switches to transfer equipment from one circuit to another. The placing of test and patching panels at such intervals avoids cutting the line wires at every station and of course keeps the line in a better physical and transmission condition. Stations intermediate to test stations can be arranged for giving a "short" cutting out or transferring the equipment from one circuit to another and no more can be required.

Every equipment should be provided with a cut-out switch for the purpose of removing it from the line when the station closes and for testing for equipment troubles. Many installations have this switch omitted, using the fuses for that purpose. But the continual handling of the fuses proves more expensive by reason of breakage and wear, than would the original installation of a switch. Cut-out switches, arresters and fuses should be mounted where the attendant can reach them without using a ladder or a chair. The idea of placing any and all equipment in a place easy of access is one which should be encouraged.

I believe there should be absolutely no equipment or apparatus under operators' tables and desks and that selectors should not be mounted in attics and basements with the idea that they are out of the way and that only the bell is needed in the office.

*From Telephony.

Railway Telegraph Superintendents.

At the joint meeting of the Eastern and Western Divisions of the Association of Railway Telegraph Superintendents, held in Chicago, November 20, Mr. J. P. Church, superintendent of telegraph of the Wabash Railroad, Decatur, Ill., asked how to avoid noises in telephones located on the same tables with telegraph sounders. Mr. L. M. Jones, of the Atchison, Topeka and Santa Fe Railway, Topeka, Kan., replied that the practice on his line is to place flexiphones on separate standards or on window casings. Mr. W. E. Harkness, assistant manager of the General Railway Equipment Company, New York, suggested and Mr. U. J. Fry, superintendent of telegraph of the Chicago, Milwaukee and St. Paul Railway, Milwaukee, Wis., explained a plan of inserting a switch on the sounder circuit to cut out the sounder when the telephone is used. Mr. C. S. Rhoads, of the Cleveland, Cincinnati, Chicago and St. Louis Railway, Indianapolis, Ind., stated that this would do only in offices where one operator is employed, and cited an office with twenty sounders and six telephones being worked together without any annoyance to the operators, stating that it was chiefly a matter of the operators becoming accustomed to such conditions.

Mr. Fry suggested the possibility of persons interpolating words in a telephone on a train dispatching circuit which might fit in the wrong place and cause trouble, and that such telephones should be closely guarded; also, in discussing the location of sets dispatchers in one terminal, he thought it dangerous to put more than two dispatchers at work in one room. Dispatchers on the Chicago, Milwaukee and St. Paul line use inverted megaphones on their transmitters.

Mr. F. T. Wilbur, of the Illinois Central Railroad, Chicago, said that booths are installed at some offices on his line to avoid external noises, and at other places where only one operator is employed, a switch is used to cut out the sounder.

Mr. E. E. Backus, of the General Railway Equipment Company, recommended a spring-switch on the transmitter key to cut off the sounder automatically.

Mr. F. H. Van Etten, of the Chicago, Terre Haute and Southern Railroad, Chicago, inquired whether selectors of different types could be worked interchangeably if one or the other type on the same line should become unserviceable. Mr. G. K. Heyer, of the Western Electric Company, New York, said the Western Electric selector would not work as well in conjunction with other styles, and vice versa, but thought they would select though with not so great a margin; also that this might be accomplished by substituting a proper sending key. Mr. W. E. Harkness remarked that an extra dispatcher's sending apparatus probably could be installed to work selectors of the corresponding type. Mr. J. J. Ross of the Michigan Central Railroad, Detroit, Mich., suggested that such arrangements would likely result in multiplying present troubles.

Secretary P. W. Drew announced that the affairs of the Association were in a flourishing condition and that the active membership had increased to about 200.

Western Union, Atlanta, Ga., "Get-Together" Banquet.

The annual "get-together" banquet of the officials and employes of the Western Union Telegraph Company, at Atlanta, Ga., was held in that city Saturday evening, November 23. There were 175 persons present and Mr. B. P. Hancock, division traffic supervisor, acted as toastmaster. He kept the guests in an uproar of laughter with his clever handling of his subjects.

The meeting was a decided success and every one present felt at ease and had an enjoyable time. Remarks were made by Messrs H. C. Worthen, general superintendent; W. G. Peebles, manager; B. F. Ragsdale, chief operator; J. J. Hoefman, division auditor; L. H. Beck, division plant superintendent; J. C. McDowell, division circuit manager; Mr. Satterwhite, of superintendent Scofield's office; Mrs. Runion, Peck Building branch office manager, and several others, all of Atlanta. The address of one of the operators present was listened to with deep interest. He said, among other things:

"We are living in the dawn of the greatest commercial era the world ever saw. We are working for perhaps the most gigantic corporation of this commercial age, and when I note the the efforts of those who are directing the company to better the conditions of their employes, I believe that the day has passed when historians will idolize the masters of carnage and political ascendency alone, but will write into the life of the world the benefactions of such men as Mr. Theo. N. Vail.

"The commercial achievement of furnishing typewriters alone constitutes one of the greatest feats of modern finance. Salaries have been raised from time to time; working conditions have been improved in every possible manner, and as a grand climax, the pension, death and sick benefit policy has been executed, the far-reaching benevolence of which can scarcely be conceived. No civic institution of the state or the nation will surpass it in alleviating pain and care to a greater number of toilers.

"The district and local officials of Atlanta have been untiring in their efforts to advance our interests. It is our duty to stand by those who have thus befriended us."

Mr. W. E. Bayliss, Western Union Telegraph Company, Charlotte, N. C., writes: "I wish to state that I find Telegraph and Telephone Age of great interest and help. I consider it indispensable to one in the profession who desires to keep up to date."

A Real Bird Man's Eye View of Hawthorne Works.

The *Western Electric News* has in its December issue a supplement showing a general view of the Hawthorne works of the Western Electric Company made from an actual aerial photograph taken from an aeroplane.

Five flights were necessary to secure an acceptable picture. The aviator and the photographer rose to a height of 2500 feet and the aeroplane was permitted to glide down to 1000 feet at a speed of 45 miles an hour. Between heights of 1500 and 1000 feet the picture was taken. Experts who have seen the result declare it to be the most remarkable photograph ever taken.

Municipal Electricians.

Mr. J. B. Yeakle, superintendent fire telegraph, Baltimore, Md., was a recent New York visitor on business.

Mr. W. Y. Ellett, superintendent fire telegraph, Elmira, N. Y., was in New York this week attending the funeral of his brother-in-law.

Meeting of Municipal Electricians in Philadelphia.

An informal meeting of the International Association of Municipal Electricians was held at the Electrical Bureau, City Hall, Philadelphia, Monday, December 10. Among those present were president John W. Kelly, Jr., Camden, N. J.; past presidents, James B. Yeakle, Baltimore, Md.; William H. Thompson, Richmond, Va.; H. C. Bundy, Watertown, N. Y.; A. C. Farrand, Atlantic City, N. J.; treasurer, C. E. Diehl, Harrisburg, Pa.; past treasurer, Adam Bosch, Newark, N. J.; Arthur J. Bell, New Rochelle, N. Y.; Oliver M. Schafer, Trenton, N. J.; Robert Stuart, New Brunswick, N. J.; Jay B. Franke, Perth Amboy, N. J.; Clayton W. Pike, Leo D. Firman, Frank Maize, H. M. Voorhis and Price I. Patton, Philadelphia, Pa.; Theodore Torrey and Richard Smith, New York.

The members present discussed some of the proposed topics for the 1913 convention, together with some of the sections of the new constitution and by-laws.

The use of twisted pair telephone wire for fire-alarm use was discussed and it was the consensus of opinion that wire of this kind should never be used for fire-alarm circuits.

A recommendation was made to the executive committee that the dues of the Association be raised to ten dollars per year.

The highest voltages permissible for overhead construction in municipalities came up for discussion and it was decided to have a committee report on the subject at the next convention.

Letters of regret at their inability to be present, were read from Will Y. Ellett, Elmira, N. Y.; John S. Craig, Toronto, Canada, and C. S. Downs, Altoona, Pa.

Electrolysis and joint use of pole lines in cities will also be the subjects of papers and discussions at the next convention which will be held in Watertown, N. Y., in the early fall of 1913. The visitors were entertained at luncheon in Jovian Hall, at the new Bingham Hotel.

In the afternoon a thorough inspection of the Philadelphia Electrical Bureau was made and the members were shown through the City Hall and taken up in the tower, 500 feet above the street.

Mr. Clayton W. Pike, chief of electrical bureau, Philadelphia, was host at a dinner served at the Engineer's Club.

In the evening all attended the "Municipal Night," held by the Philadelphia Section of the American Institute of Electrical Engineers at the Engineer's Club. The following papers were presented, "Electrcity in Municipalities, As Applied to Fire Alarms and Police Signals," by John W. Kelly, Jr., president International Association of Municipal Electricians, and chief of electrical bureau, Camden, N. J.; "The Trend of Improvements in Fire Alarm Systems," by Clayton W. Pike, chief of electrical bureau, Philadelphia, Pa.; "Automatic and Manual Fire Alarm Systems under Central Station Supervision (not Municipal)," by Washington Devereux, chief electrical inspector, Philadelphia Board of Fire Underwriters. These papers were discussed by James B. Yeakle. superintendent fire alarm telegraph, Baltimore, Md.; C. E. Diehl, superintendent fire alarm and police telegraph, Harrisburg, Pa.; Leo D. Firman, electrical bureau, Philadelphia, and others.

After the discussion, an elaborate demonstration was made of fire alarm boxes, auxiliary outfits, drill boxes, thermostats, punching registers, time stamps, etc. Three circuits had been run to the City Hall and alarms were sent in on a street box circuit and sent out on a joker and also on a gong circuit. President Kelly presented a "rapid fire" fire alarm box, register and gong, which, when the box was pulled, sent in its four rounds, which were punched in the register tape, time stamped and struck on the gong in twenty-seconds for the complete operation of the four rounds.

The day's proceedings were so interesting and successful that several of the members requested President Kelly to arrange for similar meetings in other cities.

Maver's American Telegraphy.

We call attention to the advertisement in another column of the publisher's offer to sell the new edition of Maver's American Telegraphy and encyclopedia of the Telegraph. The latest edition of this work is probably the most complete text-book on telegraphy which has ever been written. Among the important additions to the work in this edition are descriptions of the Barclay and the Murray printers, the latest arrangements of the Western Union and the Postal quadruplex systems, etc. This book is a library on telegraphy, simultaneous telegraphy and telephony, on wire and cable testing, etc. It is used as a text-book and a book of reference in many of the largest universities, and the large telegraph and telephone offices in this country. It contains within its covers a complete elementary treatise on electricity and magnetism, primary and storage batteries, line construction, etc. The beginner may successfully peruse his studies of these subjects by means of this book without reference to any other work. This statement is attested by many successful telegraph and telephone engineers who gratefully term the book their Alma Mater. The book is written in simple English, and is practically without mathematics. No aspiring student in the telegraph or telephone ranks can afford to be without it. This fine work will be sent to any address, carrying charges prepaid, on receipt of price, $5.00, by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Western Union Bridge Duplex.

(*Continued from page* 802, *December* 1.)

By the same arrangement of bridge arms and other connections already described this artificial line at each station permits signals to be sent out from that station without affecting the relay there. In the double-current system, however, the artificial line does not, as in the single-current system, prevent any flow of current through the relay at that station when the distant key is in the spacing position. This will become evident when it is remembered that in the single-current system, the spacing position of the key connected the circuit to ground and removed the source of current, while in the double-current system the spacing position of the key connects the circuit to a source of current equal to that used for the marking signal, but opposite in direction. The function of the artificial line in this case, therefore, is to prevent the operation of the key at the same station causing any alteration in the amount or direction of the current in the relay. How it accomplishes this may be understood by an examination of Figs. 6, 7, 8 and 9. These theoretical diagrams show a simplified double-current bridge duplex circuit connecting two cities named Nevada and Wyoming.

Fig. 6 shows the conditions existing when the key is in the spacing position at Nevada, thus sending out a positive current from the generator D_2; at Wyoming the key is closed for sending a marking signal, thus connecting the circuit to the negative generator at that point. Current flows, therefore, over the circuit from Nevada to Wyoming, and divides among the branches at each end as per the diagram. It will be seen that the polar relay at each station is operated by a current of 14 milliamperes; at Nevada this current flows upward from U to T in a marking direction through the polar relay coils, thus producing a marking signal in response to the "closed" key at Wyoming; while at Wyoming the current through the polar relay is downward from V to W, in a spacing direction through the coils, and its armature is thus thrown into the spacing position to correspond with the "open" key at Nevada.

If the key at Nevada is depressed to send out a marking signal, as shown in Fig. 7, no current will flow over the line wire ML; as both ends of the circuit are connected to generators of the same polarity and potential (160 volts negative), there is the same tendency for current to flow from the point T as from the point V, and because these tendencies counterbalance each other, no current flows between the points mentioned. A current of fourteen milliamperes, however, flows through the polar relay at each station, in the upward or "marking" direction. Each relay is therefore responding to the signal being sent on the distant key, although the current passing through each relay comes entirely from a generator at its own station; for a change in the position of the key at either station will reverse the current through the relay at the distant station,

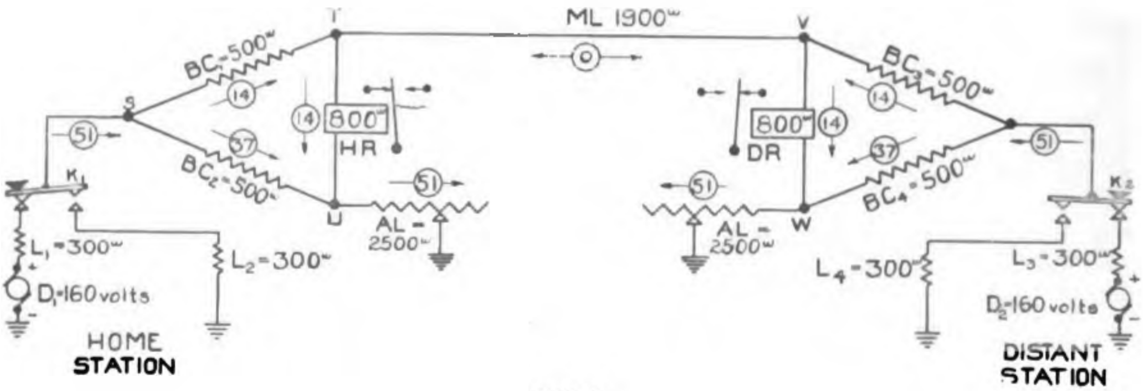

FIG. 5.

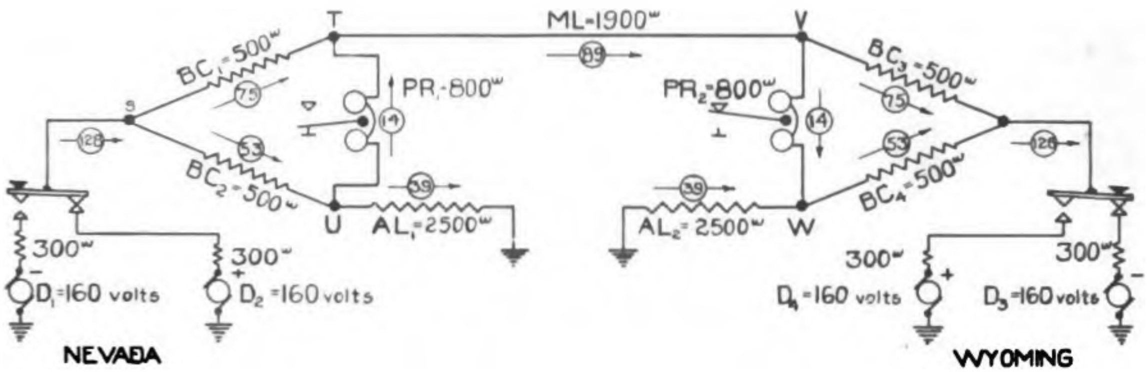

FIG. 6.

bringing about the conditions shown either in Fig. 6 or Fig. 8.

Suppose the operator at Wyoming "opens" his key, i. e., releases it to the spacing position. This connects his end of the circuit to the positive downward from point T or point V, thus keeping its armature in the spacing position.

In the above descriptions and explanations, only the fundamental principles of the bridge duplex circuit have been considered. Numerous

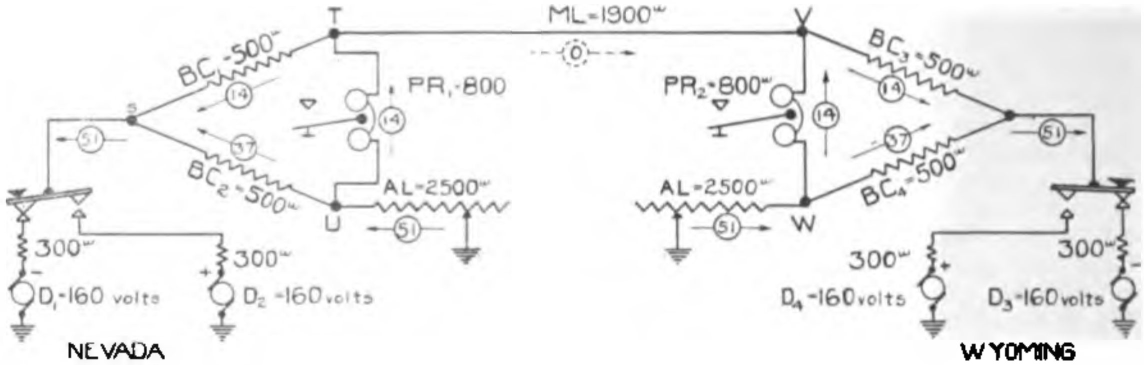

FIG. 7.

generator D, and current flows over the line from Wyoming to Nevada. This results, as shown in Fig. 8, in reversing the current through the polar relay at Nevada, throwing its armature to the features, which are necessary to obtain the best results in practice, are outlined in the drawings accompanying these specifications, and most of them are referred to in detail under the headings

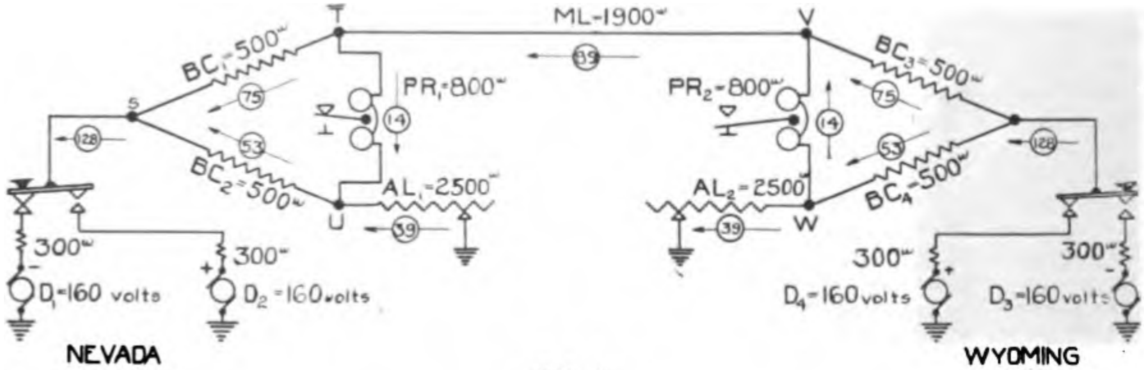

FIG. 8.

spacing position. The polar relay at Wyoming is, of course, unaffected, and continues to give a marking signal in response to the depressed key at Nevada.

In Fig. 9 is shown the current distribution when "Installation" and "Operation." The following explanations of the most important of these additional features will, however, assist in reaching a thorough understanding of the duplex.

Artificial Line. So far it has been assumed

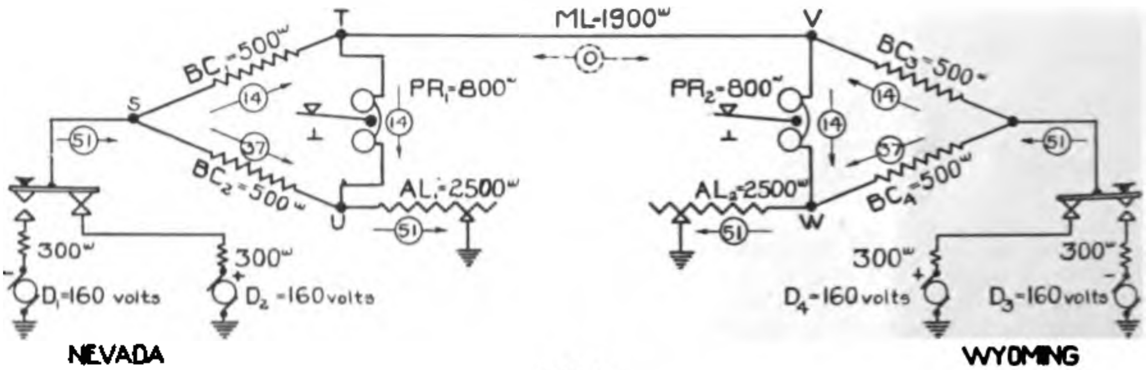

FIG. 9.

the keys at both stations are in the spacing position. The conditions then differ from those shown in Fig. 7 only in the direction of the current through the various branches. The relay at each station is operated by a current flowing that it is merely necessary for the artificial line at each station to have a resistance equal to that of the main line plus the apparatus at the distant station. This is seldom, if ever, the whole truth. Every line wire, in addition to its current-carrying qualities, is able to hold upon itself a quantity of electricity in the form of a stationary electric charge. This quality is known as the electrostatic capacity of the wire, and manifests itself by a tendency to delay the travel of the current over of each negative current the same quantity of electricity rushes out of the wire. These charging and discharging effects must be reproduced in the artificial line, so as to resemble as nearly as possible those occurring in the main line as

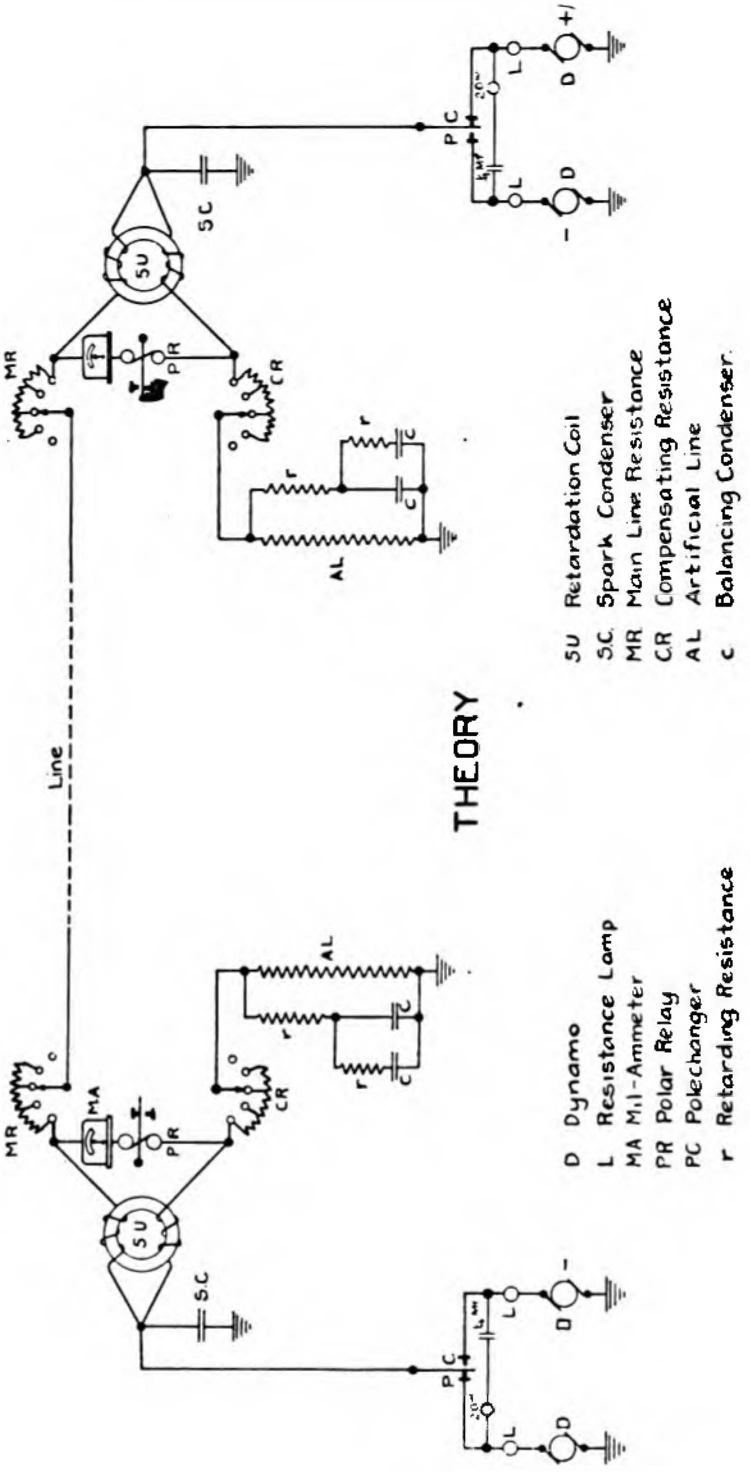

FIG. 10.—DIAGRAM SHOWING THE THEORY OF THE DUPLEX.

the wire, because the wire must become fully charged with electricity before the full strength of the current can reach the distant end. It also permits a rush of electricity into the wire at the beginning of each positive current to assist in the charging mentioned above, and at the beginning described. This is accomplished by the addition of adjustable condensers to each artificial line, by means of which the latter can be given an electrostatic capacity corresponding to that of the main line.

(*To be continued.*)

Telegraph and Telephone Age Subscription Contest.

Sixty dollars in cash prizes is to be distributed by TELEGRAPH AND TELEPHONE AGE to those of its regularly appointed agents who send in the greatest number of new subscriptions and renewals during the months of November, December and January. The prizes are as follows: First, $25; second, $15; third, $10; fourth and fifth, $5 each.

This contest is limited to new subscriptions and renewals only and does not include orders for books or merchandise.

Remember two things: (1) This is a circulation contest; and (2) you have as good a chance as the next fellow to win the $25 prize, or one of the other prizes. Recently the head of a business house was asked about success: "I'll tell you, young man," he replied, "the average fellow is lazy, and if you make yourself an exception to this rule, you will succeed."

The contest to date stands as follows:

H. H. Dengler, Postal, Chicago, $55.00; Miss G. G. Amber, Western Union, Philadelphia, $37.50; C. F. Bartlett, Postal, St. Louis, $27.75; W. C. Hair, Western Union, Atlanta, $17.75; Miss M. Wright, Western Union, Chicago, $10.00; C. W. Alexander, Western Union, Kansas City, $9.75; P. G. Galbraith, Canadian Pacific Railway Telegraph, Toronto, Ont., $8.00; A. E. Krumling, Western Union, Toledo, $7.50; W. E. Brooks, Western Union, Portland, Ore., $6.90; Chas. Vollertsen, Western Union, El Paso, $6.00; R. J. Ramsey, Michigan Central Railroad, Jackson, Mich., $6.00; D. F. Brown, Western Union, Washington, D. C., $6.00; R. W. Wells, Western Union, San Francisco, $6.00.

Write to J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, for more particulars.

Mr. J. H. Gates, manager of the Western Union Telegraph Company, Davenport, Iowa, in renewing his subscription, writes: "I appreciate your keeping me in line and trust that my subscription may never be allowed to lapse. The AGE is one of the necessities of life."

Institute of Radio Engineering.

The final meeting for the year of the Institute of Radio Engineers, New York, was held at Columbia University, Wednesday evening, December 4. Mr. E. J. Simon read a communication from Dr. G. Seibt describing in detail the latter's new direct reading wavemeter, and added some interesting data from his own experiences with the instrument. One of the meters was shown. The editor of publications announced the issue of a new pamphlet containing the constitution and a directory of members. The next meeting will be held January 8, 1913, at which the results of election of officers will be announced.

LETTERS FROM OUR AGENTS.

NEW YORK WESTERN UNION.

Senator W. L. Ives, of New York, the veteran old timer and military telegrapher, suffered a stroke of paralysis, while at his desk on the afternoon of December 2. He is confined to his home in Brooklyn. His right side is paralyzed, but he is apparently recovering from the shock.

WASHINGTON, D. C., WESTERN UNION.

James M. Darley, who was employed in this office for a number of years, died December 7. He was a first-class operator, and was a train dispatcher in the Pennsylvania Railroad office in this city before coming to the Western Union. Several members of the operating department attended the funeral. The pall bearers from the office were Messrs. Wm. H. Kimball and Henry Pfaff.

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 employe. 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 employes not otherwise provided with adequate life protection.

TELEGRAPHERS OF TO-DAY.

"Telegraphers of To-Day," illustrating the personnel of the telegraphic profession as it existed in 1894, with more than 900 biographical and historical sketches of leading members of the craft, is a unique and valuable publication; it has become standard, being the only work of the kind extant. It contains 354 double-column pages, 7 x 11 inches in size, has gilt edges and is bound in imitation morocco — altogether a handsome volume.

Of this fine publication, becoming more and more valuable as time passes, we have but a few copies left. The original price was $5. In order to readily dispose of these remaining volumes, and place them where they rightfully belong, in the hands of every telegrapher who failed to secure a copy at the higher original price, we have cut the figure to $1 a volume. On receipt of this amount the book will be sent to any address, express charges to be paid by the purchaser. At this low rate, a sum below the cost of binding the book even, no telegrapher who desires to own a copy should fail to obtain one at this time, for this "bargain" price can never be repeated, as the book will soon be out of print. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Any electrical or telegraph book published, for sale by Telegraph and Telephone Age, 253 Broadway, N. Y.

Maver and Davis' Quadruplex.

"The Quadruplex," by William Maver, Jr., and Minor M. Davis, is, without doubt, the best book on this subject which has ever been produced. Being written by two operators who made an exhaustive study of quadruplex apparatus, both from the theoretical and the practical standpoint, it is strictly accurate in its details as well as being written in language which is comprehensible to any operator. Among other points which the book contains are: a chapter upon the development of the quadruplex, beginning with Edison's device of 1874; a chapter explaining the fundamental principles upon which the operation of the quadruplex depends; descriptions of transmitters, rheostats and condensers used; full explanations of the operation of the Stearns and polar duplex systems; the modifications of the duplex principles which enter into quadruplex working; the relation of the dynamo to the quadruplex system; hints regarding the care and operation of the apparatus; a chapter upon the various types of repeaters and a description of the Wheatstone automatic telegraph system. The 128 pages of this book are brimful of valuable information for the practical telegraph operator or engineer. It contains sixty-three illustrations which enable the reader to see at a glance the application of the matter set forth in the text. The price of this valuable work is $1.50, carrying charges prepaid, and orders should be addressed to J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, N. Y.


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